



the **18th** INTERNATIONAL CONFERENCE
**LIFE SCIENCES FOR
SUSTAINABLE DEVELOPMENT**
26th - 28th September 2019, Cluj-Napoca, Romania

**BOOK OF
ABSTRACTS**

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IMPRESSUM

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26th – 28th of September 2019
Cluj-Napoca, Romania

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WELCOME MESSAGE

We are pleased to welcome you at the University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, Romania to share our scientific performance and progress during this special scientific event.

The University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca, classified in the first category of “advanced research” universities of Romania, place also confirmed by the European University Association (EUA). The University becomes nowadays one of the most prestigious academic institutions from Romania.

The 18th International Conference ”Life Sciences for Sustainable Development” is a dynamic forum of exchanges for scientific experiences, innovative ideas and concepts, future prospects in agriculture, plant and animal science, food science and technology, biotechnology, veterinary medicine, as well in other interdisciplinary and transdisciplinary areas.

The 18th International Conference ”Life Sciences for Sustainable Development” includes invited conferences, presented by known international and national personalities, oral and poster presentations, where recent advanced scientific and technical results can be seen, especially now, in the context of the new European Research Program “Horizon 2020” and of the national Research – Technological Development and Innovation Program, related to Life Sciences.

The conference programme will consist of ten main sessions:

1. Agriculture
2. Environmental Protection
3. Food Science and Technology
4. Horticulture and Forestry
5. Economics and Rural Development
6. Animal Science
7. Biotechnology
8. Veterinary Medicine - Fundamental and preclinical sciences
9. Veterinary Medicine - Clinical sciences
10. Geodesy, Geomatics and Property Valuation

The participants registered to our conference have the opportunity not only to present their results, published as summary in the “Book of Abstracts” but also to publish in extenso their contributions. The oral presentations, after a previous peer review process, can be published in the journal Bulletin of UASVM-CN – Agriculture, Horticulture, Animal Science-Biotechnology, Veterinary Medicine and Food Science and Technology.

This proceedings’ “Book of Abstracts” contain abstracts submitted by participants from different countries. We wish to thank all participants and organizers for making this meeting possible. We do hope that you will find during the 18th International Conference an interesting program and a great opportunity to interact with colleagues and friends from Romania.

With best wishes,

Prof. Cornel CĂTOI, PhD
Rector

Prof. Dan C. VODNAR, PhD
Vice-rector for Research

ANNOTATION

**The abstracts and contact information are submitted by the main authors.
Each author explicitly confirms that the abstract meets the ethical standards for authors
and coauthors.**

CONFERENCE PROGRAMME

Thursday, 26 th September 2019		
08:00-13:30	Registration of participants	Aula Magna "Mihai Şerban", UASMV Cluj-Napoca
08:00-13:30	Poster Display	Life Sciences Institute / ICHAT Building/ Red Amphitheater, Library Building
09:00-10:45	Doctor Honoris Causa Award Ceremony Adrian CURAJ, România Valeriu TABĂRĂ, România	Aula Magna "Mihai Şerban"
10:45-11:00	<i>Coffee break - Aula Magna "Mihai Şerban"</i>	
10:45 - 11:00	Book release - <i>Caiet Documentar 4 Agricultura. Concepte si instrumente operationale.</i> Marius Stoian și Mihai Aniței	Hall Library Building
11:00-11:10	Opening ceremony Rector, Cornel CĂTOI Vice-Rector, Dan C. VODNAR	Aula Magna "Mihai Şerban", first floor
11:10-13:15	Plenary Session - Aula Magna "Mihai Serban" Chairman: Francisco FUENTES Co-chair: Dan C. VODNAR	
11:10-11:35	ENZYME BIOTECHNOLOGY FOR FOOD PROCESSING: AN INVENTORY OF CURRENT AND POTENTIAL APPLICATIONS	KATIA LIBURDI, ITALY
11:35-12:00	DIFFERENTIAL SPLICING: AN EFFECTIVE WAY TO EXPAND MOLECULAR DIVERSITY OF CASEINS AND THEIR ABILITY TO GENERATE BIOACTIVE PEPTIDES	PATRICE MARTIN, FRANCE
12:00-12:25	BIOTECHNOLOGY RESEARCH IN KURDISTAN REGION - IRAQ	JALADET M. S. JUBRAEL AL-SOFI, IRAQ
12:25-12:50	FOOD ANALYSIS BY USING ION CHROMATOGRAPHY. STATE OF THE ART	RAJMUND MICHALSKI, POLAND
12:50-13:15	BIOTECHNOLOGY FOR PLANT GENETIC RESOURCE CONSERVATION: AN OVERVIEW OF <i>IN VITRO</i> -BANKING AND CRYOBANKING IN THE WORLD	MAURIZIO LAMBARDI, ITALY
13:15-15:00	<i>Lunch – Biodiversity Research Center</i>	
15:00-18:00	Oral Sessions (sessions I-X) - For more details, please see the program	
19:00-24:00	<i>Gala Dinner – Wonderland Cluj Resort Restaurant</i>	
Friday, 27 th September 2019		
09:00-10:00	Poster Presentation and Evaluation	Life Sciences Institute / ICHAT Building / Red Amphitheater, Library Building
10:00-13:30	Oral Sessions (sessions I-X) - For more details, please see the program	
13:30-13:50	Closing ceremony and Best Poster Awards	Aula Magna "Mihai Serban"
13:50- 15:00	<i>Lunch – Biodiversity Research Center</i>	
Saturday, 28 th September 2019		
08:00-20:00	Post - conference trip (optional) Route: Cluj –Medias –Alma Vii –Sighisoara –Cluj	

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ORAL PRESENTATIONS

SESSION 1: AGRICULTURE

BIOTECHNOLOGY RESEARCH IN KURDISTAN REGION - IRAQ

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Introduction: In 2006 the Scientific Research Center (SRC) at Duhok University was the first research center to be established in Kurdistan mainly devoted to biotechnology research and its potential applications.

Aims: The aim was to provide researchers with the necessary equipment and technologies to promote academic research at our University and other Kurdistan region Universities. Training students on medical, microbial, plant and animal biotechnology through M. Sc. and Ph. D. projects. Furthermore, this center was engaged in organizing training courses, Workshops and international scientific conferences.

Materials and Methods: To start, 4 main research programs were developed, the medical biotechnology program was planned for detection of gene mutations associated with hematological diseases (Thalassemia, sickle cell anemia etc.) that are of main interest in the health care system in this region.

Results: The work in molecular microbiology program involves phenotypic identification and genotyping of pathogenic microorganisms common in hospitals and food, detection of virulence genes, in house DNA Sequencing and development of phylogenetic relationships to trace locally distributed microorganisms. In plant biotechnology program, research activities include variety and cultivars identification and *in vitro* propagation of economically important plants (apple, prunus spp.) for both the introduced and land races in the region. This program also runs DNA sequencing research for gene variation within large genomic datasets. This program has recently initiated gene cloning experiments to pave the way for isolation and study of disease resistant genes. The main objective of setting up animal biotechnology program was to establish and design new tissue culture cells from different animal sources for different application and for banking. Molecular identification of different animal meat was aimed for boarder quality control purposes.

Conclusions: The overall achievements at this research center from its establishment may summarized as follows; more than 100 published articles, 60 M. Sc. and Ph. D. graduates from Duhok, other Kurdistan and Iraqi universities, more than 30 training and Workshops in different application of biotechnology, and five successful international Conferences. Since its early development, SRC has become and still represents the focal point for biotechnology research activities in Kurdistan universities and other scientific research institutes including a large number of hospitals, Clinical Labs and Agricultural Directorates etc.

Keywords: *DNA, cultivar, microbiology, research programs.*

USING SOIL AND FOLIAR APPLICATIONS OF SOME FERTILIZERS TO IMPROVE YIELD AND QUALITY PARAMETERS OF TABLE GRAPES

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Introduction: Grapes production contributes to about 16% of the total fruit production. In 2017, grape production was estimated to be 73.3 millions of tons (OIV, 2018). Deficient any nutrient or more of macro and micronutrients to a particular crop is becoming the limiting factor for the growth and yield (Mengel and Kirkby, 2001; Rawashdeh and Sala, 2016).

Aims: The aims of this study the effect of soil and foliar application of some fertilizers on yield and quality of table grapes.

Materials and Methods: The experiment was carried out on *Vitis vinifera* L. cv. grown in a private grape farm. Grape trees were subjected to seven treatments (3 as soil and 4 as foliar application) along with control treatment. Soil treatments were applied as exclusively Calcium (T2), Potassium (T3), and Nitrogen (T4) at the rate 200 g tree⁻¹, 150 g tree⁻¹ and 200 g tree⁻¹ respectively. Foliar treatments were applied as solely Calcium (T5), grow more^{INC} fertilizer contains (total N = 20%, P₂O₅ = 20%, K₂O = 20%, B = 0.02%, Cu = 0.05%, Fe = 0.1%, Mn = 0.05%, Zn = 0.05%) was applied in (T6), Potassium (T7), and Cupper (T8) as form Cu- EDTA (12% Cu) at rate 30 g L⁻¹, 10 g L⁻¹, 20 g L⁻¹ and 0.5 g L⁻¹ respectively. The experiment was laid out in a randomized completely block design (RCBD) with five replications and eight treatments.

Results: Results indicate that soil and foliar fertilizers application increases quantity and improved quantity of table grapes compared to control. The highest berry diameter, weight of 100 berries and size of 100 berries were obtained in trees that were treated with 200 g tree⁻¹ Ca in soil application method. The maximum fruit yield was found in trees that were treated with 150 g K in soil application method.

Conclusion: it can be concluded that foliar application of potassium significantly increased berry firmness (T7). Also soil application of Nitrogen, potassium and Calcium significantly increased cluster weight, weight of 100 berries, berry diameter, size of 100 berries and yield per vine. The highest yield vine⁻¹ was obtained from soil application of potassium (T3). The control treatment (T1) gave the lowest values of all studied parameters.

Keywords: *foliar fertilizer, grape, Macronutrient, Micronutrient, soil fertilizer*

References

1. OIV (2018) World Vitiviculture Situation, OIV Statistical Report on World Vitiviculture, International Organization of Vine and Wine, viewed 28 February 2017, available on line at <http://www.oiv.int>
2. Rawashdeh H. and Sala F. (2016). The effect of iron and boron foliar fertilization on yield and yield components of wheat. *Romanian Agricultural Research*, 33: 241-249/

EFFECT OF EARLY WEANING AND CO-FEEDING IN BURBOT LARVICULTURE

Jurgen ADRIAEN*, Joachim CLAEYÉ, THOMAS ABEEL, Wouter MEEUS,
Heidi ARNOUITS, Stef AERTS

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Introduction: Burbot (*Lota lota*) is a cold water fish species that has already shown its potential for aquaculture. However the long Artemia feeding-period during larval stage is an impediment for further development of burbot aquaculture as it makes the activity laborious and more expensive. A new commercial feed was given within an adapted feeding technique to assure feed availability in the water column.

Aims: This study wants to investigate the possibility of earlier weaning in burbot and the difference between co-feeding and direct weaning during larval production.

Materials and Methods: Burbot larvae of 50 days after hatching (DAH50) were stocked at random at a density of 37.5 larvae per liter over twelve experimental eight liter zugler-bottles connected to a recirculating aquaculture system. Four weaning protocols were applied in triplicate. At the start of the trial all larvae were fed with enriched Artemia instar II. For three treatments (DW55, DW63, DW70) Artemia feeding was stopped immediately on respectively DAH55, DAH63 and DAH70 and larvae were given artificial larval feed (Otohime, 250-360µm). For treatment CF63 Artemia gift was reduced to the half while the other half of the daily feed ratio consisted out of artificial dry feed and this from DAH63 on till DAH70 when full feed ratio only consisted out of artificial dry feed. Water temperature was maintained around 16°C during experimental rearing and this under constant light conditions. Fifteen larvae per bottle were collected on four specific dates during the trial to measure length, wet and dry weight. Mortality was recorded every day.

Results: Longer Artemia feeding period resulted in larger larvae. Survival rate was above 70% for CF63, DW63 and DW70, while this was much lower for DW55 (52%).

Conclusion: The small differences found between treatments with and without co-feeding shows that earlier weaning without co-feeding could be possible and may be economically interesting. This study also indicates that working with feed that is made available in the water column and not only on the surface improves production parameters in burbot larviculture.

Keywords: *Burbot, larvae, Lota lota, weaning*

INSIGHT INTO FOOD SAFETY RISK ASSESSMENT TRAINING AT THE UNIVERSITY OF SEVILLE UNDER EFSA'S EUROPEAN FOOD RISK ASSESSMENT FELLOWSHIP (EU-FORA)

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Introduction: The European Food Risk Assessment Fellowship (EU-FORA) was created by the European Food Safety Authority (EFSA) to build a European community of expert risk assessors. It is targeted at scientists with less than 15 years of professional experience and offers dedicated training and hands-on experience in risk assessment. Each of the 15 fellows was enrolled in a 12-month individual training programme at a hosting site outside their home country. The programme developed by the Department of Nutrition and Bromatology, Toxicology and Legal Medicine (DNBTLM) Faculty of Pharmacy, Universidad de Sevilla had a fellow coming from the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca as sending organisation, offering complementary skills for risk assessment.

Aims: The aim of the programme was to train the fellow in EFSA's risk assessment methodologies and guidelines in the field of contaminants, food contact materials, technological ingredients and nutritional risks.

Materials and Methods: The programme was developed from EFSA's methodologies and guidelines and adapted to the expertise of the team at DNBTLM. The objectives of the training were considered in relation to the 2 groups at DNBTLM: Area of Toxicology and Area of Nutrition and Food Science. The activities were grouped in 4 modules based on intended outcomes. A "learning by doing" approach was the basis for all the modules.

Results: Module 1 was an insight into chemical risk assessment while the hands-on activities were 3 case-studies: an exercise on an official opinion; working in a team to produce a new opinion; an individual work on food contact materials. Module 2 was a training in experimental toxicology. The fellow joined the team on cyanotoxins, gained experience with EFSA and Organization of Economic Cooperation and Development (OECD) guidelines on genotoxicity. In module 3 the fellow was trained in nutritional risk assessment and worked on bioactive compounds to assess nutritional and health claims. Module 4 was on scientific risk communication related to the presentation of the scientific outcomes of the 3 modules.

Conclusion: The training was successful in offering first-hand practical experience in risk assessment in a multicultural and interdisciplinary context, contributed to building a European risk assessment capacity.

Keywords: *toxicology; cyanotoxins; nutrition; bioactive compounds; health claims.*

Acknowledgments: Giorgiana M. Cătunescu wishes to gratefully acknowledge EFSA funding under the EU-FORA Programme for her contribution to the present work

IMPROVEMENT OF THE WATER MANAGEMENT IN THE SOIL BY APPLYING THE NO TILLAGE SYSTEM AT THE WINTER WHEAT, AT ARDS TURDA

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Introduction: In the last years there have been growing drought problems, so it is necessary to conserve water in the soil, and the choice of the range of equipment and technologies has the most important role.

Aims: The purpose of the research made is the study, under the pedoclimate conditions from the Turda area, of the influence of the soil tillage system on the accumulation and preserve of water in the soil and of winter wheat yield.

Materials and Methods: These researches were carried out in a bi-factorial experiment, during the period 2012-2018, the experimental field being included in a three-year crop rotation: soybean - winter wheat - maize. The experimental factors were: **A - soil working system:** a₁ classic; a₂ no-tillage; **B - the agricultural year**, characterized by different climatic conditions: b₁- 2012; b₂- 2013; b₃- 2014, b₄- 2015, b₅- 2016, b₆- 2017, b₇- 2018.

Results: In this area, the soil tillage systems had a rather small impact on the formation of winter wheat yields. In the classic system a reserve of accessible water is better preserved during the spring period, this being assumed to be due to a better infiltration into the soil of winter precipitation. In the conservative system, generally restoring the ground water reserve is made more difficult than in the CS but the loss of water in the CS is just as fast.

Conclusion: A stress factor that affects the yield is represented by the heat during a period the end of May - the end of June, in the Turda area. In the NT, the available water reserve is kept better in the soil even during drought, the depth water rises through capillaries to the radicular area compensating the lack of water due to drought. In general, the yield achieved in the two soil systems had very close values, the differences being 7-67 kg/ha.

Key words: *clime, no tillage, winter wheat, water reserve, yields.*

Acknowledgements: This work was supported by a grant of the Romanian Ministry of Research and Innovation, CCCDI- UEFISCDI, PN-III-P1-1.2-PCCDI-2017-0056, *Functional collaboration model between public research organizations and the economic environment for the provision of high-level scientific and technological services in the field of bio economy, within PNCDI III.*

REGARDING THE REGENERATION CAPACITY OF THE POLLUTED SOILS WITH PETROLEUM PRODUCTS

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Introduction: Industrial technologies are diversifying, the process equipment used is becoming more precise and sophisticated, and the environmental protection procedures come to ensure the preservation of the regional ecological balance.

Aims: To plan the cleaning of polluted sites by developing model solutions using depollution and fertilisation technologies.

Materials and Methods: historical polluted industrial sites with petroleum products from Maramures County

Results: The paper presents results from field work, investigation work of polluted sites with oil products in the Romania-Ukraine cross-border area. Based on the obtained results, differentiated regeneration plans were proposed for these sites, respectively ecological regeneration plans for lightly polluted, medium and intensely polluted industrial sites with petroleum products.

Conclusion: In conclusion, it is shown that the exploitation of natural resources must be permanently correlated with measures and works of environmental protection, considered as an inseparable part of global, regional and local strategies of sustainable development.

Keywords: *contaminated soils, regeneration, sustainable development.*

IRIS PSEUDACORUS L. ONE YEAR FOLLOW-UP A.M. INOCULATION AND PLANTING IN FIELD

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Introduction: *Iris pseudacorus* is a common ornamental macrophyte, widely researched for its phytoremediation capacity (Parzych *et al.*, 2016). In addition, this species has other potential applications: seeds can serve as coffee substitute while flowers and rhizomes are sources of natural dyes. Although recognized as toxic plant, was used in past centuries to treat dropsy.

Aim: Aim of this study was to monitor the development of *Iris pseudacorus* plants after transplanting in field and asses frequency of root colonization by main categories of micromycetes in local conditions.

Material and Methods: Plants grown in pots in two types of commercial substrates and subject to application of bioproducts with A.M. were transplanted in field plot from Agro-Botanical Garden UASVM Cluj-Napoca in randomized blocks with three replicates. Were conducted plant morphometric measurements for two vegetative seasons and stained root samples were assessed for presence of root fungal colonization.

Results: Second season after planting in field (May 2019) flowering percentage exceeded 60%, while average flower stem length had 83.52 cm with a range of variability of 20.22 cm. Average plant height in second season was 84.91 cm. Average number of shoots per plant was 6.01 and average number of leaves per plant 32.97. Between the end of first vegetation season (October 2018) and until post-anthesis in second season (June 2019) on average the plants tripled the number of leaves per plant and doubled their height.

Conclusion: Previous studies proved that *Iris pseudacorus* is suitable bioindicator plant for heavy metals. Thus, studies on phenology, biological characteristics and endomycorrhizal dynamics in local conditions come to fundament the perspective of their application for decontamination.

Key words: *fungal endophytes, macrophyte, rhizosphere.*

References

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RESEARCH REGARDING DRIFT REDUCTION OF PHYTOSANITARY MACHINES USED IN ORCHARDS AND VINEYARDS

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Introduction: The primary objective of the experiment was to investigate drift reduction of machines used for phytosanitary treatments in orchards and vineyards, especially on special ceramic nozzles tested against traditional nozzles used by farmers.

Aim: To achieve the primary objective, a comparison was made using a vineyard and orchard sprayer and a software that determines the degree of coverage using image analysis.

Material and Methods: The experiment was conducted in the University of Agriculture and Veterinary, at the Department of Technical Sciences and Soil Sciences.

Results: Collected samples from the study were individually assessed for percent coverage

Conclusion: The software application called SnapCard was used.

Key words: *nozzle, objective, SnapCard.vineyard.*

SUSTAINABILITY ASSESSMENT OF A ROMANIAN AGROFORESTRY SYSTEM USING EMERGY EVALUATION

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Introduction: Even if agroforestry systems are not recognized officially in Romania, this kind of agroecosystem are widely spread in Romania, especially in the centre and North part of the country as a historical land use practice.

Aim: Resource use and environmental impacts of an agroforestry system from Petrova village, Romania was assessed using emergy evaluation. This is a widely used method to analyse energy efficiency and sustainability of complex systems by expressing and accounting different forms of energy on a common physical basis.

Material and Methods: The system consisted of a farm with silvopastoral livestock system with wooded semi-natural grasslands (94 ha). The on-farm resource use production and economic inputs of different types like sunlight, fuel, machinery, and human labour and economic services have been converted into a common unit of solar equivalent Joules (seJ).

Results: After accounting emergy in the system we used emergy indices to interpret in terms of ecological and economic efficiencies as indices of sustainability.

Conclusion: Emergy-based indices calculated in this study are: output (Y), total emergy use (U), solar transformity (U/Y), fraction of local renewable resource use, emergy yield ratio (EYR), environmental loading ratio (ELR), and emergy sustainability index (ESI). The obtained values showed us that the manner in which this farm is using its resources does not affect their sustainability.

Key words: *Emergy evaluation, sustainability, agroforestry, integrated farming.*

DIVERSITY OF THE GENOTYPES OF *ORIGANUM VULGARE* SSP. *VULGARE* L. AND *ORIGANUM VULGARE* SSP. *HIRTUM* IETSW

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Introduction: The *Origanum vulgare* ssp. *vulgare* L. is attested in the spontaneous flora of Moldova, but both subspecies *O. vulgare* ssp. *vulgare* L. and *O. vulgare* ssp. *hirtum* Ietsw. are cultivated in the country. The researches were carried out in order to elucidate the biochemical composition of different genotypes and *O. vulgare* ssp. *vulgare* and *O. vulgare* ssp. *hirtum*. The results could be used to create new varieties with a specific biochemical composition. The earlier investigations have showed phenotypic diversity of genotypes of both subspecies.

Materials and Methods: *O. vulgare* ssp. *vulgare* and *O. vulgare* ssp. *hirtum* genotypes. The essential oil was isolated by hydrodistillation and was recalculated per dry matter. Qualitative and quantitative analyses of the essential oil were conducted using GC-MS.

Results: Content of the essential oil in the *O. vulgare* ssp. *vulgare* genotypes varies from 0.077% to 0.360%. Content of essential oil in *O. vulgare* ssp. *hirtum* genotypes are 2.315–4.923%. In the essential oil has been identified from 17 to 28 compounds depending on the genotype. The essential oil of the ssp. *hirtum* genotypes content 18–25 compounds. The identification rate making 98.09% to 98.80%. The concentration of the components identified in the essential oil is also different in all the genotypes of the both subspecies. The major components in the essential oil of ssp. *hirtum* genotypes are carvacrol (74.63–88.13%), γ -terpinene (3.59–10.69%), p-cymene (2.23–5.06%). The ssp. *hirtum* genotypes divided into three chemotypes. The essential oil of the *O. vulgare* ssp. *vulgare* genotypes contains four major components: D-germacrene (26.01–33.98%); β -caryophyllene (12.16–33.16%), γ -elemene (3.82–16.79%). Another component in the essential oil this subspecies – (+) β -bisabolene was certified in concentrations from 0 to 16.4%. The *O. vulgare* ssp. *vulgare* genotypes divided into three chemotypes.

Conclusion *O. vulgare* ssp. *vulgare* and ssp. *hirtum* genotypes with higher content of essential oil are perspective for creating new varieties

Key words: *Origanum vulgare*, essential oil.

DETERMINATION OF SOME BIOMETRIC INDICES FOR *OCIMUM BASILICUM* L.

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Introduction: The production and capitalization of medicinal and aromatic plants in the organic farming system represents an alternative to the conventional agricultural production system, by promoting non-polluting agricultural technologies, which exclude synthetic chemicals. The name of basil (aromatic plant) comes from Greek, *basileus* means "king". Basil is an annual, cold-sensitive plant that reaches heights of about 40 cm. Its sharp stems and soft leaves are very aromatic and covered with lyme grass. The parts that are used for medicinal purposes are stems, flowers and leaves from which are prepared infusions, decoctions, tinctures and various ointments with miraculous effects on human health. Basil's active substances are given by the volatile oil of herbs (*Herba basilici*), rich in estragol (80%), camphor, anadol and linalol.

Aims: The aim of the paper was to test the suitability of basil culture in the pedo-climatic conditions of Cluj Napoca in organic culture, through determination of some biometrics indicators for *herba* and *radix*.

Materials and Methods: The sowing of basil was done on 27.04.2018, the emergence took place on 15.05.2018, and planting in field was done on 10.06.2018. The experience was set up according to the nonrandomized blocks method, in a single repetition. Planting was done with 50 cm between rows and 25 cm between plants/row. Harvest of basil was on 09.10.2018. After harvesting, the plant material was transported in laboratory where the following determinations were made: mass and height of the plants; length of the shoots; leaf mass and mass of inflorescence.

Results: Analysis of results obtained shows that the mass of the plant is influenced by 1% of its height, the mass of the plant is influenced by 60.1% by the mass of the inflorescence, the mass of the leaves is influenced in proportion of 25.8% of the mass of the plant and the average length of the shoots is influenced by 38% of the plant mass.

Conclusion: Following the research carried out we can notice the existence of certain correlations between the different organs of the plant and the fact that we can influence through technology and fertilization applied to the culture the phenotype and biometrics of plants.

Keywords: *Ocimum basilicum*, *biometric indices*, *bio culture*

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ANALYSIS OF CAP GREENING PAYMENTS IN BULGARIA

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Introduction: Common agricultural policy (CAP) greening is the main change introduced by 2013 reform. The CAP greening is an important part of the sustainable development of scarce resources, conservation of habitats and species diversity. The CAP greening payments make the system of direct payments more environmental friendly.

Aims: The aim of the study is to make a comparison between requirements resulting from the CAP greening for farm development and environmental conservation through two programming periods.

Materials and Methods: The report presents a review of the situation of CAP greening payments for the two programming periods – present period 2014-2020 and future period 2021-2027 in Bulgaria.

Results: There was presented CAP greening payments requirements for the present programming period 2014-2020. The results show that cross-compliance and CAP greening payments are the mandatory measures under CAP pillar I and the ecological measures under rural development are voluntary under CAP pillar II. Also, there was presented CAP greening payments requirements for the future programming period 2021-2027. The results show that farmers should comply with mandatory and voluntary schemes in the future programming period (Scheele, 2019). The mandatory measures under CAP pillar I they will include enhanced conditionality with fourteen practices related to preserving climate, water, soil, biodiversity, and landscapes. The voluntary measures under CAP pillar II they will include Eco-schemes and Agri-environment-climate commitments.

Conclusion: In the present research work, I show a review of the mandatory and voluntary requirements on CAP greening payments for two programming periods.

Keywords: *CAP, Direct payments, Farmers, Greening*

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NITROGEN SENSORS USED IN AGRICULTURAL CROP ASSESSMENT – A REVIEW

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Introduction: Optimal quantity of fertilizer spread per hectare, from an economic point of view, is dependent on both the soil's content in nutritional elements and also the scheduled yield (Engström, 2009) and both are spatially fluctuant inside the area (Delin, 2002). The sensors of N are used for adjusting the fertilizer rate, based on the soil's nitrogen intake status during fertilization.

Aims: In practice, using these optical sensors and other technologies for determining the nitrogen in plants follow two directions: identifying the risk areas and laying out the crop, variable execution of fertilization (either real time adjustment of the fertilizer's rate or establishing areas of variable execution). So for this reason we try to review the sensors used for crop Nitrogen assessment.

Materials and Methods: Usually these sensors are positioned at the top of the fertilization aggregate (cabin's ceiling) for it to be able to cover a wider part of the workspace. The optical sensor measures the light reflected by the crop and calculates the reflexion index (SN), which indicates the total nitrogen content of the crop (Lena Engstrom, 2016).

Results: For creating and developing the crop maps and identifying the risks, multiple systems are available today. One of these is based on using data received from satellite systems that offer images with quite good resolutions (10 or 20 m). In the precision agriculture, almost all technological links could be adjusted to variable execution of inputs (seeding, weed management, fertilizer: applying N, P or amends). The conventional fertilization methods are based on the consistent distribution of fertilizer on the soil's surface. However, the fields are not completely even, and the nutrients absorption is influenced by a multitude of factors, including the slope, type of soil, drainage and content of organic matter. The consistent distribution could lead to an inefficient usage of fertilizers because certain areas in the field would receive less nutritive substances, while other areas would be over-dozed. Applying the variable rate fertilization (VRF) is a technology part of the precision agriculture which takes into consideration the diversity in nutrient demand on a soil surface and ensures a more effective application of nutrients, thus increasing the input exploitation

Keywords: *Nitrogen sensor, optical sensors, variable rate fertilization, crop assessment.*

A REVIEW OF NUTRITION DEFICIENCIES IN MAIZE (*ZEA MAYS* L.) USING PROXIMAL IMAGES AND MACHINE LEARNING

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Introduction: The automatic recognition of nutrition deficiencies is similar to there cognition of diseases, as the objective is to identify the visual signs that characterize the disorder of interest. Accurate determination of the nutritional status can not only prevent those losses, but also serve as basis for the rational use of nutritional supplements, aspreconized by precision agriculture principles (1).

Aims: This work aimed at providing a detailed overview on the techniques used for detection of corn nutrition deficiencies using proximal images.

Materials and Methods: Every kind of imaging sensor was considered (visible range, hyperspectral, chlorophyll fluorescence, multispectral), provided that images were captured at close range, thus excluding research using Unmanned Aerial Vehicles (UAVs), airplanes and satellites. Diverse types of images have been applied to plant health issues, including chlorophyll fluorescence, thermal, multispectral and hyperspectral. Although those types of images can often convey more information than conventional Red-Green-Blue (RGB) images, the latter have been more frequently employed due to the low cost.

Results: It is worth detecting that many studies use images to estimate chlorophyll content, which has been shown to be directly re-lated to nitrogen. However, chlorophyll can vary due to other factors, so only studies that either explicitly related chlorophyll to nitrogen ortargeted nitrogen content directly were considered in this review. Also this study arranges the literature according to the main approachused for detection of the nutrition deficiencies (regression analysis or machine learning classification techniques).

Conclusion: Close range images are often a more viable choice, and with the rapid development of robotic vehicles (2), they may play a very important role in the feasibility offinely tuned precision agriculture.

Keywords: *chlorophyll fluorescence, imaging sensor, nutrient deficiencies, Zea mays.*

Acknowledgements: This work was supported by a project PN-III-P1-1.2-PCCDI-2017-0560.

RESEARCH CONCERNING THE COMBATING OF *POLYSTIGMA RUBRUM* FUNGI UNDER THE CLIMATE CONDITIONS OF SOMCUTA MARE AREA

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Introduction: The climate conditions favor the development fungus *Polystigma rubrum* occurring especially where phytoprotection treatments are not performed (Parvu, 2010).

Aims: The aim of this research was to highlight the resistance and the sensitivity of some plum tree varieties against the fungi attack, in order to make recommendations for new plantations and detect products the best biologically efficiency.

Materials and Methods: The experimental research was performed during 2013 and 2014, in Somcuta Mare, Maramures County. The plant protection products were tested on the Centenar and Anna Spath varieties. The attack was counted by determining the frequency, intensity and the attack degree.

Results: In year 2013, the conditions were ideal for a fungi attack. The most sensitive was the Anna Spath variety, and the most resistant was the Centenar variety. Out of the nine fungicides tested under the conditions of the year 2013, we have remarked that the products Dithane, M45, Syllit 400SC and Folicur Solo 250EW had good results: the attack frequency on the Anna Spath variety was 1% in contrast to the untreated control (30.3%) and in the case of the Centenar variety is 0,5 in contrast to 23.3%. In year 2014 we have remarked a lower attack frequency for all the tested products. The calculations of the biologic efficiency thus we observed that for the Centenar variety, the attack frequency against the leaves ranged between 8.4 to 10.5%. From 66.7% in the untreated control to 8.4%, with efficiency biological Folicur Solo 250EW (87.5%) being followed Dithane M45 (86.5%) and Syllit 400SC (84.3%). For variety Anna Spath the biologic efficiency of the tested products were lower.

Conclusion: The tested products to have a biologic efficiency well can be recommended to be included in the plum tree plant protection system. The Centenar variety proved to have a good resistance against the fungus attack.

Keywords: *attack, fungicides, variety.*

THE BEHAVIOUR OF SEVERAL FACULTATIVE WHEAT GENOTYPES SOWN IN SPRING

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Introduction: Wheat is one of the main sources of food for mankind. Researchers must ensure this source even in the context of climate change. They must consider all possibilities for this. In order to improve the cultivation technology of facultative wheat, less studied in our country, we started this experience in 2017.

Aims: The aim was to establish an optimal sowing date for facultative wheat in spring and to see the difference of yield and quality of facultative wheat in comparison with spring wheat.

Materials and Methods: Using the subdivided plots method, into three replication, at ARDS Turda were studied six genotypes of wheat (Taisa, Ciprian and Lennox – facultative wheat; Pădureni, Granny and Triso – spring wheat) in terms of production and quality. The influence of the sowing date (E), the row spacing (D) and the applied fertilizer dose (F) were the main technological elements pursued in this experience.

Results: The interaction E x S has significantly influenced ($p > 0.1\%$) yield, TKW (thousand kernel weight) and hectoliter mass (HLM). The grain protein content, the gluten content and Zeleny sedimentation were significantly influenced by the genotype (S), row spacing and fertilization. The sowing date had a significantly influence on HLM, while the fertilization had no statistical influence on this parameter.

Conclusion: In spring, when the sowing time is delayed, the length of growing season and yield decrease, but the quality of grains increases. So, the facultative wheat needs to be sown until March 15. Unfortunately, by applying N fertilizer rates can not cover the yield losses caused by delayed sowing time. Both, spring wheat and facultative wheat, capitalize better the nutrition space and the N fertilizer in increasing the protein and gluten content.

Keywords: *facultative wheat, quality, sowing date, spring wheat, yield.*

RESEARCH ON PRODUCTION OF BIO-PRODUCT FOR TREATMENT OF LIVESTOCK WASTES OF PIG IN VIETNAM

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Introduction: In order to resolve the environmental pollution by livestock wastes, at the same time to reuse this abundant organic material resource, it is very necessary to study on production of bio-products which have to decompose organic matter fast, reduce sticking smell and annihilate disease resource remain in livestock wastes and cycling into organic fertilizer without noxious, service for agricultural production.

Aims: The aims of this paper is to select the useful microorganism strains and raw materials which will be used to produce bio-product with the capabilities of deodorant, kill germs as well as quickly decomposing organics matters in pig breeding wastes to minimize environmental pollution and increase values for livestock industry.

Materials and Methods: Based on determination of biological activities of microorganism strains and properties of materials used, a microbes combination (including 2 bacteria strains (*Bacillus sp.* B11, *Lactobacillus sp.* B16), 2 actinomycetes strains (*Streptomyces sp.* A5, *Streptomyces sp.* A6), 2 yeast strains (*Saccaromyces sp1*, *Saccaromyces sp2*), and a mold strain (*Penicillium sp.* M3) and mixing of organic composting, bran and rice husk (5:3:1 ratio) were chosen for production of biological product.

Results: Utilizing bio-product to treat pig breeding waste has the effect in speed up humus accumulation as well as in crease nutrient content (OC decreased 18.35%, available phosphorous and potassium increased 38.92% and 41.53% respectively).

Conclusion: The test of treatment the livestock wastes of Pig by biological product proved that the sticking smell reduced noticeable, *E.coli* decreasing 90% after 5 days and the composting wastes could use as organic fertilizer after 21 days.

Keywords: *Bio-products, livestock wastes, microorganism, treatment, substrate.*

THE USE OF BIOSTIMULATORS IN THE AGRICULTURAL SYSTEM

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Introduction: The current market of biostimulators is constantly rising, due to their increasing integration into agricultural systems, in order to modify the physical processes in plants to optimize productivity. Plant biostimulants based on natural materials have received considerable attention by both the scientific community and commercial enterprises especially in the last two and a half decades. Biostimulants offer a potentially novel approach for the regulation/modification of physiological processes in plants to stimulate growth, to mitigate stress-induced limitations, and to increase yield (1).

Aims: The aims of the current review are to provide a analysis of the current situation in the field of biostimulants and to develop a theoretical foundation for the conceptualization, classification, and practical application of these materials.

Material and Methods: The large number of publications cited for each category of biostimulants demonstrates that there is growing scientific evidence supporting the use of biostimulants as agricultural inputs on diverse plant species. The cited literature also reveals some commonalities in plant responses to different biostimulants, such as increased root growth, enhanced nutrient uptake, and stress tolerance (Velez *et al.*). Agricultural growing practices have been evolving towards organic, sustainable or environmental friendly systems.

Results: In vegetables, the application of biostimulants allowed a reduction in fertilizers without affecting yield and quality. In leafy vegetables susceptible to nitrate accumulation, such as rocket, biostimulants have been able to improve the quality and keep the nitrates under the limits imposed by EU regulations. Moreover in leafy vegetables, biostimulants increased leaf pigments (chlorophyll and carotenoids) and plant growth by stimulating root growth and enhancing the antioxidant potential of plants. In floriculture, biostimulants used in bedding plant production stimulated the growth of plants, which reached the blooming and commercial stages earlier, thus optimizing space in the greenhouse.

Conclusion: The multitude of biostimulators that are used in agriculture, varies according to the origin of the compounds from which they are made. The action of biostimulators on plants is difficult to define due to their diversity and complexity. Many scientists and farmers believe that the application of biostimulators is a perspective method to be applied in organic farming and to protect the environment.

Keywords: *biostimulants, mode of action, definition, classification.*

PLANT SENSING, ACTIVE SPECTRAL SENSOR AND VARIABLE-RATE FERTILIZER. IMPLICATIONS FOR THE ADJUSTMENT OF AGRICULTURAL TECHNOLOGIES TO REDUCE FERTILIZER USE

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Introduction: Spectral sensing technology provides an assessment of the spectral signature reflected from a target in a wide range of spectral wavelengths beyond human vision, and it has been applied in precision agriculture for nondestructive estimation of plant and soil properties to improve quality and productivity.

Aim: Plant stress has been estimated by spectral signature using both passive and active sensors. As optical sensors measure reflected light from a target, changes in illumination conditions critically affect sensor response.

Material and Methods: Active spectral sensors minimize the illumination effects by producing their own illumination, which is reflected from the target and measured by the detector.

Results: Fertilizer plays a significant role in increasing crops quality.

Conclusion: When fertilizer users use inappropriate fertilization practices in fields, it brings nutrient waste, large investment and residue in soil.

Keywords: *active spectral sensors, spectral sensing technology, response surface methodology.*

THE EFFECTS OF WILD BOAR DISTURBANCES ON THE AGRONOMICAL VALUE OF SEMI-NATURAL GRASSLANDS

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Introduction: Semi-natural grasslands in Romania are being degraded under the influence of several factors with a multitude of negative actions (undergrazing, overgrazing, abandonment etc.) even while getting support from subsidies. One source of degradation with which most Romanian farmers deal with in both croplands and grasslands is the disturbance caused by wild boars (*Sus scrofa*). Wild boar grubbing is suspected to accelerate soil erosion and affect soil pH and decomposition processes and hence the nutrient contents in soil (Singer et al. 1984).

Aims: To measure the effect of grass cover destruction by wild boars on the floristic composition of a semi-natural grassland.

Materials and Methods: The experiment was based on a semi-natural grassland within the area of the Monor commune, Bistrița Năsăud county, Romania. Grass cover destruction occurred in 2018. Floristic analyses were done in the summer of 2019 by applying the Blaun-Blanquet method, modified by Păcurar & Rotar (2014). The phytocoenosis was situated on a mountain with an average slope of 20-25% and N-W orientation.

Results: The semi-natural grassland was found to be of type *Festuca rupicola* - *Agrostis capillaris*. The floristic composition was made up of 65.75% *Poaceae*, 10% *Fabaceae*, 2.5% *Cyperaceae* & *Juncaceae*, and 19% forbs. Grass cover was measured at 97.75%. Agronomically, the phytocoenosis was ranked as class IV, the mediocre category, with a capacity of 0.41-0.60 LSU. A year after the wild boars caused destruction, grassland type shifted to *Festuca valesiaca*. Within the *Poaceae* group, and along with the dominant species, several others appear: *Cynodon dactylon* with 8% cover, *Deschampsia cespitosa* with 0.5% cover and *Festuca pratensis* with 0.5% cover. The *Fabaceae* group reached 3% cover. From the forbs group, *Plantago lanceolata* had 12.5% cover, *Plantago media* had 5% cover and *Prunella vulgaris* had 5% cover.

Conclusion: The damage to the grassland caused by wild boars had led to profound degradation of grass cover and to a drop in agronomic and ecological value.

Keywords: *vegetation cover; semi-natural grasslands; wild boar.*

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DEFINING THE MAIN TECHNOLOGICAL ELEMENTS SPECIFIC FOR MAIZE CULTIVATION UNDER THE ECO-PEDOLOGICAL CONDITIONS IN THE TRANSYLVANIAN PLAIN

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Introduction: *Zea mays* is one of the most cultivated plants in the world. The goal of each farmer is high yield, which is influenced by many agronomic factors. Some of them can be adjusted according to the climatic and soil conditions or fertilization. After choosing the variety according to the cultivation conditions, the corn is sown.

Aims: Determining the influence of the genetic potential of the maize hybrids used on the response to the complex application of all agricultural inputs specific to modern technology and the study of the behaviour of the genetic material (maize hybrids from different sources - APPR source) under the particular conditions of the agricultural year 2018.

Materials and Methods: The experience was located in Cojocna (www.agrim.ro), on a type of phaeoziom soil in 2018. The provenance of the seeds are from Romanian Corn Producers Association (APPRP) - Pioneer Hybrids. Biological material

Results: Regarding the behaviour of hybrid 1 in the two fertilizers (NPK 14:14:14 MOP + 7% SO₃ + 4% MgO - fertilization which we will refer to as kieserite and NPK16: 16: 16 - which we will refer to below - NPK) it is found that this hybrid had better results on fertilization with NPK 16:16:16.

Conclusion: Elaboration of specific recommendations for maize cultivation technology depending on the biological material, the inputs used and the timing and harvesting methodology.

We conclude that under the same conditions in 2018 the two hybrids sown at Cojocna behaved differently to the two types of fertilization. Thus, in recommending the type of fertilizers, the genetic potential of the studied hybrids will be taken into account, which differentially exploits the nutritional elements available, given their different consumption.

Keywords: *corn, Cojocna, kieserite*

EFFECTS OF BARLEY YELLOW DWARF VIRUS ON YIELD AND YIELD COMPONENTS OF SOME WINTER WHEAT GENOTYPES

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Introduction: yellow dwarf is considered the most economically devastating virus disease of small grains worldwide (Wegulo and Hein, 2013) causing between 11% and 33% yield loss in wheat fields and sometimes up to 80%. The disease Barley Yellow Dwarf virus (BYDV) was first recognized by Oswald and Houston (1951) as a viral pathogen transmissible by aphids. BYDV is caused by a group of phloem-limited luteoviruses transmitted by aphids in a circulative non-propagative manner. The disease is often unrecognized because even experienced cereal agronomists have difficulty in distinguishing its symptoms from those associated with frost, wet weather, waterlogging, nutritional deficiencies and several other non-infectious agents.

Aims: the aim of this study was to establish the influence of yellow dwarf disease on some winter wheat genotypes regarding the main yield components and finally on grain yield.

Materials and Methods: eight winter wheat genotypes affected by Yellow Dwarf in normal field condition at Agricultural Research and Development Station Turda were studied regarding the agro-morphological trait such as plant height, number of grains per spike, weight of grain per spike, thousand kernel weight and grain yield.

Results: yellow dwarf causes important damage with significant yield losses. All studied genotypes were affected by BYDV in a different level. The most affected traits were weight of grains per spike, thousand kernel weight, grain yield and plant height.

Conclusion: Breeding for improved tolerance to BYDV is difficult because simple effective selection strategies are not available. Following an intensive program of breeding and selection for BYDV tolerance, some studies indicated disappointment with the yield loss levels of a number of elite lines.

Keywords: *grain yield, yellow dwarf, winter wheat*

MECANIZATION SOLUTIONS FOR ENHANCING AGRICULTURAL OUTPUT

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Introduction: The introduction of up-to-date technologies developed in the mechanical sector generally speaking, and in new agricultural mechanized technologies, in particular are able to deliver solutions in order to enhance agricultural output. One of the major problems of performing mechanization in agriculture is the contribution to the decrease of pests and pathogens attack against crops.

Aims: The paper aims to analyze the benefits brought by new mechanized technologies destined to develop plant protection management.

Materials and Methods: The study evaluates the technologies available from the point of view of their contribution to the optimization of plant protection machines so that the impact on the environment is as low as possible.

Results: The results of this research emphasized the benefits of using the new mechanized technologies in agriculture, which contribute to the reduction of the losses of plant protection products in water from point sources of pollution. Our research, also, underlines the progress recorded in the field of reducing the impact of diffuse sources of environmental pollution.

Conclusion: The implementation of the new mechanized technologies destined to develop plant protection management, also, developed and recommended by European practices through experts and professional groups in this field of knowledge, have high potential in enhancing performance in Romanian agriculture.

Keywords: *agriculture, plant protection, pollution, practices.*

IDENTIFYING *ARNICA MONTANA* FLOWERS IN DIGITAL IMAGES AUTOMATICALLY WITH THE HELP OF IMAGE CLASSIFIERS

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Introduction: Aerial drones and machine learning algorithms are already being used in agriculture to increase precision in field operations or to detect plants that are suffering and require attention. For biodiversity, aerial imagery has been used to monitor large animals and trees, but it has been used less for small vegetation such as grasslands. However, recent technological upgrades in digital cameras, UAVs, machine learning frameworks and computer vision frameworks have created the potential for applying these technologies at a smaller scale where grassland flowering species are visible.

Aims: This study aims to test and evaluate new technologies for the automation of identifying small flora based on aerial imagery.

Materials and Methods: Image sets of *Arnica montana* were captured via DSLR camera mounted on an advanced drone with automatic flight planning capability. The oligotrophic grassland where *Arnica montana* was situated in the Black Forest (Schwarzwald). Image sets were converted into training data and testing data. A neural network was set up to create a new model for detecting *Arnica montana* flowers in various phases of blooming.

Results: *Arnica montana* flowers from the testing set were identified with over 90% accuracy.

Conclusion: *Arnica montana* flowers have sufficient uniqueness to be identified automatically via image classification neural networks, even with a small training data set. This opens up further possibilities into using more advanced algorithms that can count and isolate the plants visible within a grass cover aerial photo.

Keywords: *neural network, image classification, computer vision, Arnica montana*

RESPONSE OF THIRTEEN SOYBEAN GENOTYPES TO FERTILIZATION IN THE CLIMATIC CONDITION OF 2019

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Introduction: The interest in conventional soybean culture is steadily growing, being the main source of good quality protein as well as vegetable oil (Probst and Judd, 1973). Soybeans are considered a basic food with a high nutritional value. The importance is given by their use as raw material in the food and animal feed industry (Addo and Oguntona, 1993). The increase in soybeans yield and grain quality can be influenced by climatic conditions during vegetative growth (Urdă et al., 2019) and by nitrogen, phosphorus and potassium soil supply.

Aim: The aim of this study is to evaluate the influence of two types of chemical fertilizers with four levels of fertilization on the main soybean growing stages in the pedoclimatic conditions of the experimental field at the Agricultural Research and Development Station from Turda.

Materials and Methods: To achieve the objective of this experience from ARDS Turda, the soybean varieties studied are experimented by the subdivided parcel method. Studied biological material contains thirteen soybean genotypes created at ARDS Turda (seven varieties and six prospective lines, in advanced generations of the breeding process). Fertilization was carried out with NPK 27:13.5:0 and NPK 16:16:16 complex fertilizer applying the following doses: unfertilized (Mt.), 150 kg/ha, 200 kg/ha and 250 kg/ha.

Results: Atypical climatic conditions in the first half of 2019 may be considered as less favorable for soybean culture for the reference area, with consequences on the main plant growth stages.

Conclusion: Given the climate change and the growing interest in soybean culture, monitoring the reaction of soybean varieties to fertilization becomes essential. The results of the investigated characteristics at the thirteen soybean genotypes reveal the influence of climatic conditions and fertilization on different stages.

Keywords: *climate change, fertilization, soybean.*

Acknowledgements: This work was supported by a grant of the Romanian Ministry of Research and Innovation, CCCDI-UEFISCDI, project number PN-III-P1-1.2-PCCDI2017-0301, contract no. 28PCCDI/2018 - Integrated management system of the agroecosystem resistance against pests in order to promote sustainable agriculture under the conditions of climate change, within PNCI III.

EFFECT OF GENE PYRAMIDING ON THE RESPONSE OF POTATO TO INFECTION BY *PHYTOPHTHORA INFESTANS* IN A COMPATIBLE INTERACTION

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Introduction: Potato (*Solanum tuberosum*) is the fourth crop worldwide after cereals (wheat, rice and corn). Late blight caused by the oomycete *Phytophthora infestans* is the most devastating disease on potato crop. The control of late blight is based principally on the use of fungicides. Due to environmental and health concerns, the use of fungicides is not very recommended. Potato breeding for resistance to late blight represents a good alternative to chemical control. Conventionally potato breeding is mainly based on the introgression of individual major genes and deploying them. The high evolutionary capacity of the pathogen allow it to overcome this type of resistance. Gene pyramiding is a promising strategy to control *P. infestans*.

Aims: In this study, we aimed to evaluate the contribution of each resistance gene added to the resistance of the potato genotypes to late blight.

Materials and Methods: Four potato genotypes were used ,differing from each other with the number of genes: *R1*, *R1R2*, *R1R2R3*, and *R1R2R3R4*. They were inoculated with the virulent race 13A2. The phenols and flavonoids were quantified at different time point: 0 hpi, 24 hpi, 48 hpi, 72 hpi.

Results: All the genotypes were sensitive; however, a delay of 2 days was enregistered for the *R1R2R3R4* genotype. The biochemical tests showed that this genotype accumulated the most important quantity of polyphenols and flavonoids as a response to inoculation. A positive correlation was detected between the number of genes, a genotype contains, and the quantity of secondary metabolites it synthesizes.

Conclusion: Even that all the genotypes were sensitive to the *P. infestans* race used in this study, the pyramiding of defeated genes still has an effect on their resistance.

Keywords: *gene, introgression, genotype, polyphenols.*

THE QUALITY OF *SORGHUM ALMUM* AND *SORGHUM SUDANENSE* SILAGE AND PROSPECTS FOR ITS USE

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Introduction: *Sorghum* species have recently gained popularity due to their numerous advantages, such as heat and drought tolerance, resistance to specific diseases and pests; being able to exploit the salty soils where the cultivation of traditional cereals is more difficult, are used for the production of grains, forage, sugar and, more recently, biofuels.

Aims: The objective of this research was to evaluate some biological peculiarities and the quality of the silage prepared from Columbus grass, *Sorghum almum* Parodi, and Sudangrass, *Sorghum sudanense* (Piper) Stapf, and the possibility to use them as fodder for animals and feedstock for biogas production.

Materials and Methods: *Sorghum almum* cv. Argentina and *Sorghum sudanense* cv. Chernomorka, grown on the experimental land in the National Botanical Garden (Institute), Chisinau, latitude 46°58'25.7"N and longitude N28°52'57.8"E, served as subjects of the research. The preparation of silage and the evaluation of its quality were carried out in accordance with the methodological indications and the requirements of the Moldavian standard SM108. A rapid predictive method based on near-infrared spectroscopy (NIRS) was developed to measure plant cell walls: acid detergent fiber, neutral detergent fiber and acid detergent lignin. The biochemical biogas potential and methane potential were calculated according to the equations of Dandikas et al. 2015, based on the chemical compounds: protein, acid detergent lignin and hemicelluloses.

Results: The silage of the studied *Sorghum* species was characterized by agreeable green-yellow color with pleasant smell, specific to pickled vegetables. The results of the study on biochemical composition indicate that satisfactory *Sorghum* silages were obtained: pH 3.82-4.06, lactic acid 24.1-28.4 g/kg, acetic acid 4.4-5.7 g/kg, organic matter 911.4-923.3 g/kg, crude protein 56.5-103.0 g/kg, crude fats 25.1-32.6 g/kg, crude fibre 413.2-430.5 g/kg, nitrogen free extract 347.9-428.3 g/kg, carotene 41.92-51.67 mg/kg. The fodder value of the prepared silage was 0.18-0.19 nutritive units/kg and 1.82-2.16 MJ/kg metabolizable energy. The specific methane production potential of *Sorghum almum* silage was 350 l/kg, but of *Sorghum sudanense* silage – 332 l/kg dry organic matter, respectively.

Conclusion: The silage obtained from the studied *Sorghum* species largely meets the standards and can be used as alternative feed for animals and substrate for anaerobic digestion in biogas plants.

Keywords: *biochemical composition, fodder value, Sorghum almum, Sorghum sudanense.*

MYCORRHIZAL FREQUENCY IN CORN DUE TO CROP ROTATION

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Introduction: Corn is a base crop in world agriculture, occupying the 1st place as production potential. The ecological plasticity and directed selection of this species has led to the achievement of hybrids with a high degree of adaptation to varied soil conditions, especially microbiological ones. Of the microbial components, an important role is played by the mycorrhizas that supplement phosphorus transfer in corn rhizosphere.

Aims: Determination of the presence / absence of mycorrhizal symbionts in corn roots, in the conditions of the Mureș riverside. Evaluation of precursor influence on mycorrhizal phenomenon and applied technologies in an early developmental phenophase.

Materials and Methods: The samples were harvested from a number of 6 corn-sown plots and with a history of differentiated cropping. The roots harvested in the 4-leaf phenophase were stained and analyzed by microscope to assess the presence of mycorrhizal fungi.

Results: The dynamics of mycorrhizas fluctuate within wide limits under the impact of climatic and soil conditions, precursor crops and applied corn crop technologies. The maximum frequency is reached for the wheat and maize precursors, where it reaches 50%. Organo-mineral fertilization provide significant benefits in principal root colonization and fewer for colonization of secondary roots.

Conclusion: The main roots are colonized differently from the secondary ones due to the applied technology and the precursor plants.

Keywords: *Corn, agronomy, technology, mycorrhiza*

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EXPLOITATION AND MANAGEMENT OF LOW INPUT GRASSLAND SYSTEMS

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Introduction: Low input farming systems should be analysed in a holistic vision: the idea of a farming system is thus essential to capture the complex relationships playing at the cropping system and the landscape ecology levels which enable the farmer to rely on low off-farm inputs.

Aims: By this project the authors aimed to analyse the evolution and management of low-input grassland from a specific area in the Apuseni Mountains, in order to define what can be the result of a low input grassland system on the botanical composition of the grasslands and on the income of the farmers.

Materials and Methods: In addition a full description of Flanders area with special attention to its grassland management is given, such that one can make a comparison between those two different cultures: the Province of East Flanders, Belgium and the area of Apuseni Mountains, Cluj County, Romania.

Results: Flanders (Belgium) and the area of Cluj County, Apuseni Mountains (Romania), are completely different not only in terms of their people with their own life-styles and culture, but also in terms of uses and management of arable land and grasslands.

Conclusion: Low-input meadows are an important part of the Romanian vegetation, including significant areas of pastures and meadows. They are the result of centuries of traditional exploitation by local farmers. The Flemish agriculture is rather small but very intensive and losses every year hundreds of farmers and their hectares for urbanization.

Key-words: *grasslands, Flanders, Transylvania*

ANTIMICROBIAL ACTIVITY AND TOTAL PHENOLIC CONTENT OF LOCAL SMOKED CHEESE

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Introduction: Cheese is widespread in Romania and smoking is being practiced to improve its preservation degree and also to increase its sensory quality. Generally, smoking affects food which is high in protein, with bacteriostatic and antioxidant role. Developing countries, including Romania, have poor hygiene standards in traditional milk production, and that is reflected in the poor hygiene quality of traditionally made cheeses (Georgescu *et al.*, 2014).

Aims: The purpose of this study is the microbiologically analysis of smoked cheese products on the local market, in order to assess the antimicrobial effect of smoke, as well as the determination of water-soluble phenolic compounds within the product.

Materials and Methods: In order to test the antimicrobial effect on smoked cheese samples, we have performed microbiological analysis: total number of aerobic mesophilic germs, coliforms bacteria, coagulase-positive staphylococci, yeasts and molds. The Folin–Ciocalteu test was chosen to measure Total Phenolic Content of smoked cheese extracts.

Results: Microbial activity is reduced in smoked cheese types in both purchased cheese and those smoked in the traditional system. Thus, the found values were below the maximum admissible limits in the case of the total number of aerobic mesophilic germs, the absence of coliforms bacteria, the inhibition of the growth of coagulase-positive staphylococci. Yeast and molds are inhibited through the smoking process, but a slight increase of them was observed when stored in the refrigeration conditions for 21 days. The total content of phenols varies from one type to another, with higher values in traditionally smoked cheese.

Conclusion: The smoking process on cheese has a beneficial effect on the degree of preservation of this product. The antioxidant effect of smoke is highlighted by the higher content of phenolic compounds in smoked cheese.

Keywords: *cheese, microorganisms, polyphenolic content.*

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SESSION 2: ENVIRONMENTAL PROTECTION

WATER QUALITY INDICES OF IARA RIVER

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Introduction: Due to the increasing concern related to the pollution phenomenon, both vegetal and animal world do not cope enough rapidly to the new harmful conditions and for this reason lot of species disappeared. Some rivers and lakes are so polluted that fish and completely disappeared, the total number of hydro-bionts dramatically decreased, except pathogen microorganisms.

Aims: The aim of this paper is to elaborate and implement a plan of monitoring the water quality from a mountain river by quantifying the physico-chemical parameters characteristic for the water from Iara River, upstream and downstream, meaning pH, turbidity, conductivity, dissolved oxygen.

Materials and Methods: The samples were harvested upstream and downstream of the Valea Ierii village, from Iara affluent of Arieș River. The analysis was carried on within the Laboratory of the Monitoring of Environmental Quality from the Faculty of Agriculture of the University of Agricultural Sciences and Veterinary Medicine Cluj – Napoca, during April - June 2019. The parameters recorded during monitored time interval, April 1st - June 16th 2019, were: temperature, pH, turbidity, conductivity, and dissolved oxygen.

Results: Temperature recorded normal values within the limits 16 – 21 °C, and pH was also within normal considered limits (6,5 – 6,9), in both river sections, upstream, and downstream, respectively. The other monitored parameters were within the following limits: 70,2 – 72,8 μS/cm for conductivity, 0,05 – 0,16 NTU for turbidity, and 9,30 – 10,14 mg/l for dissolved oxygen.

Conclusion: All monitored parameters, which characterize the water quality indices over the monitored timeframe, fell within the normal allowable limits, demonstrating the lack of pollution in this river sector.

Keywords: *conductivity, dissolved oxygen, pH, pollution, turbidity.*

INTELLIGENT PACKAGING THE ALTERNATIVES TO CONVENTIONAL PACKAGING

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Introduction: Packaging is defined as a assets (or set of assets) intended to contain or to wrap a product or set of products to provide them with physical, chemical, mechanical, biological protection in order to preserve quality and integrity in the state of delivery, during handling, transport, storage and disposal to the consumer or until the expiry of the warranty period. Considered often irrelevant, packaging is an indispensable product for commercial transactions due to the role and functions it performs.

Aims: The aim of this paper is to emphasize the main challenges of the state of art of innovative packaging solutions.

Materials and Methods: The bibliographical, selective study methodology was approached in order to realize the present study.

Results: The most common intelligent packaging currently in use is those that have an annihilation/ absorption or oxygen cleaning system. Intelligent systems may be internal or external from a UV light source. In turn, smart packaging can include active systems inside the package by placing micro-plates or active envelopes. Another way to manufacture smart packaging is to incorporate the active ingredients into the material from which the package is made.

Conclusion: At European level, drastic decisions have been made in the last period regarding packaging, especially plastic ones. The EU wants all plastic packaging to be recyclable. Cheap and sustainable plastics are widely used, but their increasing popularity has been accompanied by increasing amounts of plastic waste and marine litter, which affect the environment and human health.

Keywords: *smart packaging, active systems, plastics, environment, regulations.*

INFLUENCES OF CLIMATIC CONDITIONS UPON PINE TREES HEALTH STATUS

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Introduction: The European Union is interested to approach the forest policies in a way that allows to be implemented by the member states concern not only the development of the wood in healthy conditions but also measures taking into account the production technologies.

Aims: The aim of this study is to describe climate evolutions and conditions upon the pine tree health status, using multiannual data concerning: pathogens attacks, environmental temperature, relative humidity, wind velocity and rainfall regimen.

Materials and Methods: The health status of pine forests was determined within a forest under the management responsibility of the Forestry Office of Târgu Mureş. Thus, the state of pine health was determined by taking into account the incidence of pathogens and mites specific to this species. In order to accurately determine the degree of infestation, the degrees of attack were calculated. Also, on the basis of bibliographic resources, recommendations have been made to maintain the optimum health status of pine trees, taking into account norms and regulations provided both nationally and internationally.

Results: Because forestry policy is regulated nationally, it is necessary to correlate the phytosanitary management in accordance with the current phytosanitary practices. In this respect, the present study highlights the importance of applying phytosanitary regulations in phytosanitary management of pine forests and the need to apply appropriate practices, harmonized with those of the EU.

Conclusion: A performant management of pine forests can only be achieved if EU regulations are aligned with the national legal framework for phytosanitary forestry management, by also taking into account the specific climatic conditions, where the experimental field is located and also the incidence of pests and pathogens.

Keywords: *environment, forest, pathogen attacks, policy, study.*

INTERNATIONAL AND NATIONAL INSTITUTIONALIZATION ON SUSTENABLE DEVELOPMENT

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Introduction: The concept of sustainable development designates all the forms and methods of socio-economic development that focus primarily on ensuring a balance between social, economic and environmental aspects and elements of natural capital.

Aims: The aim of this paper is to emphasize the main challenges of the state of art of innovative packaging solutions.

Materials and Methods: The materials and methods used for realize the present study was the bibliographical study.

Results: The National Strategy for Sustainable Development of Romania-Horizon 2013-2020-2030 establishes concrete objectives for moving, within a reasonable and realistic timeframe, to the model of high value-added development, driven by the interest for knowledge and innovation, the continuous improvement of the quality of people's lives and of the relations between them in harmony with the natural environment. The achievement of these strategic objectives will ensure, in the medium and long term, a high economic growth and, consequently, a significant reduction of economic and social disparities between Romania and the other EU Member States.

Conclusion: From the point of view of the synthetic indicator that measures the real convergence process, i.e. Gross Domestic Product per Capita (GDP / Place), at the Purchasing Power Standard (PCS), the Strategy implementation creates the conditions for the GDP / place expressed in the PCS to exceed, in the year 2013, half of the EU average at that time, should approach 80% of the EU average in 2020 and be slightly above the European average in 2030.

Keywords: *sustainable development, public policies, strategic objectives, gross domestic product.*

A STUDY OF BENTHIC ABUNDANCE AND DIVERSITY IN KRUENG CUT ESTUARY, BANDA ACEH

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Introduction: This study attempts to establish the spatial distribution of benthic based on its abundance and diversity. Because benthos is sensitive to water pollution, it can be used as an indicator to determine the health status of an estuarine ecosystem.

Aim: Therefore, the purpose of the study is to identify the abundance and diversity of benthic community in Krueng Cut estuary.

Material and Methods: The study used purposive sampling method by applying seven station sampling along the study area. The sampling was done in three places within one station that were in the left bank, center of the channel, and right bank.

Results: Benthos samples were taken using Ponar Grab, whose size is 23cm x 23cm with \pm 20 kg weight and sieved from the substrate using a mesh filter of 0.1 mm in size. The result showed that Krueng Cut estuary has 347 ind/m² density index from 7 benthos species. It was found that the most abundance of benthos is *Balanus* sp., while the least are *Nacula nucleus*, *Olivella volutella*, and *Uca* sp.

Conclusion: This result informs that the diversity index is categorized as low and on the other hand the dominance index level is high.

Keywords: *abundance index, diversity index, estuary ecosystem, Krueng Cut.*

**TECHNOLOGIES FOR ENVIRONMENTAL PROTECTION IN
COMPANIES DEALING WITH ASPHALT MIXTURES PRODUCTION.
A CASE STUDY: S.C. DIMEX COMPANY 2000 S.R.L.**

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Introduction: One of the major concerns of mankind today is related to the devastating impact of pollution, in all its aspects, on natural resources and people. Reducing carbon dioxide emissions is a commitment of each country within the EU.

Aims: The aim of this paper is to analyze the technological processes of production of asphaltic mixtures in order to quantify the pollutant emissions emitted by this industry sector and to analyze the applied environmental protection technologies. As a case study I chose the company DIMEX COMPANY 2000 S.R.L.

Materials and Methods: The applied research methodology includes a bibliographic study regarding: the pollution level of the urban centers in Romania and the development stage of the asphalt production sector in Romania.

Results: Reducing carbon dioxide emissions is a commitment of every country within the EU. These concerns are also present in the management plan of the company studied, which deals with the production of asphalt mixtures. Road builders must meet two basic requirements: extraordinary mobility and the protection of the natural environment.

Conclusion: The quality indicators of the water discharged into surface receivers fall within the limits provided by H.G. 188/2002, amended and supplemented by H.G. 352/2005 - the norm of NTPA 001 (according to the Analysis Bulletin issued by S.C. I.C.P.E. BISTRIȚA S.A./2018).

Keywords: *asphalt, technologies, environmental protection.*

MONITORING TREES IN CITIES USING THE *INTERNET OF TREES*

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Introduction: *Internet of Things* is the concept where sensors and data processors interact with each other. With the technology developed at the KULeuven DRAMCO [1], this offers an opportunity to collect large amounts of continuous data, e.g., of trees. City or town authorities need information regarding the condition of the trees in public spaces that they manage. Placing sensors that record properties that are correlated with its condition can be an instrument for monitoring a tree's health.

Aim: This pilot project verifies if this approach offers the possibilities mentioned.. The study sheds light on which properties to monitor and their complexity: many factors (environment, species, etc.) are assumed to have an impact on the data and thus its usability.

Materials and Methods: Nine sensor modules were placed, recording two temperatures: a reference temperature near the tree and the tree's temperature "on" its bark (shielded from outside weather effects). Data were collected for eight months. Thorough statistics were performed on the data to analyse its complexity and usability.

Results: At the time of submitting this abstract, the analysis was not finished (it will, however, be by the time the conference is held). First results show indeed a relationship between the two temperatures. Besides providing information about the condition, this can also provide insights on the effect of trees on their surroundings: trees have a regulating effect on (micro)climates, e.g., buffering the urban heat island effect.

Furthermore, some data already show some effects of species or plant location.

Conclusion. The presented research shows that, with a certain number of conditions in mind, adopting IoT could be an interesting method to record continuous and geographically diffuse data of trees. Data that can be used for tree monitoring or ecological and environmental studies.

Keywords: *Internet of Things, tree monitoring, tree temperature*

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THE CURRENT RESEARCH ON DEPIK *RASBORA TAWARENSIS* THE ENDEMIC AND THREATENED FISH SPECIES IN THE LAKE LAUT TAWAR, ACEH PROVINCE, INDONESIA

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Introduction: Depik *Rasbora tawarensis* is one of the commercial freshwater fish in Lake Laut Tawar. Depik is the trademark of the Takengon the capital city of Aceh Tengah District, Aceh Province, Indonesia. Currently, the population of the depik in Lake Laut Tawar has been threatening by ecological perturbation, unfriendly fishing practices, presence of alien species, and pollution. This condition has caused a significant decline of this fish population within the last three decades.

Aims: The objective of the present study was to review several biological aspects of the depik in Lake Laut Tawar, Indonesia.

Methods: This paper reviews the previous current research that has been done on this important species. Several biological aspects of depik *R. tawarensis* have been reported by several authors and reviewed in this paper.

Results: The fish is distributing widely in the Lake Laut Tawar where the small fish was frequently found in the shallow waters close to coastal, where the bigger fish was found in the deep water, this is a plankton feeder fish. The depik is a group synchronous fish that spawning several times a year with spawning peak is during April, September, and December. The female was predominant in the population, and the male was matured earlier than female. The female fish produces about 3715 eggs per spawning season.

Conclusion: The bioecology of the depik *R. tawarensis* has been well documented, and the future study is focusing on the breeding and feeding of the larvae.

Keywords: *Takengon city, Freshwater fish, Fecundity, plankton feeder.*

LENGTH-WEIGHT RELATIONSHIP *METAPENAEOPSIS MOGIENSIS* IN NORTH ACEH WATERS, INDONESIA

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Aims: This study aims to determine the long-weight relationship of shrimp (*Metapenaeus mogiensis*) caught in the waters of North Aceh, Indonesia. The results are expected to add information about the existence of shrimp and sustainable resource management for fishermen.

Methods: The method used is a simple random method by taking shrimp samples (10%) randomly from a fishing catch basket in one sail or trip. Next, the samples are measured in length and weighed. Sampling was carried out in July 2019 at fishing port Lhoksemawe.

Results: The results showed the carapace length of male shrimp ranged from 14.8 mm to 22.2 mm and females 13.9 mm to 22.1 mm. The weight of male shrimp ranges from 2.17 g to 6.73 g and the weight of female ranges from 2.01 g to 5.83 g.

Conclusions: Growth patterns found in both males and females belong to allometric negatives and the ratio of sex ratio is 1: 0.47.

Keywords: *Shrimp, Length-weight, Aceh.*

DEVELOPING KEY SUSTAINABILITY COMPETENCIES IN SECONDARY BIOLOGY TEACHING

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Introduction: UNESCO is promoting Education for Sustainable Development (ESD) through the Global Action Programme on Education for Sustainable Development (GAP). At the core of the 2030 Agenda are Sustainable Development Goals (SDGs). Teachers should consider it their responsibility to foster the development of sustainability competencies.

Aims: The intention is to provide biology teachers with a repertoire of activities enabling them to create interactive, learner-centred teaching and learning settings which promote the achievement of SDGs connected to climate action and sustainable use of ecosystems.

Materials and Methods: Review of selected sustainability learning objectives underpinning the cognitive, socio-emotional and behavioral domains. Presentation of promising sustainability practices by setting up a digital platform of resources.

Results: Best practice examples which comprise topics, teaching and learning activities, core and cross-cutting concepts and learning outcomes aligned to support the SDGs in secondary biology teaching. Problem-based, collaborative learning activities organized around eight key sustainability competencies enabling teachers to create a productive space where students can reflect on the SDGs and their own views.

Conclusion: Competency development is linked to knowledge acquisition and values clarification. Achieving SDGs includes active participation and motivates learners to become responsible sustainability citizens.

Keywords: *biology teaching, key sustainability competencies, learning activities, sustainable education goals*

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TESTING BIOMONITORING USEFULNESS FOR INDOOR POLLUTION

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Introduction: The quality of indoor air is a prerequisite for creating a healthy environment and is an especially important element connected with the health and well-being of the occupants. Since the 1970s, when the issue of energy conservation has become a priority, buildings have undergone important changes. The unexpected consequences at that time consisted of increasing indoor pollution.

Aims: Taking into account that plants can improve indoor air quality by simultaneously taking CO₂ and releasing O₂ through photosynthesis, depending on light and increasing air humidity through water vapor released from the leaves through the pores, this study aims testing the *Spathiphyllum* Schott. capacity to become a biomonitoring agent for PM air pollution.

Materials and Methods: The experiment was carried out between March and May 2019 within the L3 Laboratory of the Environmental Engineering Studies Program of the Faculty of Agriculture of the USAMV Cluj-Napoca. In the present study, the biological material consisted of the lily of the peace (*Spathiphyllum* Schott.). The loading of particulate matter (PM₁₀, PM_{2,5}) of the ambient air was quantified using a GRIMM EDM 180 extruder. Dry matter and ash were determined by the gravimetric method. Environmental quality parameters (temperature and relative humidity inside the laboratory), but also outside temperature were recorded.

Results: For the whole experimental period, an average PM_{2.5} of 11.06 µg/m³ and an average PM₁₀ in the experimental enclosure of 15.58 µg/m³ were recorded. Between the dry matter content of the plant foliage and PM_{2.5} and PM₁₀ load of indoor air, by experimental period, an interrelation is established, highlighted by the value of the multiple correlation coefficient $R = 0.223$.

Conclusion: The values of the correlation coefficients and determination coefficients suggest that there are interactions between the PM_{2.5} and PM₁₀ content in the indoor air, on one side, and the bioaccumulation capacity of the plant tissue, on the other side. This suggests that research concerning these interactions must be continued.

Keywords: *correlation, interactions, lily of peace (Spathiphyllum Schott.)*

THE INFLUENCE OF SOME ENVIRONMENTAL TRAITS UPON *Lavandula angustifolia* L. ESSENTIAL OIL

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Introduction. The increasing market demand of lavender oil is the reason why research in the field of increasing production of the above mentioned product became an important preoccupation for researchers. Among the notable influences upon lavender oil production, the environmental factors may be considered.

Aims. Testing environmental temperature and air relative humidity influence upon *Lavandula angustifolia* L., Mailette variety oil production has been the purpose of this study.

Materials and Methods. Flowers collected from the *Lavandula angustifolia* L., Mailette variety, from two cultivars founded in 2015, harvested in June 2019, were used. Temperature and air humidity were quantified using a mobile environmental station. Lavender oil was obtained by hydro-distillation, and oil quality was quantified using gas chromatography.

Results. The influence of the environmental temperature and air humidity on lavender oil production was quantified by calculation of the intensity of simple and multiple correlations between temperature, and airy humidity on one hand, and oil production on the other hand. The qualitative characterization of the lavender oil was identified using gas chromatographic analysis.

Conclusion. This study emphasized the influence of environmental factors temperature and air humidity on *Lavandula angustifolia* L., Mailette oil production, and possible influence of this factors also upon oil composition.

Keywords: *correlation, cultivar, distillation, production.*

CURRENT POLICIES AND STRATEGIES REGARDING CLIMATE CHANGE. CLIMATE AND ENERGY FRAMEWORK FOR 2030

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Introduction: Climate change is one of the greatest threats to the environment, the social and economic framework. Extreme climatic events, including heat waves, drought and flood periods, are expected to become more frequent and intense. In Europe, the highest temperature increases occur in southern Europe and in the Arctic. Precipitation decreases in southern Europe and grows in the north/northwest. It causes impacts on natural ecosystems, human health and water resources.

Aims: This paper aims to summarize aspects concerning the current policies and strategies regarding climate change, in context of the climate and energy framework for 2030.

Materials and Methods: The methodology of bibliographical study was implemented in order to elaborate the present paper.

Results: Even if policies and efforts to reduce emissions are effective, some climate change is inevitable. Therefore, strategies and actions to adapt to the impacts of climate change in Europe and especially beyond its borders must be developed as less developed countries are among the most vulnerable with the least financial and technical capacity to adapt. Romania, as a member country of the European Union, must act both to combat the causes of climate change (by reducing emissions) and to mitigate the effects (through adaptation actions).

Conclusion: The climate change adaptation component of the "National Climate Change Strategy 2013-2020" is intended to represent a general and practical approach to adaptation to the effects of climate change in Romania, providing directions and guidelines for different sectors to establish specific action plans. Will be updated periodically, taking into account the latest scientific conclusions on climate scenarios as well as sectorial needs.

Keywords: *climate change, policies, strategies, action plans, regulations.*

GUPPY FISH, *POECILIA RETICULATA*, ILLUSTRATE NEW MECHANISMS OF POLYMORPHISM DIVERSIFICATION, IMPORTANT FOR SPECIES ECOLOGY

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Introduction: Genetic linkage acting through crossing-over between X and X chromosomes, X and Y chromosomes, and autosomal gene recombination are the most important sources of color pattern polymorphisms in animals. Variability in male color patterns and fin morphologies in the guppy, *Poecilia reticulata*, a livebearing fish is an example of extreme pattern polymorphism.

Aims: We explored the possibility that crossing-over between Y chromosomes can also contribute to the high degree of pattern polymorphism in guppies because YY individuals are easily induced in the laboratory. However, note that YY individuals are also produced in natural populations.

Materials and Methods: We used captive bred guppies; half-black color pattern is generally determined by a dominant Nigrocaudatus II (Ni II) gene linked to the X chromosome. Three different YY males of wild-type phenotypes from our own biobase were used in this study. Their ascendants were Half-Black Guppy that have lost both their half-black pattern and X chromosomes. The sex-linkage of Ni II was used for easier genotype identification of the supermales. After their identification, they were progeny tested as described in the work of Petrescu-Mag (2007).

Results: Our results indicated that YY crossing-over was another important source of phenotypic variability - probably because recombination may be possible over the entire length of Y chromosomes, and at very high frequencies due to high degrees of homology. Thus, crossing-over between Y chromosomes is yet another mechanism that can contribute to extreme pattern polymorphism in the guppy, a popular aquarium and important research model species. The results were extensively presented in Petrescu-Mag & Bourne (2008).

Conclusion and Perspectives: Our finding is relevant to a better understanding of animal ecology and evolution.

Keywords: *Color polymorphism, ecology, Poecilia reticulata, sex-chromosomes.*

EVALUATION OF ANTHROPICAL PRESSURES ON COMMUNITY INTEREST HABITATS IN NATURA 2000 SOMEȘUL RECE

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Introduction: The list of habitats of community interest within the Natura 2000 site ROSCI0233, as provided in the Natura 2000 standard, comprises 8 habitats of community interest: boreal and alpine grasslands on siliceous substrate (6150); mountain meadows (6520); *Luzulo-Fagetum* beech forests (9110); *Asperulo-Fagetum* beech forests (9130); peaty vegetation (91D0 *); alluvial forests with *Alnus glutinosa* and *Fraxinus exelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) (91E0 *); acidophilic forests of *Picea abies* in the mountain region (*Vaccinio-Piceatea*) (9410); active peat (7110 *).

Aims: The aim of the paper is to ensure favorable conservation status for all types of habitats of Community interest in the Natura 2000 Somesul Rece site.

Materials and Methods: Two important activities were carried out: identification and inventory of habitats and assessment of negative influences affecting a habitat and the species that could affect its natural distribution area, its structure and its functions.

Results: The inventory activity identified all 8 habitats listed on the standard form in the field. The structure and functions of inventory habitats, such as: acidic peatlands, mountain meadows, boreal and alpine meadows on a silicon substrate that are found in good conditions without significant damage.

Conclusion: The assessment of the conservation status has highlighted the existence of significant anthropogenic pressures on some habitats (deforestation, land use change), which led to their unfavorable conservation status (habitat 9410, habitat 91D0*, habitat 91E0*, habitat 9110).

Keywords: *anthropogenic pressures, conservation status, habitats, identification.*

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SOLUTION FOR ENHANCING THE USE OF THE UNCONVENTIONAL ENERGY

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Introduction: The unconventional energies are a continuous challenge for the future. They may be a valuable alternative for fossil fuels use, as natural gas. The natural gas contains a certain amount of dust particles, small particles light rock, heavy metals, and other different substances.

Aims: The aim of this research is to emphasize solutions for enhancing the use of unconventional energy using literature data.

Materials and Methods: The bibliographic study, by consulting a series of reference sources, was used in order to obtain a general picture of the present systems used in order to assure appropriate solutions for enhancing the use of unconventional energy

Results: The use of unconventional energy, involves a series of processes excluding the preliminary and final treatments, with the aim of obtaining, as result, the sequential or simultaneous separation of the gaseous, solid impurities, also liquid impurities, and hydrocarbons, which are condensable. These operations are usually developed in order to ensure, where it is possible, best quality of the gas resulted from the process. A series of patterns, which may describe the use of unconventional energy systems destined to supply the necessary are available, worldwide.

Conclusion: The systems destined to improve the use of unconventional energy systems must be delivered only after a serious study of particular possibilities characteristics, meaning.

Keywords: *gas, impurities, pipeline, scaffolding.*

A COMPUTATIONAL STUDY ON HEALTH RISKS OF PAHS

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Introduction: Air pollution became a critical environmental problem. Noticeably, polycyclic aromatic hydrocarbons (PAHs) pose both high environmental and human health risk. In this respect, computational tools became valuable assets for prediction of effect assessments of pollutants.

Aims: This work focuses on computational evaluation of PAHs over some health risk alerts.

Materials and Methods: QSAR Toolbox v4.3 (Schultz et al., 2018) was used to predict and evaluate the bioaccumulating PAHs in oak barks (Birke et al., 2018) and urban area (Yli-Pelkonen et al., 2018) for *in vitro* mutagenicity (Ames test) alerts, *in vivo* mutagenicity (Micronucleus) alerts, carcinogenicity alerts and protein binding alerts for chromosomal aberration.

Results: Virtual screening of bioaccumulating PAHs for *in vitro* and *in vivo* mutagenicity and carcinogenicity alerts showed that indeno[1,2,3-cd]pyrene has two structural alerts (SAs) involved in all the three aforementioned health risks; most of the investigated PAHs having only one SA, while acenaphthene and naphthalene are free of such of SAs. The profiler for protein binding alerts for chromosomal aberration found that, with exception of fluorene, all investigated PAHs were free of SAs. Fluorene was found as carrier of a Michael acceptor, which can bind (irreversible) multiple targets with undesirable side effects over human health.

Conclusion: Computational tools can be a precise and rapid asset to evaluate the human risk of air pollutants in emergency studies and long-term exposure at air pollutants.

Keywords: *pollution, PAHs, QSAR*

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ASPECTS REGARDING THE ROMANIAN LAW IN THE FIELD OF ECOLOGICAL RESTORATION OF THE INDUSTRIALLY CONTAMINATED SITES

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Introduction: Ecological restoration of the industrially contaminated sites from Romania starts to become an important problematic fact due to the large land surfaces affected. These surfaces are usually placed in the path of urban development or in key points of urban areas and continues to affect the quality of life, environment and health of the population living in the neighboring areas.

Aims: The paper presents the tendencies in ecological restoration from worldwide, Europe and Romania and details the about the Romanian laws in this domain.

Materials and Methods: Bibliographic research was used to elaborate the paper.

Results: The Romanian law regarding the management of the contaminated sites is in inchoative state, transposing partially the European law which is as well unclear. Due to the lack of a clear legislative path, the funding for ecological restoration of the contaminated sites is limited.

The issue of ownership over these sites is also an aggravating factor in the restoration process and reinsertion of these surfaces in the functional circuit.

Conclusion: A worldwide interest is observed in the ecological restoration activity and management. In Romania the lack of legislation makes the process more difficult and due to this fact, the funding methods of the ecological restoration processes are limited. Positioned, in the past, in the suburbs of the cities, the old industrial sites, now abandoned and intensely polluted, affects the quality of life in the ever-expanding city areas and are a danger for health and environment.

Keywords: *contaminated sites, ecological restoration, legislation.*

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THE ROLE OF POLICY INCENTIVES FOR OPTIMIZATION OF THE ENVIRONMENTAL AND ECONOMIC PERFORMANCE OF CEREAL FARMS IN SOUTH-CENTRAL BULGARIA

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Introduction: Agriculture is a major driver of negative environmental impacts. The sector is the world's second largest emitter of greenhouse gas emissions and causes significant water pollution, soil degradation and biodiversity loss. The Common Agricultural Policy of the European Union has been addressing these issues through providing farmers with economic incentives for following environmentally sustainable farming practices.

Aims: The objective of this study is to examine how the policy incentives for environmentally-friendly farming practices for cereal crop production affect the environmental and economic performance of cereal farms in South-Central Bulgaria. The study aims to develop an optimal production structure for the region's model farm, which provides a minimal environmental impact and a maximal net income.

Materials and Methods: A model of a cereal farm is developed based on FADN data for the specialized cereal farms in the South-Central region in Bulgaria. LCA data is used for quantification of the environmental impacts; crop rotation is included as a precondition for soil health; and environmental priority area is devoted to securing the biodiversity in the model farm. Three scenarios are developed for the organic and conventional production of cereals: without subsidies; with CAP Pillar 1 direct payments; with compensatory payments for organic production. The model farm's environmental and economic performance is optimized through a multi-criteria optimization of the farm's production structure.

Results: Organic production generates lower negative environmental impacts and is preferred production system for the environmental objective of the study. The outcomes of the study indicate that the policy incentives play a significant role for the economic results of farms, especially for those specialized in organic production.

Conclusion: Agriculture plays an essential role for the delivery of some public goods and ecosystem services, but it can also cause severe negative impacts to the environment. In order to continue to provide these services, it is crucial for farms to achieve an optimal balance between their environmental and economic performance.

ALOE VERA CULTIVATION IN PARTICULAR ENVIRONMENTS

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Introduction: Among most practiced medicinal plants management techniques in Aloe Vera cultures we must mention the appropriate fertilization. By adopting these techniques an appropriate weed control may be practiced. According to literature, the suitable applications of correct soil fertilization with appropriate nutrients, may lead to decrease of weed attack severity.

Aims: Testing the influence of fertilization on weed occurrence in Aloe vera cultures within specific climatic conditions of Transylvania was the aim of our study.

Materials and Methods: The research was carried out on an experimental plot cultivated with Aloe Vera, in conditions of the same type and doses of fertilizers and herbicides were applied for both plots (control and experimental). The qualitative weed occurrence was recorded, and weed attack was quantified. Data were statistically processed.

Results: As expected, the best results were obtained in experimental plot where appropriate fertilization was practiced, previously to Aloe Vera culture installation. Even the same weed species were identified in both plots (with and without fertilization), in plot where fertilization was practiced, the weed attack was lower compared to control, the differences being statistically assured at statistical threshold of 0.1%.

Conclusion: The current practice of appropriate fertilization and herbicidation supplying, contributes to enhance Aloe Vera crop quality and quantity, by reducing the weed attack, and also reducing crop maintaining costs with herbicidation.

Keywords: *agriculture, plant protection, pollution, practices.*

SESSION 3: FOOD SCIENCE AND TECHNOLOGY

FOOD ANALYSIS BY USING ION CHROMATOGRAPHY. STATE OF THE ART

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Introduction: Food industry is worried about the safety of its products and the quality of all parts of the food production process need to be controlled. The requirements of analytical techniques used in food safety have increased and industry claims for simple, rapid, sensitive and reliable methods. In case of inorganic and organic ions and ionizable substances very useful instrumental method is ion chromatography (Weiss, 2016).

Aims: The aim of the work is presentation of principles and the latest ion chromatography solutions and applications in food research.

Materials and Methods: The definition of ion chromatography has been broadened to include other separation modes such as ion pair chromatography and ion exclusion chromatography, which are based on different separation mechanisms.

Results: Ion chromatography is increasingly being adopted by many test and research laboratories in food and beverage industry (Michalski, 2010). Most commonly determined in food samples are: inorganic anions (e.g. F^- , Cl^- , NO_2^- , NO_3^- , Br^- , I^- , PO_4^{3-} , SO_4^{2-}) and cations (e.g. Na^+ , K^+ , NH_4^+ , Mg^{2+} , Ca^{2+}); carboxylic acids (e.g. formic, citric, oxalic), metals ions (e.g. AsO_3^{2-} , CrO_4^{2-}) and organic substances (e.g. amines, carbohydrates). The key problem in application of ion chromatography in food analysis is sample preparation (Frenzel and Michalski, 2016).

Conclusion: Advances in ion chromatography has made this analytical technique becomes a very useful tool in food safety analysis. New developments in sample preparation, higher capacity of ion-exchange stationary phases coupled with high efficiency, different selectivity, solvent compatibility, and major diffusion of ion chromatography detection techniques other than conductivity cause its more widespread usability in food industry.

Keywords: *anions, cations, food analysis, ion chromatography, sample preparation*

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FOOD INDUSTRY WASTE AS BIO-ADSORBENTS FOR REMOVING HEAVY METALS FROM FOOD STUFF

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Introduction: Heavy metals are dangerous and toxic in nature because they tend to bio-accumulation living cells where the concentration of a specific chemical or a heavy metal increases the non-degradable toxic in nature. The use of bio-adsorbents for removal of toxic heavy metals from waste offers a relatively low-cost method with potential for metal recovery. The metal sequestering ability of adsorption technology offers great advantages as it does not produce sledges requiring further disposal, further it is highly selective, more efficient, easy to operate, can handle large volumes of waste containing low metal concentrations. Both commercial adsorbents and bio adsorbents are used for the removal of heavy metals from wastewater, with high removal capacity. The potential of the waste material on adsorbing toxic and heavy metals depends on the affinity, capacity and specificity including physico-chemical nature of it.

Aims:As managing waste materials on the whole especially developing countries are often unsatisfactory and the unreasonable disposal of waste is a major issue in the worldwide. Bread is one of the most consumed foods in the world and especially in Iran, and therefore the pollution of this product has become one of the major concerns of food safety. Accordingly, the research was conducted to evaluate the bioavailability of heavy metals using inexpensive waste as an alternative to the traditional methods.

Materials and Methods: In the current study, conventional flour of bread samples were analyzed in presence and absence of apple pomace, the apple pomace treated with citric acid 2%, using wet digestion of flour bread, in order to remove heavy metals, nickel and cadmium. Ion concentrations were determined in three replicates using method of inductively coupled plasma optical emission spectrometry.

Results: The results indicated that the nickel and cadmium concentrations of the samples decreased significantly after treatment with adsorbents ($p < 0.05$). Also, the use of 2% citric acid-modified apple juice significantly reduced the concentration of heavy metals, nickel and cadmium ($p < 0.05$).

Conclusion: The use of agricultural and food industry waste compounds has highly recommended to remove these contaminations from other food stuff and consequently the food chain.

Key words: *apple pomace, biosorption, cadmium, conventional bread, nickel*

STUDY OF *SCHIZOCHYTRIUM LIMACINUM* SR21 GROWTH IN A BIO-WASTE MEDIUM TO EXPLORE THE CAPACITY OF PRODUCING POLYUNSATURATED FATTY ACIDS

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Introduction: *Schizochytrium limacinum* is a species of thraustochytrids, different from other *Schizochytrium* species due to its cell size, assimilation profile of carbon sources, and high capacity to use different substrates to produce polyunsaturated fatty acids (PUFAs), and especially ω -6 and ω -3 forms [e.g. docosahexaenoic acid (DHA)]. Bio-waste substrates with high volatile fatty acids content can be ideal carbon sources for *S. limacinum*.

Aims: To investigate the capability of *S. limacinum* to produce biomass using a waste-based medium containing carbon sources, and to extract and purify the biomass-derived PUFAs.

Materials and Methods: *S. limacinum* SR21 (ATCC MYA-1381) was purchased from ATCC. The cells were activated in a medium (5 ml) containing glucose, yeast extract, and sea salts, and then transferred into fermenters with volumes of 5 L, where specific parameters, such as temperature, pH, O₂ level and rpm values were monitored. Samples collected daily were centrifuged at 1000 rpm, 15 min and 4 °C, and the pellet was washed using 0.9 % NaCl. Derived biomass was purified and the extracts were analyzed by GC-MS for PUFAs profile identification.

Results: *S. limacinum* was able to grow on the waste-based substrate with a maximum biomass production yield after 80 h of fermentation. DHA extraction yield ranged between 61.5 and 121.2 mg DHA/g lipids. Accumulation of PUFAs was dependent mainly on substrate concentration and O₂ levels during fermentation.

Conclusion: *S. limacinum* SR21 was successfully grown and produced DHA using a waste-based substrate. Monitoring the specific fermentation parameters throughout the process is crucial for optimum results. The purification process can be further optimized to increase DHA yields.

Keywords: *Bio-waste, DHA, S.limacinum, PUFA*

Acknowledgment: This research was funded by two grants from the Ministry of Research and Innovation: CNCS–UEFISCDI, project number PN-III-P1-1.1-TE-2016-0661, within PNCDI III; and MCI-UEFISCDI, project number 37 PFE-2018-2020“Cresterea performantei institutionale prin mecanisme de consolidare si dezvoltare a directiilor de cercetare din cadrul USAMVCN”.

ANTIMICROBIAL ACTIVITY OF DIFFERENT SPECIES OF ALGAE - REVIEW

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Introduction: Seaweeds provide a rich source of diverse secondary metabolites. These secondary metabolites offer defense against fouling organisms and pathogens, play a role in reproduction, protection from UV radiation and as allelopathic agents. The bactericidal agents found in algae include amino acids, terpenoids, phlorotannins, acrylic acid, phenolic compounds, steroids and many others.

Aims: Taking into account the different uses for algae we decided to make more obvious the antimicrobial assessment.

Materials and Methods: Algae were triturated in a fine powder and for extraction solvents we chose methanol, ethanol, chloroform and diethyl ether. Extraction solvent was evaporated under vacuum and used for antibacterial assay by paper disc diffusion method and minimum inhibitory concentration method using the broth microdilution method. Test microorganisms were cultivated on Mueller Hinton Broth at 37°C for 18 h before inoculation for assay.

Results: *Ulva lactuca* presents a low antimicrobial activity against *Escherichia coli* compared to other species. *Ulva lactuca* was the most effective marine algae against the tested bacterial and fungal species. *Escherichia coli* and *Staphylococcus aureus* were inhibited by a chloroform extract of *Ulva lactuca*. *Cladophora vagabunda* presented a good antimicrobial activity against *Staphylococcus aureus*. *Stocheospermum marginatum* is a red algae with a good antimicrobial activity against many bacteria, except *Escherichia coli* (like *Proteus mirabilis*, *Klebsiella pneumoniae*, *Enterococcus faecalis*, *Bacillus subtilis* and others). *Cladophora elongata* in a chloroform extract was able to inhibit *Salmonella sp.*

Conclusion: In the present work, we presented the antimicrobial activity of some species of algae and the benefits of them being used in the food industry (for protection against fouling or as a supplement).

Keywords: *algae, antimicrobial activity, metabolites*

FOOD HYPERSENSITIVITY AND THE IMPORTANCE OF ROUTE OF EXPOSURE TO ALLERGENS AND ENVIRONMENT

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Introduction: Food allergy prevalence dramatically increased over the past decades and is reported to affect both adults and children, therefore being a common, but also potentially life-threatening condition. Allergies have a big impact on patients' diet and lifestyle and represent an economic burden for healthcare systems. Hypersensitivity to food allergens can be acquired through several routes of exposure, moreover *de novo* sensitisation can be developed after inhalation or skin exposure.

Aims: This paper aims to present an overview on the development of food allergies, human body barriers in relation with the immune system with a focus on the importance of route of exposure.

Materials and Methods: A desk-based literature review of published research papers on food allergies, routes of exposure to food allergens and the environmental factors is carried out.

Results: Food allergy is a nontoxic, immune mediated adverse reaction to certain chemicals in foods. The allergic reaction can be induced in sensitised subjects following exposure to allergens present in food. The allergy may also develop through non-gastrointestinal exposure, by inhalation and skin application and can impact not only the gastrointestinal tract, but can affect other organ systems, leading to mild local reactions or severe systemic effects. Management of food allergies consists of avoidance of ingestion of the responsible allergen or initiation of therapy in case of unintended exposure.

Conclusion: Food allergen ingestion can lead to tolerance or trigger an allergy, while inhalation or topical exposure may induce sensitisation and a secondary exposure lead to elicitation of an immune reaction.

Keywords: *allergen, immune system, route of exposure, sensitisation*

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WHEAT AND OAT BRAN WASTES' BIOACTIVE COMPOUNDS AND THEIR INCREASED BIOAVAILABILITY DURING SOLID-STATE FERMENTATION

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Introduction: Nowadays, cereals bran, although perceived as waste, are among the cheapest, highly available and natural occurring-phenolic sources, but with reduced bioavailability. A priority strategy targets the release of bound phenolic acids in matrices before consumption, for an increased health effect due to improved bioavailability, whereas bioprocessing is a promising route.

Aims: In the present study, commercially available *Saccharomyces cerevisiae* yeast strain under solid-state fermentation (SSF) conditions were used to improve the extractable phenolic acids composition and antioxidant activity of commercially wheat (WB) and oat bran (OB).

Materials and Methods: The ultrasound-assisted methanolic extracts were compared for their total phenolic content (TPC), phenolics composition, and *in vitro* antioxidant activity for study the effect of fermentation time.

Results: The comparison revealed significant differences ($p < 0.05$) between days of fermentation. The maximum increase of TPC was registered on day 3 for WB (+112%), and day 4 for OB (+83%) vs. control. The highest relative percentage increase in phenolics composition of WB was registered on day 3 (ferulic acid +56.6%, vanillic acid +259.3%, di-hydroxybenzoic acids +161.2%, apigenin-glucoside +15.3%), while for OB on day 4 (avenanthramide 2f +48.5%, ferulic acid +21.2%). Fermented WB and OB displayed enhanced DPPH percentage inhibition on day 3 (51%), and day 4 (64%), respectively, significantly correlated to TPC.

Conclusion: SSF can be applied for enriching the phenolic acid contents and antioxidant activity, thereby improving their bioavailability from WB and OB. Cost and availability are the main factors to be considered in the choice of a residue as a substrate or support in SSF.

Keywords: *antioxidants delivery, bioprocess, enzymes*

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CANNABIS SATIVA: HEALTHY FOOD SUPPLEMENTS

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Introduction: Hemp (*Cannabis sativa*) is an annual herbaceous plant that has been utilized for therapeutic and recreational purposes, Δ -9-tetrahydrocannabinol (THC) being the key psychoactive constituent (Bonini *et al*, 2018). Hemp varieties licensed for farming in the European Union (EU) should have a THC content of less than 0.2% (Matthäus & Brühl, 2008). Industrial hemp is a variety of *Cannabis sativa* of the same plant species as marijuana (Johnson, 2014) and has long been cultivated for its fibre and oil (Oomah *et al*, 2002). Hemp seed and oil are used in a range of foods and food supplements due to their nutritional value and health benefits associated with it (Leizer *et al*, 2000).

Aims: Hemp benefits are still little known in Romania. The purpose of this paper is to emphasize the nutritional value of hemp by-products and the importance of increasing the consumption of this healthy food supplement.

Materials and Methods: This study was performed by reviewing scientific articles with the purpose of explaining the nutritional benefits of *Cannabis sativa* by-products.

Results: In recent years, the benefits of industrial hemp in food and pharmaceutical products have been recognized due to the high nutritional value (Pojić *et al*, 2015), which drew an increase in demand for hemp seed, and food products derived from hemp seed, like oil, flour, milk, bakery products, chocolate (Mihoc *et al*, 2012). Hemp seeds are a superior source of protein, providing reasonable quantities of eight essential amino acids (Matthäus & Brühl, 2008). Hemp seed oil is considered a perfectly balanced food due to its content of polyunsaturated essential fatty acids, particularly the 3:1 perfect ratio of omega-6 and omega-3 (Pojić *et al*, 2015) that ensures anticancer, anti-inflammatory and anti-thrombotic properties, enhancing also the burning of fat (Leizer *et al*, 2000).

Conclusion: This review focuses on the composition and roles of hemp in human health and diet and its use in dietary supplements. *Cannabis sativa* seeds and oil are functional foods which help maintaining the optimal state of physical and mental health (Leizer *et al*, 2000).

Keywords: *Cannabis sativa*, hemp seed, hemp seed oil, nutritional value

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BIOACTIVE POTENTIAL OF FRUIT AND VEGETABLE WASTES

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Introduction: *Catharanthus roseus* is known to produce numerous alkaloids with high pharmaceutical importance such as vinblastine and vincristine which have antineoplastic activity (Morales, 1998). Since 1998, it was demonstrated that elicitation of grapevine cell cultures with cyclodextrins (CDs) induced the production of resveratrol (Bru and Pedreño, 2003) as proved by Pedreño *et al.* (2008).

Aims: Taking into account the former experimental models of elicitation, we considering that dimeric alkaloids are produced at very low levels in *Catharanthus roseus*, cell cultures were studied as a potential way to produce these compounds as monomers. Among different strategies to increase alkaloid production, elicitation could be one efficient strategy to provoke important increases in product yield.

Materials and Methods: Cell cultures were produced by the measurements were done.

Results: The combined use of methyljasmonate (MeJA) and CDs provoked a synergistic effect increasing even more the levels of resveratrol in grapevine cell cultures. The effect of CDs on resveratrol production allowed the development of an innovative procedure where high levels of this metabolite were accumulated and were easily recovered directly from the culture media without cell biomass destruction (2).

Conclusion: In the present research work, we demonstrated that this innovative technology focusing on alkaloid production improvement by elicitation of *Catharanthus roseus* cell cultures with a combination of both MeJA and CDs, is successful.

Keywords: *Catharanthus roseus*

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MILK CHOLESTEROL REDUCTION AT PILOT STATION LEVEL USING BETA-CYCLODEXTRIN

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Introduction: Cardiovascular diseases caused by higher levels of cholesterol are ranked as the first cause of death in Europe (<http://www.heartcharter.org>).

There are many other effective ways of reducing cholesterol from food, but they generate safety issues. Thus, it has passed to the use of non-toxic compounds, edible and chemically stable, as β -cyclodextrin which demonstrated to be effective (Dias *et al.* 2010).

Aims: The objective of this study was to investigate the possibility of milk cholesterol removal using beta-cyclodextrin at pilot station scale, because there is very little information in this regard.

Materials and Methods: Raw milk was purchased from the local market and high purity beta-cyclodextrin from Chengdu Healthlife Biotechnology Co.,China.

Raw milk was treated with 0.6 % beta-cyclodextrin in refrigeration conditions and then it was processed as drinking milk.

Cholesterol content was determined using YL9100 HPLC with UV-VIS detector. The samples were prepared by saponification, followed by hexane extraction and evaporation.

Physical-chemical analysis were performed using the LactoStar FTIR Milk Analyzer.

Results: The cholesterol content analysis of the beta-cyclodextrin treated milk compared with the control milk samples showed an average reduction of about 81.5 %.

The physical-chemical analysis indicated no major changes of the main components' values, which suffered a small increase due to the milk concentration during pasteurization. The cholesterol removal is signalled by this method too, fat content being the only value that decreased with 6.12%.

Conclusion: The present study demonstrates that the beta-cyclodextrin treatment of milk can be successfully applied also at pilot scale, having an average cholesterol reduction of about 81.5 %.

Keywords: *beta-cyclodextrin, cholesterol, milk*

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BIOCHEMICAL AND HISTOLOGICAL CHANGES IN RAT BRAIN CAUSED BY SUPPLEMENTATION OF ALPHA-TOCOPHEROL

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Introduction: Alpha-tocopherol (α T) is the most effective chain-breaking, lipid soluble antioxidant in biological membranes. Many studies have demonstrated the potential effects of on the activities of antioxidant enzymes and lipid peroxidation (Ammouche et al. 2002). But α T can act as a prooxidant and increase peroxidation of lipids (Rouaki et al. 2014).

Aims: The objective of this present work is to determine the effect of supplementation with α T at different doses (600, 1200 and 1800 mg d' α T/kg of food) for 8 weeks, on brain protein content, the malondialdehyde (MDA) and catalase (CAT) activity, as well as brain histology of Wistar rat.

Methods: The extents of lipid peroxidation were determined by the TBA reactive substances assay, CAT activity was based on the disappearance of H₂O₂ at 240 nm.

Results: The main results show a significant reduction in the MDA of the batch supplemented with 600 mg of α T / kg food. We obtained for the batch supplemented in 1200 and 1800 mg d' α T/kg of food, a significant decrease of the activity of the CAT and a significant increase of the rate in MDA. For these last two batches there was an imbalance of the oxidizing/antioxidant balance due to the fact that α T with such amounts did not act as an antioxidant but rather as a pro-oxidant. Histological sections have confirmed all of these results.

Conclusion: a severity of action of oxidized oil is clearly shown, but if it is incorporated with a moderate dose of α T in the food it loses its toxicity. Finally, a high level of α T significantly increases the toxic effect of this oil, and result in a pro-oxidant effect.

Key words: *α -tocopherol, brain, prooxidant, rat*

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CONSUMER PREFERENCE FOR DOMESTIC BEEF VERSUS ANGUS BEEF

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Introduction: On Romanian market there are available mainly two types of matured beef: *Black Angus* and *Romanian Spotted* (“*Bălțată românească*” - Romanian).

Aims: The objective of study was to evaluate the consumer’s preference for beef meat.

Materials and Methods: Two cuts of matured beef - sirloin and ribeye steak boneless from both *Black Angus* and *Romanian Spotted* - were bought from a local butchery. Four samples were medium-done prepared, uniquely identified by three digit codes and randomly served to 15 panellists (each piece 2,5x2,5x1cm size). The test included demographic information, consumption habits, hedonic evaluation, quality for consumption (AMSA, 2015) and preference test. According to AMSA, 2015, the 8 point scale was applied for evaluation of beef quality for consumption (where 1=not at all/extremely unpleasant and 8=very much/extremely pleasant). Samples were evaluated immediately after cooking. Participants received water and bread to neutralise the taste between the samples. Salt and pepper were provided *ad libitum* for each participant to adjust the seasoning sample according to their own taste.

Results: The scores obtained for each sensory attribute of sirloin were significantly higher ($p<0.05$) for *Romanian Spotted* than *Black Angus*. The scores obtained for ribeye were significantly higher ($p<0.05$) than the scores obtained for sirloin for both beef species. *Romanian Spotted* cuts were preferred by 11 panelists.

Conclusion: This is the first comparative study between the sensory attributes of *Romanian Spotted* and *Black Angus*. The consumers preferred the *Romanian Spotted* cuts, due to their juiciness and tenderness.

Keywords: *beef consumers, sensory characteristics, Black Angus, matured meat, Romanian Spotted*

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DNA-BASED METHODS FOR WINE AUTHENTICITY TESTING: A NEW PERSPECTIVE IN VARIETAL IDENTIFICATION

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Introduction: Wine is one of the most common beverages due to its wide range of sensory characteristics such as its color, flavor and taste. Lately, regular and moderate wine consumption, especially red wine, has been considered beneficial for human health (Guilford and Pezzuto, 2011). Wine production is an important worldwide agricultural activity which are profitable for many adjacent economic sectors. Due to the worldwide importance of food products, the new strategies in control of adulteration and counterfeiting of wine became of primary concerns to producers, retailers, and consumers. In this context, wine authenticity became an extensively investigated subject together with wine traceability. The authenticity of wine is guaranteed by strict regulations provided by the responsible national authorities. Besides, the laws of the European Union also regulate wine production conditions in terms of origin, chemical composition and treatments applied to avoid counterfeiting. Regarding quality wine production, especially with Denomination of Origin (D.O.C.), only a limited number of grape cultivars are allowed to be used in the winemaking process and the use of other varieties is only permitted in legally defined percentages. To prevent fraud, a steadily growing interest was observed on developing different methods for wine authentication.

Aims: The main aim of this review was to highlight the need and advantages of using DNA marker systems to determine the original grape varieties used for must and wine to assess traceability and authenticity.

Conclusion: The development and improvement of biotechnological testing methods (especially those, based on fingerprinting of residual DNA) for wine authentication is a real scientific challenge to ensure food safety and quality.

Keywords: *authentication, DNA-fingerprinting, grapevine, winemaking, wine*

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THE CORESPONDENCE BETWEEN METAL OXIDE NANOPARTICLES AND THE ACUMULATION OF PROTEINS IN SOYBEAN PLANTS GROWN ON HYDROPHILIC MEDIUM

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Introduction: Due to a large scale use of engineered nanoparticles (ENPs) in various industries, their presence in the environment is constant and the quantities are increasing each year. There are many studies focused on the interaction of this ENPs with plants, especially with the edible ones, due to the possibility to produce changes in the bioaccumulation of different active compounds in plants. Zinc oxide nanoparticles (ZnO NPs) and titanium dioxide nanoparticles (TiO₂ NPs) are found in the environment and their capacity to affect plants is dependence of their concentration, size and shape.

Aims: The aim of this research was to establish the place and quantities of ZnO and TiO₂ NPs in soybean plants grown on hydrophilic medium, and also to determine the variations in protein accumulation linked to the concentrations of nanoparticles

Materials and Methods: We manage to evaluate qualitative and quantitative the internalization of nanoparticles in soybean plants grown on hydrophilic medium enhanced with various concentration of nanoparticles range from 10 mg/L up to 1000 mg/L using inductively coupled plasma-optical emission spectrometry (ICP-OES), and the protein content from soybean plants grown in identical conditions were evaluated by Kjeldhal method.

Results: The accumulation of nanoparticles in soybean plants is done in all parts of the plants from roots to leaves and we observed that ZnO NPs are internalized in quantities larger up to 40 higher compared to TiO₂ NPs.

Conclusion: The presence of ENPs in our day by day life is inevitable so that it is of crucial importance to evaluate their possible effects in edible plants such as soybean. In this study we managed to localize the accumulation of NPs in plants and also to establish a trend-line regarding the accumulation proteins in soybean plants.

Keywords: *protein, soybean plant, TiO₂ NPs, ZnO NPs*

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REDUCING SUGAR IN FOOD BY OBTAINING POLYOLS

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Introduction: It is noteworthy that, due to the lifestyle of today, the number of people suffering from obesity and diabetes increases continuously (1). Furthermore, more than 1,106,500 children live with type 1 diabetes (2). To counteract this trend, humans need to consume low-calorie, healthy food, with low added sugar (1). A solution to reduce sugars would be to replace sugars with low-glycemic index polyols.

Aims: In general, polyols are not carcinogenic and do not trigger a glycaemic response; and therefore, are widely used in hypocaloric patients, diabetic patients and other specific cases where caloric intake should be controlled. In recent years, erythritol and mannitol have gained more and more importance, especially in the food industry. In this area, research efforts have been made to improve the productivity and yield of the two polyols in a commercially useful manner, relying on biotechnological production.

Materials and Methods: Lactic acid bacteria are a group of microorganisms especially suited for the production of polyols as a result of their fermentative metabolism correlated with an important redox modulation and a limited biosynthetic capacity.

Results: Lactic acid bacteria participate in food fermentation processes, where *in situ* polyol production during fermentation can be useful in the development of new functional foods (3).

Conclusion: In the present research work, it has been demonstrated that this innovative technology using biotechnological processes to produce compounds with desired features but requiring lesser management can also be applied to those lactic acid bacteria that can produce significant amounts of erythritol and mannitol.

Keywords: *biotechnology, polyols, sugar reduction.*

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HEAVY METALS IN HONEY PRODUCED IN THE REGION OF BLIDA (ALGERIA)

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Introduction: The presence of some substances such as pesticides and heavy metals has made this natural substance a possible source of intoxication (Matin *et al.* 2017). In Algeria, owing to the different incentive programs launched by State, the apiculture sector has experienced a significant expansion over the past years. Thus, national production has jumped from 2875 tons in 2004 to 5000 tons in 2017 (ANAP, 2017).

Aims: The present work focuses on the search for some heavy metals in six honeys collected from different melliferous regions of Mitidja.

Materials and Methods: The honeys studied were the subject to a sensory analysis including taste, smell, and consistency, in addition to physico-chemical characterization including pH, acidity, water content, Brix, conductivity and Hydroxymethylfurfural HMF, microbiological followed by a assay, by atomic absorption of metallic trace elements, such as Fe, Zn, Cu, Ni, Pb and Cd.

Results: The physico-chemical quality of honey is in accordance with the recommendations of the Codex Alimentarius (1981) with an acidity between 19 and 45 Meq / kg, at pH between 3.37 and 4.01, a water content between 15.8 and 17.4%, 81% and 82.6%, a conductivity between 0.25 and 0.64% and a HMF content of between 5.23 and 32.18 mg / kg. a total sugar content between 87.36 and 94.84%. Concentrations of trace elements vary from 0.62 to 3.78 mg / kg and 4.11 to 12.98 mg/kg and 0.60 to 1.80 mg/kg and 0.15 to 0.85 mg/kg for Zn, Fe, Cu and Ni respectively. However, Cd and Pb were detected in the majority of the allowable value, from 4.77 to 9.60 mg/kg for Pb and from 0.25 to 1.54 mg/kg for Cd.

Conclusion:

For the physicochemical level and despite the difference observed between the analyzed parameters, the honeys analyzed are of good quality according to the codex alimentarius. Pb was detected in four (04) samples with a high concentration

Keywords: *Blida, honey, metals, Quality.*

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CAFFEINE ANALYSIS IN SOFT AND ENERGY BEVERAGES BY RP-HPLC METHOD

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Introduction: Energy beverages and soft drinks with caffeine content such as Coca Cola are largely consumed in Romania. But, in excessive amount, caffeine intake can produce health issues such as myocardial infarction and arrhythmia (Willson, 2018).

Aims: The purposes of this research were: to establish the optimal HPLC chromatographic condition of operation for the separation and determination of caffeine concentration in energy and soft drinks; the analysis of such several drinks purchased from local market; the assessment of daily intake due to these beverages for students.

Materials and Methods: Different assortments of energy and soft drinks containing caffeine were purchased from local market. A HPLC chromatograph was used. A reverse phase (RP) HPLC method was optimized considering the literature information (Motoro and Beyen, 2017) and adapted for the determination of the caffeine in energy and soft drinks like Coca Cola. Eclipse XDB-C18 column 4.6 x250 mm was used and mobile phase was water:methanol = 53:47 (v/v). Linearity of the method was established from 10- 60 mg/L.

Results: The energy beverages analysed (4 assortments) ranged between 153 and 330 mg/L caffeine while the Coca Cola or similar drinks (4 assortments) contained 80-95 mg/L caffeine. The related daily intake of caffeine established based on questionnaires was lower than 400 mg per day considered safe in healthy adults.

Conclusion: The optimal chromatographic conditions for analysis were established. The content of caffeine in soft and energy beverages analysed was found to be safe for a moderate consumption.

Keywords: *caffeine, Coca Cola, energy drinks, HPLC*

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THE PRODUCTION OF VALUABLE COMPOUNDS FROM INDUSTRIAL WASTES BY *CANDIDA ZEYLANOIDES*

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Introduction: Organic acids such as citric and succinic acids are well-known bulk chemicals with food industry applicability that are produced in massive quantities worldwide, and are obtained particularly by means of microbial fermentations. Both citric and succinic acids can be synthesized in large amounts by specific yeast strains from industrial wastes, like crude glycerol that results from biofuels manufacturing. Most *Candida* species are lipophilic strains and can grow efficiently on crude-glycerol, and, at the same time, to biosynthesize citric and succinic acids.

Aims: The present work targets to evaluate the potential of *Candida zeylanoides* ATCC 20367 to use the industrial wastes like crude glycerol as the main nutrient source in the production of citric and succinic acids.

Materials and Methods: The experimental work consisted of crude glycerol fermentation for 7 days at the bioreactor level, at a constant temperature, rotations, and pH. The yeast viability, substrate consumption, and organic acids production were monitored throughout the experiment.

Results: The adaptation capacity and the growth of the cells of *C. zeylanoides* ATCC 20367 in media containing crude glycerol were noticeable. Important results with respect to microbial bioconversion of glycerol into citric and succinic acids were registered.

Conclusion: Industrial wastes like crude glycerol derived from biofuels processing represent a valuable source of nutrients for yeast strains like *C. zeylanoides* ATCC 20367, which further bio-synthesize important chemical compounds such as citric and succinic acids.

Keywords: *citric acid, crude glycerol, fermentation, industrial wastes, succinic acid, yeast strains.*

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COMPARATIVE ANALYSIS OF MAJOR CATIONS' PROFILE FROM SEVERAL MINERAL WATERS' BRANDS FROM ROMANIA AND POLAND

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Introduction: An increasing people's mistrust in drinking water quality, as well as a growing concern for a better health status and a change in mentality has led in the last years to a continuous rise in the consumption of mineral waters all over the world. Most mineral waters can be considered important sources of micro- and macroelements for humans, the bio-availability of magnesium and calcium being of wider interest, while the overall composition may induce supplementary beneficial health effects. Such a situation has to be supported with a proper knowledge on the chemical composition and the quality of bottled mineral waters has been controlled systematically.

Aims: The aim of the study was to compare the content of major cations (Na^+ , K^+ , Ca^{2+} , Mg^{2+}) in several mineral waters' brands from Romania and Poland market.

Materials and Methods: Mineral waters' bottles were acquired from supermarkets from Poland (25) and Romania (16). The major cations (Na^+ , K^+ , Ca^{2+} , Mg^{2+}) were determined using a Shimadzu system (Japan) consisting of one Prominence LC-20AP solvent delivery module, a Prominence DGU 20As degasser, a SIL-10AF automatic sample injector, a CDD-10Avp conductivity detector, a Prominence CTO-20A column oven and a Prominence CBM-20A system controller. Isocratic separations were conducted at 40°C, using a Universal Cation 7u column (100 x 4.6 mm–Alltech Associates), the mobile phase being a 3 mM methanesulfonic acid solution, at 1 mL min⁻¹. Instrument control, data acquisition and data analysis were accomplished by „LCsolution” ver.1.2. software. The data matrices were processed in Microsoft Excel (Microsoft, USA), then principal component analysis and cluster analysis were performed after mean center preprocessing using MatLab (The Mathworks Inc., USA).

Results: The reported data were obtained using a validated ion chromatography method; water samples were divided into still, lightly sparkling, sparkling and medicinal mineral water, a chemometric evaluation of the results being carried out. The concentrations' ranges were: 2.41–399.14 mg/L Mg^{2+} , 0.61–292.44 mg/L Na^+ , 2.85–165.14 mg/L Ca^{2+} and 0.05–6.65 mg/L K^+ .

Conclusion: The mineral waters are the preferred alternative to tap water as there are considered a more natural, pure and healthier option, with a better taste. The chemometric analysis emphasized similarities among Polish and Romanian brands, as well as mineral waters with very low mineral content and samples with high mineralization.

Keywords: *ion chromatography, major cations, mineral water*

INVESTIGATION OF HONEY BOTANICAL ORIGIN AND PROTEIN PATTERN

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Introduction: FAO estimated the worldwide honey production at 1861 thousand metric tons in 2018. The 2001/110/EC defined honey as a natural sweet substance made by honey bees by combining plant nectar or honeydew to which they add their own secretions thus the final product consists of vegetal and animal origin proteins.

Aims: Honey has an important role for the insect nutrition as well for humans which consume it for beneficial health effects. Some of these effects could be attributed to the proteins present (Buttstedt *et al.* 2014). Therefore, the aim of the study was to investigate the protein patterns of diverse botanical origin honey samples.

Materials and Methods: In this study 42 honey samples from different sources were examined for their botanical origin by using melissopalynology and for protein patterns by electrophoresis on SDS polyacrylamide gels (SDS-PAGE).

Results: The SDS-PAGE indicated that the different origin honeys shared the protein bands between 45 and 85 kDa (animal origin proteins like major royal jelly proteins, enzymes) and that specific proteins can be attributed to individual honey type. The melissopalynological analysis consisted in counting all melliferous pollen, non-melliferous pollen and honey dew elements in order to identify the species of pollen present in the honey samples. Some honey samples had predominant pollen from *Fagaceae*, *Apiaceae*, *Myrtaceae*, *Boraginaceae* and *Brassicaceae* family. From the *Fagaceae* family the most important species was *Castanea sativa*, while the *Baraginaceae* was represented by *Echium spp.*, *Brassicaceae* – *Brassica spp.*

Conclusion: The results presented in this study confirm the findings of previous research on honey proteome and emphasise the importance of honey protein diversity that may be linked to exhibiting biological properties when consumed by honey bees as well as by humans.

Keywords: honey, melissopalynology, proteins, SDS-PAGE

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EFFECTS OF RESIDUAL METAL OXIDE NANOPARTICLES ON SOYBEAN PLANTS PHOTOSYNTHESIS

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Introduction: Engineered nanoparticles (ENPs) are in continuous expanding in terms of production and application. Plant biomass counts approximately 80% of the total biomass on earth. Therefore it is understood that plants play an important role in the circulation of ENPs in the ecosystems. In the past two decades, due to important advancement in analytical and imaging techniques, numerous studies have aimed to clarify and quantify the interactions between ENMs and edible plants, in order to establish the potential of ENPs to interfere in the human organism.

Aims: The aim of this research was to establish the potential effects of titanium dioxide and zinc oxide nanoparticles (NPs) on the growth of soybean plants, as well as on the carotenoids, chlorophylls and C vitamin profile

Materials and Methods: Chlorophylls, carotenoids and C vitamin were determined by HPLC chromatography from samples growth on liquid medium with the concentration of established nanoparticles between 10-1000 mg/L. The extraction of carotenoids and chlorophylls was achieved by solvent extraction using a mix of methanol, ethyl acetate and petroleum alcohol.

Results: We observed a decrease in chlorophylls, carotenoids and C vitamin with the increase of zinc oxide NPs concentration, and also the concentrations of this type of NPs interfered in the development stages of the plant, affecting the roots and the stem of the plant. Regarding TiO₂ NPs, the external aspects of the plant showed improvements at lower concentrations, but the stress level of the plant was observed by the increased quantities of pheophytin a and b.

Conclusion: The presence of ENPs in our day by day life is inevitable so that it is of crucial importance to evaluate their possible effects in edible plants such as soybean. In this study we managed to localize the accumulation of NPs in plants and also to establish a trend-line regarding the accumulation of the most important bioactive compounds in soybean plants.

Keywords: *carotenoids, chlorophylls, TiO₂ NPs, ZiO NPs*

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CELLULAR DISTRIBUTION AND BIOCOMPATIBILITY OF NORBIXIN IN HUMAN RETINAL EPITHELIAL CELLS

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Introduction: Norbixin is a water-soluble pigment, a carotenoid present in the annatto natural colouring (E160b). Annatto is composed of the fat-soluble bixin and the dicarboxylic acid norbixin. These dyes are widely used as food pigments with applications in cheese, butter, sausages, ice cream, meat, etc. Recently, norbixin was shown to have important protective effects against age-related macular degeneration (AMD) [1], AMD being a major cause of blindness worldwide.

Aims: The aim of the study was to assess the biocompatibility and cellular internalization and distribution of norbixin in human retinal epithelial (D407) cells.

Materials and Methods: The D407 cells were grown on high glucose DMEM medium and were exposed to different concentrations of norbixin (10-400 μ M). The identification of norbixin and its intracellular distribution was assessed using Raman mapping and Dark Field Hyperspectral imaging. The cytotoxicity was evaluated by viability tests, and the spectral characterisation of norbixin was achieved by UV-Vis and Raman Spectroscopy.

Results: Norbixin acts as a stimulator in growth of D407 cells, and it becomes cytotoxic only in the high concentration range. Norbixin was internalized in the D407 cells cytoplasm, the accumulation being predominant in the region surrounding the nucleus.

Conclusion: The carotenoid norbixin can stimulate D407 cell growth and is easily accumulated in the cells. The results are promising for future detection of other internalized carotenoids and their intracellular distribution.

Keywords: *carotenoids, D407 cells, norbixin, uptake*

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APPLICATION OF QUALITY TOOLS FOR THE DERIVATIVE OF THE CONFORMITY OF PRODUCTION OF THE CHEESE A PRESSED DOUGH UNCOOKED "MONTASIO"

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Introduction The Algeria is a country of tradition dairy, milk and dairy products occupy a prominent place in the diet of the individual, they provide the biggest share of animal protein and contribute to cover the needs in energy and nutrient elements.

Aims: In the food industry, the sector "milk and derivatives" is booming, with an annual growth of around 8%. However, hard and semi-hard dough cheese remains little introduced in the flat Algerian because its high price. The citizen consumes so the melted cheese.

Material and methods: The methods used for physicochemical analyzes determinations, the total nitrogen content and microbiological analyzes are classic methods.

Results and discussion: The buds default flavor' noncompliance revealed a rate of 12.66%. The non-conformities related to texture revealed a rate of non-compliance of 26 %. The non-conformities of surface revealed a rate of non-compliance of 56.66% (colorful beaches, mould on the surface during ripening). Absolute compliance analytical physicochemical, biochemical, microbiological, temperature, pH, acidity and the boil density test (Joffin C and Joffin J.N. (2013). The microbiological results show that the pasteurization process reduces the initial microbial load and bring it back at a satisfactory rate. According (Cheftel *et al.* 1992), good microbiological quality the water results from the germicide action of the chlorine. Results of the analyses of the finished product: the 300 batches of MONTASIO referred to are of good quality, physicochemical and microbiological. The plan: **what? Which? Where? When? How? What for?** At the end of this study, an action plan has been developed and proposed to the direction for the study of its implementation

Conclusion: This study presents first progress in the context of the study of the defects of a cheese pressed using quality tools, allowed to detect the origin of nonconformities, some corrective actions, and others to preventive purpose.

Keywords: *hard and semi-hard cheese, manufacturing defects, quality tools, ripening.*

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INNOVATION IN FOOD SCIENCE – GENERATING VALUE FROM BIORESOURCES

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Introduction: The bioeconomy is receiving a lot of attention from public policies because it provides an important part of the expected solutions to the major question asked in recent years in all countries: how to reduce the dependence on fossil fuels while providing food and basic needs for a world population estimated in 2050 at about 9 billion inhabitants?

Aims: The aim of the present paper was to identify business models as examples of good practices in technological innovations for the successful shift to assuring food security.

Methods: Innovation and bioeconomy are at the core of development towards next generation food industry systems.

Results: If the concept of bioeconomy has been developed in the academic sphere since the 1970s, it has been part of the European and national political agenda recently. It is expected that innovative business models will be set up in the near future, reaching an economic model based mostly on the biosphere. Therefore, the bioresources would be at the heart of food production and processing as well as in the consumption practices.

Conclusion: A pragmatic vision in the short and medium term would be to encourage innovation of all kinds and to promote projects and jobs in the sectors concerned so that the bioeconomy occupies a more important place in the economic landscape of the countries.

Keywords: *bioeconomy, bioresources, innovation, food security*

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EVALUATION OF THE MINIMUM INHIBITORY CONCENTRATION OF 20 ETHANOLIC PLANT EXTRACTS AGAINST 5 DIFFERENT BACTERIAL STRAINS

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Introduction: Minimum inhibitory concentration (MIC) is a method used as ‘gold standard’ for determining the susceptibility of organisms to antimicrobials and are therefore used to accurately determine the growth inhibition of different extracts. (Andrews, 2001)

Aim: The focus of this work was to evaluate the minimum inhibitory concentration of 20 low concentration plant extracts against five bacterial strains.

Materials and Methods: 100 µl of each 5% (v/v) concentration ethanolic extracts from 20 plants (*Scrophularia umbrosa*, *Buxus sempervirens*, *Pinus mugo Turra*, *Abies*, *Populus*, *Juniperus*, *Alnus glutinosa*, *Hippophae*, *Vaccinium myrtillus*, *Fagus*, *Oxycoccus*, *Ligustrum vulgare*, *Cedrus*, *uglans regia*, *Rosmarinus officinalis*, *Vitis vinifera*, *Platanus*, *Corylus avellana*, *Lonicera caprifolium* and *Magnolia*) were added in 96-well plates, with 100 µl of sterile MHB in each well, and diluted in half 12 times. Five bacterial strains (*S. aureus*, *E. coli*, *P. aeruginosa*, *S. enteritidis* and *S. pyogenes*) were grown overnight at 37⁰ C on MH agar and after the incubation, the grown cells of each strain were suspended in sterile serum solution and their concentration was adjusted to 10⁵ cfu/ml. 10 µl of each adjusted solution was inoculated in each well of the aforementioned plates and incubated 18 h at 37⁰ C. To determine the growth inhibition 20 µl of resazurin sodium salt solution were added in each well and plates were reincubated at 37⁰C for 2h, followed by the interpretation of the results.

Results: In all the 5 cases the black alder extract (*Alnus glutinosa*) exhibited the lowest inhibition concentrations of 62,5 µl/ml for *S. aureus* and *E. coli*; 31,25 µl/ml for *P. aeruginosa*; 15,63 µl/ml for *S. enteritidis* and 7,81 µl/ml in case of *S. pyogenes*.

Conclusion: This evaluation highlighted black alder extract as having the best inhibition properties compared to the other tested extracts.

Keywords: inhibition, MIC, plant extract

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DANDELION, MULBERRY AND CHICORY SUITABLE FOR DEVELOPING FUNCTIONAL DRINKS IN ALLEVIATING NON-ALCOHOLIC STEATOHEPATITIS

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Introduction: Non-alcoholic steatohepatitis (NASH) is the most severe form of non-alcoholic fatty liver disease (NAFLD) which is the main cause of chronic liver disorders (Loomba R. and Sanyal A.J. 2013, Matteoni, C.A. et al. 1999). Several pharmacological agents advised for targeting hepatic fat accumulation, oxidative stress, inflammation, liver fibrosis and gut microbiome are subject of on-going studies for safety and efficacy (Loomba R. and Sanyal A.J. 2013; Sumida Y. and Yoneda M. 2018), therefore alternative aids are needed.

Aims: This research aims to address dandelion, chicory, and mulberry together with their bioactive compounds in developing functional drinks for alleviating NAFLD and NASH. It also appraises the current uses of these plants in designing functional products in aiding liver disorders.

Materials and Methods: Through a broad review of *in vitro* and *in vivo* studies conducted on *Taraxacum officinale*, *Morus nigra* and *Cichorium intybus* this work summarizes their therapeutic properties when used in NAFLD and NASH and their associated diseases.

Results: *Taraxacum officinale*, *Morus nigra*, and *Cichorium intybus* contain bioactive compounds that are hepatoprotective, antioxidant, anti-inflammatory, hypolipidemic and beneficial in obesity, dyslipidemia, type 2 diabetes, NAFLD, and NASH.

Conclusion: Dandelion, mulberry and chicory are suitable for developing functional drinks using cost-efficient technological methods and unconventional fermentable substrates for alleviating NAFLD, NASH, and associated disorders.

Keywords: *chicory, dandelion, functional drinks, mulberry, non-alcoholic steatohepatitis*

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CHEMICAL AND SENSORY PROFILE OF ROMANIAN AND MOLDAVIAN MAIN MONOFLORAL HONEYS

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Introduction: Chemical and sensory profile play an important role in evaluation of honey authenticity. Although the chemical profile of honey is stated in the legislation (CD 110/2001), it is not easily reachable by consumers. In the mind of consumers, the sensory characteristics play the most important role in quality perception.

Aims: It was the purpose of this study to compare the chemical and sensory profiles of the main monofloral honey types from Moldova and Romania.

Materials and Methods: Four honey samples (acacia, rape, linden, buckwheat) were bought directly from Romanian and Moldavian beekeepers (4 from each country). Sensory analysis (aroma profile method) and physico-chemical determinations (humidity, impurities, electrical conductivity, acidity, melissopalynological analysis, diastase and hydroxymethylfurfural) were performed according to already published methods (Oddo, 2004, Bogdanov, 2002).

Results: All physico-chemical parameters evaluated were within the limits published by European Directive 2001/110/EC (humidity 15.1-21.4%, acidity 14.8-38.79 mEq/kg, electrical conductivity 138-574 $\mu\text{S}/\text{cm}^3$; hydroxymethylfurfural 0.49-211.60 mg/kg; diastase index 0.95-31.42 US). Sensory profile was the most efficient tool to differentiate between honey samples of different botanical origin.

Conclusion: In the present research work, the honey with the same botanical origin but from different geographical origin (Moldavia or Romania) presented insignificant differences in the sensory characteristics and the physico-chemical parameters, however, the results were still corresponding to the specific profile of the honey type.

Keywords: *buckwheat honey, monofloral honey, sensory profile*

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BIOLOGICAL ACTIVITIES OF TOMATO PROCESSING BY-PRODUCTS AND THEIR CORRELATION TO CAROTENOIDS AND PHENOLICS CONTENT

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Introduction: Tomatoes (*Solanum lycopersicum* L.) are appreciated vegetables worldwide due to their appetizing taste and various shapes and colors. They represent a good source of bioactive compounds and their health-promoting functions like antioxidant properties, chemo-protective and cardio-protective effects have been widely investigated.

In the field of food industry, approximately 42 million tons of tomatoes are processed yearly and large amounts of tomato by-products end up as waste. These wastes represent an environmental inconvenience for the manufacturers, despite the fact that they contain many nutrients, which could be efficiently extracted and valorized as functional food ingredients.

Aims: The present study evaluated the carotenoids and phenolics content of ten tomato varieties processing by-products, and the correlation with their antimicrobial and antioxidant properties.

Materials and Methods: Antimicrobial activity was tested against six microorganisms and the antioxidant capacity of the extracts was assessed with the 1,1-diphenyl-2-picrylhydrazyl (DPPH), H₂O₂ scavenging potential (HPS) and ABTS radical cation decolorization (ABTS) assays.

Results: Overall, the mean content of total carotenoids and phenolic compounds was 30.2 ± 10.8 and 242 ± 89 mg /100 g dry weight, respectively. The extracts had good antibacterial activity against Gram-positive bacteria (e.g. *Staphylococcus aureus*), which correlated well with the amount of isochlorogenic acid in each tomato variety. The antioxidant activity was high for all genotypes, and especially for the Tiny Tim variety.

Conclusion: The overall results suggest that tomato processing by-products represent a reliable source of natural bioactive molecules, having good antioxidant and antimicrobial activities, and can serve as functional ingredients in new food formulations.

Keywords: *antioxidant, by-product, isochlorogenic acid, lycopene, revalorization*

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MIXED CULTURES OF LACTIC ACID BACTERIA AND SACCHAROMYCES CEREVISIAE DURING WHEAT AND SOY DOUGH FERMENTATION

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Introduction: The intake of added sugar to foods in high quantities represents a serious threat to human health. Sugar replacement with low glycaemic alternatives, such as polyols, may represent a beneficial solution for better health. Moreover, functional foods, with high phytochemical content, can combine the advantages of low calories with some biologically active compounds. Soy-enriched bread can present an alternative functional food with high isoflavone and other phytochemicals content, and presents a valuable substrate for polyol production.

Aims: The main objective of this study was to use lactic acid bacteria with applicability in food industry with the additional effect of reducing the total quantity of added sugar in bakery products. The second objective was to enrich dough with soy flour for its potential health benefits regarding polyphenol compounds, especially isoflavone.

Materials and Methods: The microorganisms used in this study were *Lactobacillus plantarum*, *L. casei* and *Saccharomyces cerevisiae*. Experiments were performed with single cultures, and with combinations of two or three microorganisms in a single fermentation, for improving functional properties and polyol production. In addition, the dough was prepared in three different concentrations with 100% wheat flour, 95% wheat flour and 5% soy-flour, and 90% wheat flour and 10% soy flour.

Results: With the use of soy-flour, higher organic acid content was obtained than with wheat flour. Lactic acid was produced up to 6.4 g/L with 10% soy flour and 2.3 g/L with no soy-flour. The production of acetic and butyric acids was significant at the beginning of fermentation, after which it decreased constantly to values close to 0.

Conclusion: Lactic acid bacteria had a superior growth dynamic in co-cultures, and on fermentations with higher soy-flour content. Polyol production was not significant in these cultures. Further studies are required with additional microorganisms like *Lactobacillus florum* or *Oenococcus oeni* that are known to produce higher quantities of polyols.

Keywords: *lactic acid bacteria, polyols, Saccharomyces cerevisiae, soy flour, wheat flour*

Acknowledgments: This work was supported by the National Research, Development and Innovations Programme for 2015-2020-PNII, developed with the support of UEFISCDI (Project No. PN-III-P1-1.2-PCCDI-2017-0056; 2PCCDI) and MCI-UEFISCDI, project number 37 PFE-2018-2020 “Cresterea performantei institutionale prin mecanisme de consolidare si dezvoltare a directiilor de cercetare din cadrul USAMVCN”.

A REVIEW ON SCIENTIFIC CHALLENGES RELATED TO FOOD CONTACT MATERIALS

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Introduction: Food packaging industry is a rapidly evolving field. During the entire cycle followed to obtain a final food product, food comes into contact with many articles and materials, particularly with food packaging. Food packaging includes many plastic products such as trays and lids, bottles, beakers, table items and internal coatings of cans. Chemical compounds incorporated in food contact materials may migrate into food. This is affected by several factors, including the nature and complexity of the food, the contact time and temperature, the type of food packaging material and the molecular size of the migrating chemicals. Due to the health concerns, regarding migrating chemicals from food contact materials respectively food packaging into food, raised by the toxicity and/or endocrine disrupting activity of these chemicals, specific regulation is required in the United States and in Europe. In order to assess the risk presented by chemical migration into food, metabolomics approaches are mainly used to face the problem given by chemical contamination through food contact materials.

Aims: The present work aims to reveal the current knowledge and progress in Romania, regarding chemical migration from food contact materials, respectively food packaging, the scientific challenges have to correlate regulations of food quality with European standards.

Materials and methods: This study is based on the recent scientific articles and experimental data on the targeted topic, available in official public reports and internet.

Results. Between 1980 and 2018, from a total of 210 nonconformities notified through Rapid Alert System for Food and Feed, 9 were related to food contact materials issues. The motivation for the notifications was, in most cases, the exceeding of the limits allowed for different pollutants.

Conclusion: Although regulations on food contact materials have been correlated with European standards, all actors from food chain, including consumers need to be aware of the importance of food safety problem raised by food packaging materials. Therefore, industry and retailers should make efforts to replace or to reduce the plastic packaging, the regulation authorities need to support stricter legislation for chemicals with a higher risk on human health and for the chemicals originated from China.

Keywords: *food contact, migration, plastics.*

ANTIMICROBIAL ACTIVITY AND TOTAL PHENOLIC CONTENT OF LOCAL SMOKED CHEESE

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Introduction: Cheese is widespread in Romania and smoking is being practiced to improve its preservation degree and also to increase its sensory quality. Generally, smoking affects food which is high in protein, with bacteriostatic and antioxidant role. Developing countries, including Romania, have poor hygiene standards in traditional milk production, and that is reflected in the poor hygiene quality of traditionally made cheeses (Georgescu *et al.* 2014).

Aims: The purpose of this study is the microbiologically analysis of smoked cheese products on the local market, in order to assess the antimicrobial effect of smoke, as well as the determination of water-soluble phenolic compounds within the product.

Materials and Methods: In order to test the antimicrobial effect on smoked cheese samples, we have performed microbiological analysis: total number of aerobic mesophilic germs, coliforms bacteria, coagulase-positive staphylococci, yeasts and moulds. The Folin–Ciocalteu test was chosen to measure Total Phenolic Content of smoked cheese extracts.

Results: Microbial activity is reduced in smoked cheese types in both purchased cheese and those smoked in the traditional system. Thus, the found values were below the maximum admissible limits in the case of the total number of aerobic mesophilic germs, the absence of coliforms bacteria, the inhibition of the growth of coagulase-positive staphylococci. Yeast and molds are inhibited through the smoking process, but a slight increase of them was observed when stored in the refrigeration conditions for 21 days. The total content of phenols varies from one type to another, with higher values in traditionally smoked cheese.

Conclusion: The smoking process on cheese has a beneficial effect on the degree of preservation of this product. The antioxidant effect of smoke is highlighted by the higher content of phenolic compounds in smoked cheese.

Keywords: *cheese, microorganisms, polyphenolic content*

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GUT PREVOTELLA AS A POSSIBLE BIOMARKER OF DIET AND ITS EUBIOTIC VERSUS DYSBIOTIC ROLES: A COMPREHENSIVE LITERATURE REVIEW

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Introduction. The gut microbiota has a profound impact on human health. Emerging data show that dietary patterns are associated with different communities of bacterial species within the gut. *Prevotella* species have been correlated with plant-rich diets, abundant in carbohydrates and fibres. Dysbiosis within the gut ecosystem has been associated with the development of non-communicable diseases such as obesity, the metabolic syndrome, inflammatory bowel disease, colorectal cancer, type 1 diabetes, allergies and other diseases (Wang 2017).

Aim. The focus of this work was to evaluate the available data on the impact of diet on the *Prevotella* genus, as a dietary fibre fermenter in the gut as well as its implications as a potential biomarker for homeostasis or disease state through its metabolite signature.

Materials and Methods. A literature review in accordance with the Preferred Reporting Items for Systematic Reviews and Meta- Analyses (PRISMA) statement was conducted. Studies were identified by conducting PubMed, Web of Science Core Collection and Google Scholar electronic searches., using specific descriptors. Duplicates were identified using Endnote (Thomson Reuters).

Results. Study data were reviewed, where possible, in relation to dietary patterns and levels of *Prevotella*, changes in the intestinal microbiota, the role of *Prevotella* in the gut system, the metabolite signature and any reported metabolic consequence of the *Prevotella* genus in rodents and human studies. Eighty-five full-text articles were included in the final review.

Conclusion. The gut commensal *Prevotella* bacteria contribute to polysaccharide breakdown, being dominant colonisers of agrarian societies. However, studies also suggested a potential role of *Prevotella* species as intestinal pathobionts. Further metagenomic studies are needed in order to reveal health- or disease-modulating properties of *Prevotella* species in the gut.

Keywords: *dietary patterns, gut microbiota, Prevotella.*

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Wang B, Yao M, Lv L, et al. (2017) The human microbiota in health and disease. Eng 3, 71–82.

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SESSION 4: HORTICULTURE AND FORESTRY

BIOTECHNOLOGY FOR PLANT GENETIC RESOURCE CONSERVATION: AN OVERVIEW OF *IN VITRO*-BANKING AND CRYOBANKING IN THE WORLD

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Introduction: Today, *in vitro* culture is a strategic tool to support medium and long-term conservation of plant genetic resources by using the slow growth storage of shoot cultures and the cryopreservation of organs and tissues. Over the last 30 years, considerable progresses were made in the development of both techniques that are nowadays considered as *ex situ* conservation strategies complementary to traditional seed banks and in-field clonal collections.

Aims: Conservation in slow growth storage consists in modifying the medium and/or culture conditions to reduce the growth of *in vitro* shoots without affecting their viability and regrowth potential when moved back to standard culture conditions. The technique allows medium-term conservation of shoot cultures from a few months to two years and more. Cryopreservation maintains plant organs and tissues at the ultra-low temperature of liquid nitrogen (-196°C).

Results: Currently, almost 45,000 accessions of vegetables (mainly potato, cassava, sweet potato, yam and garlic) and fruit species (mainly apple, mulberry and banana) are maintained in 21 genetic resource conservation centers, located in 16 Countries and 5 Continents (Europe, Asia, Africa, North and South America). Over 70% of these accessions are maintained *in vitro* by means of slow growth storage of shoot cultures, but more recent cryopreservation is constantly increasing, and over 12,500 accessions from vegetables are stored at -196 °C. In order to avoid too many replications of the same genetic resources in the different operating centers, a network was recently undertaken under the aegis of Bioversity International, the Global Crop Diversity Trust and the International Potato Center and led, in July 2017, to a report containing a census on plant genetic resources in *in vitro*-banks and in cryobanks, as well as indications and directives on the organization and costs of these forms of conservation (Acker *et al.*, 2017).

Conclusion: A first important step towards a global coordination of conservation strategies is preservation *in vitro* and in liquid nitrogen which will soon become indispensable.

Keywords: *cryopreservation, cryobanks, in vitro banks, micropropagation, slow growth storage*

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CANNABIS SATIVA, A NEW PROMISING CROP FOR MEDICAL AND INDUSTRIAL USE

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Introduction: The origin of the word cannabis is from the Greek kannabis (κάνναβης or kánnavis) being mentioned by Herodotus, the Greek historian, in the 5th century B.C.E, (Grimmer, 2013). Equally highly interested in this plant are the pharmaceutical and construction sectors, since its metabolites show potent bioactivities on human health and its outer and inner stem tissues can be used to make bioplastics (Andre *et al.*, 2016). The cultivation of *Cannabis sativa* L. for medical uses was legalized in Greece in March of 2018, governed by the law of 4523/2018 with a tetrahydrocannabinol (THC) content greater than 0, 2% (Hellenic Republic, 2018).

Aims: The use of medicinal cannabis is important for dealing with chronic diseases such as plaque, cancer, glaucoma, epilepsy and many others. As far as the industrial sector is concerned, its role in the secondary sector is tremendous. The resulting fibers are used for the manufacture of twine, ropes, etc. Especially cannabidiol (CBD) is of great interest.

Materials and Methods: Through surveys carried out by the Agricultural Laboratory of the AUA regarding the development of cannabis by applying geotextiles, plastics, radiation management, the cannabidiol (CBD) and tetrahydrocannabinol (THC) content was measured, statistical data have been compiled for cannabis cultivation both for pharmaceutical and textile uses.

Results: On the basis of the results, it can be concluded that cannabis can be grown in Greece due to the weather conditions and, above all sunshine, which is the main factor for the development of the plant, with high production volumes and correspondingly high producer incomes.

Conclusion: Any discussion that was made a few years ago was considered prohibitive. The cultivation of medicinal and textile cannabis takes place in Greece and offers tremendous opportunities for producers as well as for the domestic economy. Greece has both the specifications and the prospect for becoming a country producing high quantities of pharmaceutical and industrial cannabis.

Keywords: *Cannabis sativa*, CBD, THC

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GENETICALLY MODIFIED PLANTS AS ‘BIOFACTORIES’: THE ONLY HOPE FOR TRANSGENIC PLANTS IN EUROPE?

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Political pressure from green parties and radical environmental organisations has caused a *de facto* ban on the cultivation of transgenic plants in the European Union, with the exception – almost anecdotic – of a Bt maize variety grown in a little more than 10⁵ ha in Spain and Portugal. The recent decision of the European Court of Justice, against the general scientific opinion, to consider the products of CRISPR/Cs9 genome edition as GMOs will rapidly enlarge the gap between the EU and other countries. However, apart from generating crop varieties with enhanced agronomic characteristics or nutritional value, GM plants can be engineered to be used as *biofactories* for the production of recombinant proteins of interest for different industries. *Molecular farming* with the so-called ‘third generation’ of transgenic plants includes, among others: *i*) the production of biopharmaceuticals, such as drugs, therapeutical proteins, vaccines or antibodies; *ii*) production of industrial recombinant enzymes, for the detergents, leather tanning, paper, adhesives, paints or other chemical industries; *iii*) Proteins commercialised for experimental research, such as avidin, trypsin, or bovine serum albumin; *iv*) specialised food products: food additives, functional food, dietary supplements; *v*) biodegradable plastic, for example polyesters of 3-hydroxyacids, such as polyhydroxybutirate (PHB). The production of high-added-value pharmaceuticals in GM plants (‘molecular *pharming*’) has a special interest, although it will have to compete with the well-established mammalian cell culture systems. Nevertheless, recent developments indicate a rapid growth of this technology, even if it is limited to niche markets for specific plant-made protein drugs, such as proteins toxic for animal cells or needed in large quantities. In any case, since there is no social rejection of the production and use of recombinant proteins as diagnostic or therapeutic tools, probably this specific application is the only hope for GM plant biotechnology in the EU.

Keywords: *biofactories, biopharmaceuticals, molecular pharming, transgenic plants*

EVALUATION OF ORGANIC CAMELINA CROP UNDER DIFFERENT TILLAGE SYSTEMS AND FERTILIZATION TYPES USING PROXIMAL REMOTE SENSING

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Introduction: *Camelina sativa* (L.) Crantz is a promising oil-seed annual crop that can be grown under different climate and soil conditions and environmentally friendly with low demand of inputs. Along with the fact that Camelina oil can be used as edible, biodiesel and fodder, suggests its being an ideal crop and hence the need to optimize its production. Remote sensing can estimate the properties of a plant through non-destructive processes in a fast and accurate way (Moran *et al.*, 1997) and is widely used to estimate crop yield and quality characteristics.

Aims: The aim of the study was to assess the effectiveness of different spectral vegetation indices (SVIs) in predicting camelina's growth and yield parameters, under different tillage systems and fertilization types.

Materials and Methods: The field experiment was settled in Southern Greece in 2016 growing season. A split plot design was laid out with three replicates, two main plots (conventional tillage and minimum tillage) and three sub-plots (compost, vermicompost and control). Data were collected-analysed at both in-situ field level and in the laboratory. The Normalized Difference Vegetation Index (NDVI) and Red Edge Normalized Difference Vegetation Index (NDRE) were calculated by employing proximal sensing to assess the growth and yield characteristics of Camelina.

Results: The SVIs exhibited the highest correlations with different measurements at the flowering stage justifying this stage as optimum for crop growth monitoring. NDVI presented higher correlations compared to NDRE in most crop parameters. According to data analysis, Camelina performed best in terms of growth and yield under compost fertilization and minimum tillage system.

Conclusion: Optical remote sensing methods can be used for estimating camelina's key crop parameters in a robust and non-destructive way.

Keywords: *Camelina, remote sensing, tillage*

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INFLUENCE OF CULTURE SUBSTRATES AND BIOSTIMULATORS ON PASSIFLORA ROOTING

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Introduction: *Passiflora* genus includes about 520 species and is the most widespread tropical flora. *Passiflora quadrangularis* and *Passiflora caerulea* known as commonly passion flower are two valuable species appreciated for their impressive flowers and delicious fruit (Traub, 2007).

Aims: In order to enrich the assortment of exotic ornamental plants in Romania, as well as for the many benefits of *Passiflora* species, in this experience were studied the possibilities of vegetative propagation through cuttings under the influence of the culture substrate and the biostimulators.

Materials and Methods: Stem cuttings of approximately 15 cm in length were harvested from the medial portions of the shoots from mature plants. A trifactorial experience was organized in three repetitions. The factor A (rooting substrate) has four graduations (vermiculite, peat+vermiculite 1:1, peat+perlite 1:1, peat+sand 1:1), the factor B (rooting biostimulator) with four graduations (Radistim-2; Incit-8, AIB 1000 ppm and control-untreated cuttings), and factor C (species) with two graduations (*P. caerulea* and *P. quadrangularis*) formed an experience with 32 experimental variants. Experimental data on the variability of the rooted cuttings morphological characteristics were statistically analyzed using analysis of variance (ANOVA) and the multiple comparison method (Duncan).

Results: Regarding the rooting rate by species, it has been found that *P. caerulea* obtained a 79.78% cuttings rooting average compared to *P. quadrangularis* which rooted with an average of 74.57%. Vermiculite showed higher statistically assured values compared to the other substrates for the length and the number of roots while treatment with AIB 1000 ppm significantly influenced root length and number.

Conclusion: Establishing the most suitable measures for vegetative propagation by cuttings of *Passiflora* species studied may lead to the expansion of their culture in our country.

Keywords: cuttings, *Passiflora caerulea*, *Passiflora quadrangularis*, vegetative propagation

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ASSESSMET OF TRACE ELEMENTS AND HUMAN HEALTH RISK PRESENT IN ROMANIAN WINE

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Introduction. Knowing the metal content of wine is very important, for many reasons. Despite the fact that metals are not directly connected to the taste and aroma of the wine, their content should be determined and controlled, because excess is undesirable, and in some cases prohibited, due to potential toxicity.

Aims. Study of the concentration of trace elements in wines and health risk assessment via wine consumption.

Materials and Methods. The concentration of Pb, Cd, Ni, Co, Zn, Cr, Cu and Mn were determined by ICP-MS methods. Wine samples were represented by native and international varieties of vine from Nicorești, Ivești, Panciu, Odobești and Dealu mare vineyards.

Results. The results from this study suggested that the concentration levels of elements measured in red wines decreased in the order Zn>Mn>Cr>Cu>Ni>Pb>Co>Cd, and in the case of white wines decreased in the order Zn>Mn>Cu>Cr>Ni>Pb>Co>Cd. The Ivești and Nicorești vineyards had higher concentration level in Pb. Based on a 60 kg adult drinker consuming 200 mL of wine per day, the estimated daily intake of each element from wines was far below the temporary tolerable daily intake.

Conclusion. The measured concentration distribution of Cd showed that all vineyards had basically the same level except Odobești region, which records high concentrations. The concentration of Ni was higher in the Nicorești and Panciu vineyards, Co, Zn and Cu in Ivești vineyard, Cr and Mn in Nicorești and Dealu Mare respectively. The THQ values of each estimated element did not exceed 1 in all vineyards, suggesting that the exposed population would not experience significant health risks when ingesting these individual elements from daily consumption of 200 mL of Romanian wines. An exception is made by the Nicorești vineyard which, in case of Cr, records light values above 1 the higher THQ values indicating a slightly possibility of exposure to risk.

Keywords: *estimated daily intake, health risk assessmet, ICP-MS, multi-element analysis, Romanian wine*

DYNAMICS OF STARCH RESERVES IN SOME GRAPEVINE VARIETIES (*VITIS VINIFERA* L.) DURING DORMANCY

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Introduction: Carbohydrate reserves in grapevine are stored in form of starch and soluble sugars (Vaillant-Gaveau *et al.*, 2014). Starch reserves are at their highest level in aerial parts, by the end of the growing season. As the dormancy period begins, starch concentrations start to decrease. In the same time, due to the conversion of starch, soluble sugar (cryoprotectant) levels begin to increase (Noronha *et al.*, 2018). The conversion of carbohydrates is reversed and at the end of dormancy, the starch increases and soluble sugar decreases again (Zufferey *et al.*, 2015).

Aims: The aim of this study was to understand the dynamics of insoluble carbohydrates reserve during the dormancy period of some table and wine grapevine varieties.

Materials and Methods: Six year old grapevine varieties ('Muscat de Hamburg', 'Napoca', 'Cardinal', 'Perla de Csaba', 'Fetească regală', 'Muscat Ottonel', 'Pinot noir' and 'Fetească neagră') were sampled before winter. During dormancy (November, January and February), starch level in canes was appreciated by grading from 0 to 5 (iodin in potassium iodide method), wood and pith diameter measured and bud viability was tested.

Results: The levels of starch in grape canes at the beginning of dormancy (November) was highest in 'Muscat de Hamburg' (3.89), 'Napoca' and 'Fetească regală' (3.76), and the lowest in 'Cardinal' (3.47). Due to climatic conditions over dormancy, starch began to resynthesize already during January and February, with significantly high levels in all varieties. Wood/pith ratio was highly correlated with starch level ($r = 0.40-0.55$). Strong positive relationship was found between base and middle cane diameter and starch level ($r = 72$, and $r = 66$, respectively). Bud viability was direct influenced by the starch level in canes.

Conclusion: Results confirm the close correlation between cane vigour and starch reserves. Moreover, starch level was in direct relationship with bud viability.

Keywords: *starch, grapevine, dormancy*

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DIFFERENT LEVELS OF GLYPHOSATE-RESISTANT *LOLIUM RIGIDUM* L. BIOTYPES IN PERENNIALS CROPS OF GREECE

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Introduction: Glyphosate has been the most widely and successful used herbicide so far. Unfortunately, in recent years, several glyphosate-resistant weed species had been reported worldwide (Heap, 2019). Glyphosate resistance was first appeared in *Lolium rigidum* in Australia in 1996 (Powles *et al.*, 1998).

Aims: The objectives of the present study were to confirm the glyphosate resistance in *L. rigidum* biotypes and evaluate the level of glyphosate resistance by using dose response assays.

Materials and Methods: To confirm glyphosate resistance seeds from fields in different regions of Greece were selected and a preliminary screening with the recommended glyphosate rate was conducted. A population that had never been treated with glyphosate was used as the reference susceptible population. Following that, six glyphosate-resistant and the one glyphosate-susceptible rigid ryegrass biotypes were used to evaluate the different levels of glyphosate resistance in pot experiments. At 21 days after treatment, fresh weight reduction and visual injury were recorded. Data were expressed as percentage versus untreated plants. Dose–response experiments were repeated twice.

Results: Dose–response results indicated significant differences between the glyphosate-susceptible population and the glyphosate-resistant populations. The estimated GR₅₀ values for each of the selected biotypes confirmed significant differences in biomass reduction with response to different doses of glyphosate.

Conclusion: Glyphosate-resistant populations of *L. rigidum* have been confirmed in Greece and the level of their resistance was determined. Since no new modes of herbicide action have been introduced for over 30 years, new weed management methods and integrated strategies are necessary in maintaining the efficacy of the existing herbicides.

Keywords: *dose response, glyphosate, Lolium rigidum, resistance*

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CHEMICAL COMPOSITION AND ANTIMICROBIAL ASSESSMENT OF *SALVIA OFFICINALIS* L. ESSENTIAL OIL FROM MOUNTAINS OF BOUIRA

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Introduction: *Lamiaceae* family, to which sage belongs, represents a very important part of the flora of Algeria; it contains many herbs and aromatic condiments, rich in powerful essential oils (Teuscher *et al.*, 2005). *Salvia officinalis* L. is a medicinal plant with many virtues (Beloued, 2003).

Aims: This study aims to determine the chemical composition and evaluate the antimicrobial activity of the essential oil extracted from sage, and to justify the traditional use of the plant by the indigenous population.

Materials and Methods: We have determined the chemical composition of fresh leaves essential oil by GPC/MS and the antibacterial activity of oil using two techniques (Antibiogram and micro- atmosphere).

Results: The composition of the essential oil of sage harvested in Bouira is constituted mainly of l α -thujone (30.3%), camphre (18.5%), 1.8-cinéole (11.8%). The chemical composition of EO revealed that the monoterpenic oxygen contents are very high. *Bacillus subtilis*, *Escherichia coli*, *Staphylococcus aureus* and *Aspergillus fungal braziliensis* strains have been very sensitive to the various concentrations of the essential oil of *Salvia officinalis* where the inhibition zone has been observed in disks with diameters between 24-48 mm impregnated with 25 μ l of essential oil, the vapor released presented an inhibitory effect on the growth of almost all strains. Particularly for *Bacillus subtilis* a 54 mm diameter inhibition area was expressed for the low dose (20 μ l) and a total inhibition appeared at the dose of 60 μ l. A "dose-dependent" action was also noted for all strains tested.

Conclusion: This local plant is an inestimable source of various compounds endowed with biological activities, which testifies and justifies its use in traditional medicine as treatment to several pathologies.

Keywords: antimicrobial activity, essential oil, *Salvia officinalis*

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PRELIMINARY RESULTS IN THE STUDY OF TWO LOCAL ALMOND POPULATIONS FROM DOBROGEA REGION

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Introduction: The almond (*Prunus dulcis* L.) is a very popular nut, being one of the most complex fruit for the benefit of the human health and is considered one of the first plants to be cultivated by the man. Nowadays in Romania this culture started to decrease. Very few breeding programs have been developed in the last thirty years. At the global level the cultivated surfaces and the production is on raise. The decline of this culture can be ameliorated through scientific activity, therefore breeding new varieties can contribute significantly to the revival of the almond culture in Romania.

Aims: The aim of our study was to select almond genotypes suitable for breeding. To achieve this goal, we monitored two spontaneous populations of almond hybrids naturally formed, from two distinct localities of the Dobrogea region, namely Greci, from Tulcea county and Crucea from Constanta county.

Materials and Methods: In Greci there were studied 163 naturally formed almond trees, most probably from genitors that are also hybrids in their turn. In Crucea 140 naturally formed almond hybrids were examined, hybrids that are most probably crossings between different varieties. For all the studied hybrids there were performed observations of the phenophases during 2018 and 2019, also observing the presence of different pathogenic diseases on the phyllosphere of the plants. For the hybrids that were of high interest for our aim we also made morphological measurements.

Results: From the total number of hybrids taken into study, two of them attracted attention in Greci and eleven in Crucea. The hybrids that conferred high interest for our study presented an increased resistance to diseases or late flowering. In Greci the hybrids no. 4 and 33 presented late flowering while in Crucea the hybrids no. 3, 8, 18, 24, 40, 46, 56, 57, 66, 68 and 129 presented the same characteristic. The hybrid no. 4 from Greci and the hybrid no. 129 from Crucea presented genetic resistance to pathogenic diseases.

Conclusion: More almond genotypes were selected with specific characteristics for breeding (late flowering, resistant to pest and diseases). Future researches will continue on the selected genotypes.

Keywords: *almond, Prunus dulcis, breeding*

EVALUATION OF AGROTEXTILES IN THE DEVELOPMENT OF HEMP (*CANNABIS SATIVA* L.) IN GREENHOUSE

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Introduction: Fabrics of the agrotexile type are known in agriculture for decades, in a traditional way (Roshan, 2019). The use of agrotexiles is aimed to optimize the environmental conditions. Agrotexiles have considerable potential for solar exploitation, but few studies have been completed on their effects on aboveground biomass production.

Aims: Artificial light is installed in hemp greenhouse to increase the harvest per year. Taking advantage of the key features of Greece's climate (Folina, 2019), we used a white agrotexile to exploit the intensity of radiation through the created reflection.

Materials and Methods: Hemp cultivation, in a greenhouse, was conducted from February to May in Agricultural University of Athens for CBD production. The treatment was the soil cover with the agrotexiles. The measurements were done PAR to calculate Light Below Canopy (LBC), leaf temperature, SLA and SLW, height and CGR, fresh and dry weight, yield and CBD%.

Results: The LBC mean value was 10% higher in covered plants during vegetative stage than that of control. On the 60th day after transplanted 58.39 cm² g⁻¹ of dry leaf weight was recorded on the covered area compared to the uncovered one (50.4 cm² g⁻¹). Therefore, plant fresh weight was higher. The crop growth rate (gr day⁻¹) was higher during 20-60 DAS as compared to control. The number of inflorescences has not been found to be affected by the cover material. The CBD content was higher on covered area (2.51%) than the uncovered (2.01%).

Conclusion: On the covered area, plant development was faster and the yield higher. But when the temperature exceeds 35 °C the cover material must be removed because the relative growth rate is reduced.

Keywords: CBD, agrotexiles, greenhouse, hemp, LBC

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STUDIES ON FODDER VALUE IN CUP PLANT (*SILPHIUM PERFOLIATUM* L.)

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Introduction: The recent biomass production is based on intensively cultivated traditional crops, especially maize. A possibility to counteract the negative effects associated with large-scale maize production would be the introduction of new crops in the rotation of existing crops and, besides, the creation of new "integrative concepts".

Aims: In this paper, we will focus on the qualities of the cup plant that produce a considerable amount of biomass and have been considered to be easy to cultivate and have versatile uses - such as ornamental plants, melliferous and fodder, as well as in medicine, recovery or green energy. The main components involved in the accumulation of biomass are leaves with high photosynthetic capacity (Jucsor *et al.*, 2018, Jucsor and Sumalan, 2018).

Materials and Methods: The experiment was conducted on two experimental plots of the Plant Physiology Dept., of BUASVM Timisoara. Residual moisture of samples was determined by oven drying for 16 h at 105 °C. Ash concentration was determined by ignition of the dried sample at 500 °C for 4 h. The main parameters determined were cellulose, starch, proteins, fat, fiber and neutral detergent fiber (NDF) using a NIR analyzer model NIRS™ DS2500 F (FOSS ANALYTICS GmbH).

Results: The results of this study show the amount of certain organic components accumulated by the plant until the harvest. Cup plants harvested in September have a higher protein content in leaves (30.69%) and in stems (19.71%) compared with the plants harvested in August and had a protein content in leaves of 26.2% and 8.2% respectively in the stems.

Conclusion: *Silphium perfoliatum* can be used as an animal fodder plant due to the high protein content in the leaves and also in the stems.

Keywords: biomass production, cup plant, fibre, proteins

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EFFECT OF FERTILIZATION AND WEED MANAGEMENT ON WEED FLORA IN INDUSTRIAL HEMP (*CANNABIS SATIVA L.*) CROP

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Introduction: Industrial hemp (*Cannabis sativa L.*) emerged as a crop globally cultivated for a wide range of industrial and consumer products. Generally, hemp is known to be competitive against weeds (Willis *et al.*, 2007). Hemp suppresses weed growth as it competes with them for water, food and light (Ranalli, 1999). Despite its competitive ability, weed infestation remains an important issue during the early period of growth, since weeds can take advantage of nitrogen and water by affecting the emergence and growth of hemp plants.

Aims: The present study was conducted to determine the effect of fertilization and weed management (weedy, weed free) in industrial hemp crop during the initial growth phase.

Materials and Methods: In the field of Agricultural University of Athens the experiment was conducted under split-split-plot design with three replicates. Three monoecious industrial hemp varieties (Futura75, USO 31 and Fedora 17) were cultivated under different levels of fertilization in weedy and weed free plots. Weed density, frequency and dry weight were evaluated.

Results: Fertilization and variety affected significantly weed density and dry weight ($p < 0.05$). Weed density was increased by 53-57% in plots where organic fertilization was applied compared to non fertilized plots. The major weed species was *Amaranthus retroflexus*. Plants of this genus have the ability to concentrate high levels of nitrates (Kingsbury, 1964).

Conclusion: In the present study, it was shown that fertilization increases the density of several weeds. Further research is needed to investigate the effect of fertilization and varieties on weed populations under different climatic and soil conditions.

Keywords: *Cannabis sativa L.*, fertilization, weedy, weed flora, weed free

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ASPECTS REGARDING THE MAIN INDICATORS FOR CHARACTERIZATION OF FOREST ECOSYSTEMS IN THE BÂRGĂU MOUNTAINS AREA

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Introduction: Management of the huge natural resources of forest ecosystems on new scientific bases of extensive research using the mathematical modeling of their biological functioning laws, the monitoring of the dynamics of the state of the stands in their interaction with the abiotic and biotic factors and the anthropic factor, which can influence positively or negatively forest ecosystems, is an up to date topic both at national, European and global level.

Aims: The research plan is structured to achieve the following objectives: establishing the main indicators for characterization of forests in the Bârgău Mountains by inventories based on permanent evidence and analysis of forest characterization indicators in Bârgău Mountains.

Materials and Methods: The inventory works carried out at the local level took into account the methodology of inventorying the stands at national level applied by the National Forestry Inventory. The IFN sampling used at the Bârgău Mountains level is based on a systematic network of squares with the 4 km side (indentially with the national IFN network) traced in the Stereographic Projection System 1970. The sample areas located in the research area are permanent probing surfaces in which continuous measurements and estimations are performed at each IFN cycle according to multiannual planning. The object on which the statistical inventory focuses in the research area is forest vegetation.

Results: The structure of forest ecosystems as a whole is determined by the structure of ecosystem components. According to the forest ecosystem, the tree in the tree population is the most important component of forest biocenosis. The obtained results refer to: the characteristics, the network dimensioning by calculating the number of experimental permanent surfaces to ensure optimal layered and multiphase repetitive sampling. The estimation of the areas of forests species in the Bârgău Mountains was taken into account, by age classes, by stand density categories, method of regeneration, determination of total volume, average volume per hectare by species, average tree species by volume, total wood volume in relation to tree quality, current forest type, total volume in relation to the mean diameter of the trees. It has also been studied the distribution of trees in relation to the Kraft class, the heathing degrees and the state of trees health.

Conclusion: The present research has a pronounced practical character because based on a rich research material, a large number of indicators were used for forest production activity description and a unitary estimation of the wood resources in the area of the Bârgău Mountains has been also performed.

Keywords: *Bârgău Mountains, forest ecosystems, local development, statistical indicators*

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THE INFLUENCE OF ROOT CUTTING ON THE GROWTH AND FRUITING OF “TOP GROUP” PLUM CULTIVARS

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Introduction: In the context of the sustainable agriculture, where global technology has reached amazing peaks, the necessity to satisfy the human needs is directly proportional to the population growth and also to the development of the environment in which people live. One of the main problems to which mankind is confronted now and will certainly be confronted in the future concerns the increase of the production, meant to supply the increasing food needs.

Aims: The influence of root pruning on yield in some plum cultivars.

Materials and Methods: Four plum cultivars ‘Topfirst’, ‘Toptaste’, ‘Tophit’ and ‘Topend Plus’, were studied under the pedoclimatic conditions of Sînmihaiu Almasului, Sălaj County, Romania, in 2018-2019. The trees were grafted on Saint Julien rootstock, trained as Zahn Spindel and the orchard had a density of 1000 trees/ha. Roots were cut twice, at 40 cm distance from the trunk, in an angle of 45° and 30 cm depth, as follows: first time in autumn, during the fall of leaves, on one side of the row and the second time, in spring, at blooming time, on the other side of the row.

Results: The treatments influenced the shoot growth, height of the trees, cumulative yield, trunk cross-section area, the ratio of the yield to a trunk section area, with differences statistically assured. Root pruning reduced the average length of shoots. The longest shoots, in mean values, gave the unpruned root variant. Root pruning decreases the average length of annual growth. The largest average trunk cross-section area was obtained with the unpruned root system. Root pruning also influenced the height of the trees.

Conclusion: The best cumulative yield was obtained in the variant of root pruning system, followed by unpruned root system. Finally root pruning increased productivity. The lowest value of productivity index has been obtained in the unpruned system variant.

Keywords: *root pruning, vegetative growth, fruiting, yield, trunk cross-section area*

USING MODERN TEHNOLOGIES IN SOIL SURVEY

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Introduction: Soil, the main component of the ecosystem, along with climate and vegetation, is a complex and dynamic factor that, for rational use, needs to be studied, analyzed, known and understood. The spreading of soils in the territory is conditioned by the microrelief and lithology characteristics, plus the surface hydrographic network.

Aims: This paper aims to establish the soil survey characteristics and soil evaluation of an agricultural land to be introduced into the national forest fund for afforestation using the modern available technologies.

Materials and methods: In order to achieve the proposed goals, in addition to the classical works that are being carried out on the field (covering the land, digging soil profile and soil sampling), orthophotomaps were used to better understand the shape of the land.

Results: To establish an afforestation solution, the main site characteristics were determined on the field: altitude, exposure, slope, functional category. These characteristics have been associated with laboratory analyzes to determine soil type, with orthophotomap measurements and weather data from the nearby station. Analyzing all the data, an afforestation composition consisting of typical hill mixed hardwood forest species was established.

Conclusion: Analyzing the collected data, the land was enclosed in the bioclimatic hilly region of Turkey oak stand (Turkey oak, Hungarian oak, sessile oak and mixtures of these species) (FD2), where the best suited main species is the Turkey oak, mixed with flowering ash, field maple and pear-tree.

Keywords: *soil, orthophotomaps, soil survey, afforestation*

MULCH EFFECTS ON HIGHBUSH BLUEBERRY IN CONTAINER GROWN PLANTS

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Introduction: Highbush blueberry (*Vaccinium corymbosum* L.) is a calcifuge (acid-loving) plant that responds favorably to mulching with organic matter (Strik *et al.*, 2014). Weed management is critical for successful production of blueberries. The use of herbicides is becoming increasingly limited and as well as the cost and availability of manual labor are prohibitive factors in some areas of the country. There was little research comparing different production strategies in container grown blueberries, and most of the production research done in conventional blueberry system might not be applicable to container grown blueberries.

Aims: The aim of this research was to determine the influence of different mulches like pine bark and weed mat and different fertilizing methods on the growth and yield of the highbush blueberry (*Vaccinium corymbosum*). The main objective was finding a cost effective weed suppression method that increases yield, promotes vegetative growth and fruit quality.

Materials and Methods: The field trial was set in the spring of 2016 in Bologa, Cluj county, Romania. The containers have a 40 L volume, and were filled with a substrate of 2:1:1, loamy acidic soil, acidic peat moss and sand. Results were registered in three consecutive years and out of which two were fruiting years (2017-2018). The number of shoots, length of shoots, date of harvest the total yield, berry weight, fruit firmness, total soluble solids, soil pH, soil organic matter and temperature were analyzed on two blueberry cultivars 'Duke' and 'Bluecrop' with two different fertilizer methods.

Results: The most successful in weed control was the weeding mat, but the highest fruit firmness was registered in the treatment with pine bark and chicken pelletized enriched manure.

Conclusion: In the present research work it has been proved that mulching is beneficial to blueberry plants. Soil under weed mat registered higher temperatures than soil under pine bark, leading to an increased demand of water.

Keywords: *Vaccinium corymbosum*, weed control, fruit quality

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ASPERULA L. - INDICATOR SPECIES OF MESOBASIC AND EUBASIC FOREST SOILS

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Introduction: Biological collections of plants contain a vast amount of information about biodiversity and represent a particularly useful source of research material. Established in 1929, the “Alexandru Beldie” herbarium of the National Institute for Research and Development in Forestry “Marin Drăcea” consists of around 40000 botanical specimens, covering a wide variety of vascular plants.

Aims: This paper provides a quantitative and general description of the main representatives of the genus *Asperula* L. present in the collection.

Materials and Methods: This study combines herbarium and bibliographic sources to document the *Asperula* genus stored in the “Alexandru Beldie” Herbarium. All data (scientific name, collection name, harvesting date, harvesting place, the name of the person who has collected or identified the plant, conservation degree) were incorporated into an electronic dataset. All the plant names were unified according to *The Plant List* database.

Results: The analyzed material is composed of 101 vouchers harvested between 1830-1992. Currently, *Asperula* genus comprises 27 different taxa (20 with a status of species and 7 as intraspecific units), harvested mainly from the Romanian forests. The majority of plants are kept in very good conservation conditions (first and second conservation degrees). Two of the species (*Asperula rumelica* Boiss and *Asperula setulosa* Boiss) present in the Herbarium should be given high conservation priority since they are of national conservation concern, being included on the *Red List of Superior Plants from Romania*.

Conclusion: The *Asperula* genus is widespread across the country and is mostly associated with mesobasic and eubasic forest soils, representatives of this genus having the value of indicator species.

Keywords: *Asperula* L., conservation, herbarium, indicator species, voucher

EFFECTS OF TOMATO POMACE COMPOSTS ON YIELD AND QUALITY OF PROCESSING TOMATO (*LYCOPERSICON ESCULENTUM* MILL.)

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Introduction: Tomato constitutes an important horticultural crop cultivated worldwide, and consumed both as fresh fruit and processed into various products such as sauce, juice, ketchup, canned tomato and soup. During processing, approximately 4% of total processed tomato is discarded as waste, called tomato pomace, which is a mix of tomato skin and seeds and a small fraction of the pulp. Organic farming encourages the use of organic waste materials as substitutes for chemical fertilizers. This may be an effective way to use the high volumes of waste organic materials from tomato processing operations and is therefore of potentially significant environmental value.

Aims: The objective of this study was to evaluate the influence of tomato pomace composts and nitrogen fertilization on agronomic and quality parameters of the processing tomato.

Materials and Methods: A field experiment was conducted at the Agricultural University of Athens in 2019. The experiment was laid out in a randomized complete block design, with three replications and five fertilization treatments [untreated (control), nitrogen fertilizer, tomato pomace mixed with sheep manure, tomato pomace mixed with biocyclic humus soil, and tomato pomace mixed with plant residues].

Results: The results shown that the highest fruit number per plant (92.6), average fruit weight (62.2 g) and fruit yield (163.4 t ha⁻¹) were found in plots subjected to nitrogen fertilization. The highest total soluble solids (4.29 °Brix), L* (42.6) and a* (34.7) values were obtained through the application of tomato pomace mixed with biocyclic humus soil.

Conclusion: The results of the present study indicated that the yield and quality parameters of processing tomato were significantly affected by the different fertilization regimes. The highest yield parameters were observed under nitrogen fertilization, while the highest total soluble solids content, an important quality parameter to processing tomato industry, was found in plots treated with tomato pomace mixed with biocyclic humus soil.

Keywords: *Heinz 3402 F₁, processing tomato, tomato waste compost, total soluble solids*

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ASSESSING GERMINATION CAPACITY, ENERGY AND TOLERANCE TO SALINITY IN SOME SPECIES OF *AGASTACHE*

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Introduction: Modern crop production faces new challenges with ever-growing needs for higher production. One of these challenges is the decrease of water regime due to a multitude of factors like an increase in crop production and expansion, unavailability of clean water sources, use of desalinated water by shoreline crop production also the accumulation of salts in the soil from water impurities and fertilizers. Pressed by environmental concerns for preservation of clean, quality water sources, we are facing the inevitable use of saline irrigation in the near future.

Aims: Therefore it is necessary to assess the salt tolerance of common used crops.

Materials and methods: Screening of several species of the genus *Agastache* was performed for salt tolerance during germination in green house production. The selected genus with its 22 members is part of the *Lamiaceae* family. It is an aromatic flowering herbaceous perennial plant mainly native to North America and East Asia. It has a significant use in agriculture as a multipurpose plant. Some of its uses are culinary, medicinal tea and can also serve as a good nectar source for pollinator insects. The study focused on determining the germination capacity and the germination energy of a number of *Agastache* species in controlled conditions. Seed germination was conducted under controlled conditions at a fixed temperature of 30 °C using three salinity concentrations in addition to an untreated control. Seedlings were exposed to 50, 100 and 200 mM/L NaCl concentrations. The seeds were germinated in petri dishes on filtration paper. They were observed for 20 days with an additional 10 day exposure for non-germinated seeds to non-saline water to observe recovery capacity.

Results: There is a noticeable influence caused by saline concentrations, the negative effect on the germination rate can be best observed at higher salinity concentrations 100 and 200 mM/L NaCl where there is decrease in germination rate and energy across all species.

Conclusion: It can be concluded that *Agastache* species have a high germination rate under non or low salinity concentrations and a tolerance for high temperatures at germination.

Keywords: *Agastache*, germination, salinity

POLYAMINE AND AMINO ACID SYNTHESIS IN GRAPEVINE LEAVES DURING EARLY DEVELOPMENT UNTIL BLOOM

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Introduction: Polyamines (PA) are ubiquitous and are found in all eukaryotic organisms. Major PAs in plants are the diamine putrescine (Put), the triamine spermidine (Spd) and the tetraamine spermine (Spm). They function in key developmental and physiological events, such as cell division, floral initiation, senescence and response to stress. Biosynthesis and degradation of PAs are responsive to environmental stimuli (Lui *et al.*, 2007). Other studies reported that PAs mold plant responses to abiotic stresses (Minocha *et al.*, 2014).

Aims: Taking into account that grapevines are produced, especially for wine making, on marginal soils and partly stressful conditions it may be expected that specific reactions may be provoked on grapes. Nitrogen fertilization is supposed to act as an external and additional stress factor.

Materials and Methods: Grapevines were cultivated in a N-fertilizer experiment for more than five years with increasing N doses (0, 30, 60, 90 kg N/ha). After leaf emergence, blades were harvested according their plastochrone index (pi), from pi 1-4 up to 13-16. PAs and amino acids were determined by HPLC.

Results: Increasing the N-level in the growing medium affects in general the concentration of soluble γ -amino butyric acid (GABA) as well as of glutamic acid. Their dynamics during the leaves' development is remarkable. The PAs show a similar course, i.e. increasing N generally ends up in higher PA concentrations in leaf tissues. There is also a high variability during their development, comparable to that of amino acids. Changes of PAs run after those of amino acids. According to these results it can be supposed that between PAs and amino acids is a more or less strong interconnection.

Conclusion: In the present research work, it can be demonstrated that N fertilization functions a stressor and induces the formation of PAs in leaves. To what extent these changes may influence the general performance of grapevines on a production site has to be worked out in further experiments.

Keywords: *amino acids, GABA, polyamine, putrescine, spermine*

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TRADITIONAL GRAPEVINES IN FACE OF CLIMATE CHANGE – NEW CHALLENGES FOR CLONAL SELECTION

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Introduction: Changing climatic conditions are becoming a growing challenge for viticulture in general and even more for grapevine breeding in particular. Higher temperatures and changing rainfall patterns will have a significant impact on grape soundness and thus, in the long term, might also lead to changes in the existing region-specific grapevine variety usage.

Aims: One possibility to preserve traditional varieties for cultivation is the selective search for mutations in grapevines that are more fit to meet these challenges. A major objective in this respect is the harvesting of healthy and ripe grapes. Selecting types with smaller berries, looser grape clusters and thicker berry skin are supportive breeding objectives. Furthermore, the selection of clones with a more accentuated aromatic profile, later grape ripening and higher total acidity content is getting more and more important in the future.

Materials and Methods: The introduction of a comprehensive project for the conservation of genetic resources made it possible to collect and examine a large array of genetically diverse variants of different traditional grapevine varieties.

Results: The selection of Pinot Noir clones focused on higher botrytis resistance. Due to the genetic variability of this variety, it was possible to select clone types with upright growth habit, loose grape clusters and small berries. In these three clone types it became possible to reduce grape rot significantly. The search for more grapevine variants worthy to be preserved was extended to other important traditional varieties such as Riesling and all the Pinot varieties including their genetically related varieties Chardonnay and Auxerrois. Accordingly, the appropriate collection of genetically diverse material is an indispensable basis for finding of new interesting types appropriate for further clonal selection.

Conclusion: The selection of these clones is significant in two respects, on one hand a wide range of botrytis resistant clones with varying characteristics is available for the winegrowers, on the other hand it is clearly revealed what can be achieved with clonal selection.

Keywords: *clonal selection, Botyitis cinerea*

BENEFITS OF THE ABUNDANCE AND IMPORTANCE OF FOREST FRUITS IN BISTRITA-NASAUD COUNTY

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Introduction: From the earliest ages, forest has played an important role in human's life, being an essential food and shelter resource. During the last period however, attention focused also on non-woody species that include forest fruits, medicinal plants, resins, edible mushrooms, seeds etc. They have an extremely important purpose in the food and cosmetic industries (Janse and Ottitsch, 2005). In addition, the consumption of forest fruits has a special importance for human health due to their rich content in flavonoids.

Aims: The purpose of the present paper was to identify and analyse the forest fruits in Bistrița County, in order to emphasise their importance. The highest abundance was registered by the following forest fruits: brier (*Rosa canina* L.), blackberry (*Rubus hirtus* W. et K.), blueberry (*Vaccinium myrtillus* L.), blackthorn (*Prunus spinosa* L.), hawthorn (*Crataegus monogyna* L.), wild apple (*Malus sylvestris* L.), cranberry (*Ribes nigrum* L.), wild strawberry (*Fragaria vesca* L.) and others (Vasile *et al.*, 2016).

Materials and Methods: The Expert Choice Desktop was used in order to determine and analyse the main characteristics of forest fruits. Based on this program, a decisional model based on more criteria was established. This model belongs to the Analytic Hierarchical Process (AHP) created by Thomas Saaty (Saaty TI, 2008). As such, the model was based on a hierarchy of eight forest fruits and takes into consideration 19 criteria, namely: harvesting period, the quantity harvested by one worker in eight hours, harvesting cost and complexity, perishability etc.

Results: It was observed that the most popular and demanded forest fruits are: blueberry, wild strawberry and hawthorn. The longest harvesting period is required by brier, followed by hawthorn. At the same time, the quantity harvested by one worker in eight hours is higher for wild apple, brier and hawthorn than for blackberry, blueberry, blackthorn and strawberry. On the other hand, wild strawberry and blackberry are the most perishable forest fruits.

Conclusion: Bistrița-Năsăud County shelters a large quantity of non-woody forest species that generate forest fruits. It was observed that each fruit type requires a special attention for its harvesting, transport and storing as most of them have a pronounced perishability.

Keywords: *analytical hierarchy process, flavonoids, forest fruits, non-woody forest products*

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IDENTIFICATION OF FOREST CULTURES VULNERABLE TO PATHOGENS IN TRANSYLVANIA AREA

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Introduction: Pathogens pose difficulties for foresters in creating new forests, because they easily infect seedlings, especially those grown in solariums or nurseries, but also those from natural regeneration.

Aims: The aim of the paper is to know the present and potential impact of pathogenic cryptogamic agents on seedlings and to estimate optimal control measures.

Materials and Methods: To achieve the goal, forest cultures vulnerable to the action of pathogens have been identified. For the identification to be in accordance with the proposed objective, it was necessary a preliminary documentation on Forest Districts, with the purpose of establishing the locations to be monitored.

Results: From the solariums, nurseries, plantations and regenerations, physico-geographic data and information concerning the state of nurseries and solariums, culture technologies, and solutions used for applying phytosanitary treatments were collected. In natural plantings and regenerations, in addition to recording the GPS position, information has also been collected on increases and injuries caused by abiotic and biotic factors, in order to establish possible pathogen attacks and predicting the degree of infestation. Based on the data collected in the field, there has been made up a map showing the areas where pathogens were identified following documentation, and these areas would be further monitored.

Conclusion: If, in the case of nurseries and solariums, pathogens can be kept under control by mechanical, non-polluting means, in the case of plantations the best prevention method is the use of seedlings with increased resistance to pathogens, preferably from nurseries as close as possible to the planting areas, so seedlings easily adapt to new conditions. In the case of natural regeneration, crops are monitored for spraying from the early stages of infestation.

Keywords: *pathogens, forest cultures, vulnerability*

THE INFLUENCE OF CERTAIN TYPES OF SUBSTRATUM AND CHEMICAL SUBSTANCES IN SEED GERMINATION AND PLANT DEVELOPMENT OF SPRUCE (*PICEA ABIES*)

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Introduction: The seed is being incorporated in the germinative bed where it has favourable conditions for germination, so one wishes to obtain as vigorous as possible exemplaries and a high rooting percentage (Holonec, 2008).

Aims: This paper has as aim the determination of the most propitious substrate types for germination and the growth of spruce seedlings (*Picea abies*), but also the types of treatments that can influence positively seed germination.

Materials and Methods: The biological material consists of spruce seedlings (*Picea abies*). The seeds were placed in different types of substrate, following seed germination and seedlings` growth, as well as in different substances, following seed germination. The used substrate variants were: V1-Jiffy pills, V2-peat+humus of coniferous, V3-peat+humus of coniferous + perlite, V4-peat+humus of coniferous+sand, V5-peat+humus of coniferous+perlite+sand. For seed germination the following types of substances were used: V1-H₂O, V2-Atonik, V3-Cropmax, V4-CuSO₄, V5-KMnO₄.

Results: Antonik solution registered the best stimulation effects of spruce seed germination in germinator. In case of seed germination in different types of substrate, the highest germination percentage (76.7%) registered variant V₅. To be appreciated are also the results obtained in case of variants V1 and V3. Regarding average seedlings` height, the best results were obtained in case of variant V3, variant at which at the last reading an average seedlings` height of 4.45 cm was registered.

Conclusion: One recommends the treatment of spruce seedlings with an Antonik solution previous to their germination, consequently, seeds, for the best results, will be sown in recoverable containers from plastic material in substrate composed out of peat (40%), humus of coniferous (40%), perlite (10%) and sand (10%).

Keywords: *recoverable containers, seeds, spruce, substratum, substances*

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QUINOA LEAF AS A NUTRITIONAL ALTERNATIVE

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Introduction: *Chenopodium quinoa* is an herbaceous plant that possesses green polymorphic leaves. They are traditionally consumed in America and are considered nutritive vegetables. Most vegetables are considered valuable sources of micronutrients, such as mineral, vitamins, carbohydrates and dietetic fiber; however, because they are poor in proteins, they are considered to have no energetic value. The consumption of vegetables generates a satiety sensation and favours the reduction of total calories consumed. Quinoa leaves can be consumed raw when they are ripe or steam cooked; they retain most of their vitamins and minerals. The FAO considers quinoa to be the “perfect food”, and it is not only used in common diets, but it is also suitable for the unique diets of those that are vegetarian or high-performance athletes as well as those with celiac disease and diabetes.

Aims: The aim of this work was to determine the nutritional value of quinoa leaves.

Materials and Methods: For every test, dried and powdered quinoa leaves were used, and the following parameters were determined: total polyphenols, total flavonoids, proteins, carbohydrates, reducing sugars, water content, ash content, and raw fiber, and the flavonoids were determined by HPLC.

Results: The results obtained for the polyphenols were 131.8 ± 10.3 mg 100 g⁻¹ and 62.07 ± 5.1 mg 100 g⁻¹ for flavonoids, and the main compounds were gallic acid, kaempferol and catechin. The content of proteins was $11.8 \pm 0.6\%$, the carbohydrates was 18.3 ± 0.9 , the reducing sugars were $3.2 \pm 0.27\%$, the water content was $2.8 \pm 0.9\%$, the ash content was $1.4 \pm 0.14\%$, and the raw fiber content was $4.37 \pm 0.39\%$.

Conclusion: Based on the nutritional profile and the content of polyphenols and total flavonoids, quinoa leaves can be considered an alternative for human consumption because they offer interesting potential in nutrients and antioxidant capacity, which is a dietary requirement.

Keywords: *Quinoa leaf, nutrient profile, phytochemicals*

SESSION 5: ECONOMICS AND RURAL DEVELOPMENT

THE DETERMINANTS OF THE USE OF EU FUNDS SUPPORTING INVESTMENT IN AGRICULTURAL HOLDINGS IN POLAND AND ROMANIA

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Introduction: Investment and investing is one of the crucial factors of farms' development, because it stimulates the process of structural changes in agriculture through innovations. Improving the competitiveness of farms by investing in their development, was - and still is - a priority of the CAP. The accession of Poland and Romania to the European Union and the inclusion of agriculture in CAP instruments created the possibility of additional financing support for farms' transformation. The co-financing of investments (measure Modernisation of agricultural holdings of the 2007-2013 and 2014-2020 RDP) was dedicated to facilitate the production conditions to the EU requirements and also increase the farm income.

Aims: In accordance with the research hypothesis quantifiable features of agricultural holdings determined the implementation of investment measures from EU funds were examined. Assuming that the reasons for participation in investments support funds based on characteristics of the farm, then these characteristics were studied.

Materials and Methods: Based on unpublished individual FADN data the Propensity Score Matching method was used to characterise the specificity of beneficiaries of EU CAP investment measures in comparison to similar (control) groups of farms. Poland and Romania were chosen because these are countries with a very high level of agricultural fragmentation. PSM allows to select the control group to make it as similar as possible to the experimental group (beneficiaries). The goal of the research was to investigate the characteristics (productivity, efficiency or profitability) which might have been decisive for farm participation in the pro-investment support.

Results: The beneficiaries of EU investment support are relatively large farms. Those farms had capital resources of about 350 thousand euro in Poland and 540 thousand euro in Romania. In the comparative analysis the beneficiaries of EU investment support funds and the control group had a similar structure of fixed assets. The characteristic feature of both countries was that the value of machines in the beneficiaries' farms was higher than in the control group. This means that beneficiary farms had previously (before the implementation of the EU funds) made investments related to machinery renewal, and EU funds only supported this process. This was also proved by the higher value of net investments. What is important, beneficiaries (as compared to control farms) were not distinguished by better production results (total output or farm income) and, consequently, the efficiency of production factors.

Conclusion: It can be assumed that it was not the characteristics of a farm which determined whether to join the support programme for investments support by EU CAP funds but rather other factors, like characteristics of the farmer.

Keywords: *CAP Rural Development Programme; Farm investments support; Modernisation of agricultural holdings*

MENTORING AGRIBUSINESS COMPANIES ON THEIR WAY TO AGRICULTURE 4.0

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Introduction: At the moment it is necessary to create a favourable interregional ecosystem to stimulate: new innovative solutions fitting specific requirements of agri-food chain and associated joint investments toward advanced agrifood industry 4.0. It will be achieved through the modernization of the vegetal-based agrifood chain by intensifying cross-pollination between ICT / traceability and big data (TBD) sectors, in priority SMEs, and actors of the agrifood industry.

Aims: The article is studying the possibility of increasing the competitiveness of these actors, in close connection with Agro-Food S3 Platform on «Traceability and Big Data», by tracking opportunities to develop and strengthen data collection and big data in the agrifood sector to boost agrifood industry 4.0. The article is based on the findings of a consortium of 5 clusters partners constituted with a special care to both guarantee a strong complementarity regarding domains of interest, crossing Agriculture and ICTs, geographic coverage and types of services provided to SMEs and, secondly, ensure some future productive interclustering activities.

Materials and Methods: Activities conducting targeted several key-types of actors along the business and innovation ecosystem at the crossroad of ICT-TBD technologies and agrifood sector, so as to take into account the entire agrifood. The priority is given to SMEs in ICT-TBD sectors and in agrifood industry, even if larger companies can also be involved because of their experience or because of their importance at the regional level in the related sector. ICT SMEs training and mentoring consists in an acceleration program for ICT SMEs wanted to address or to develop their activity for the agrifood value chain, with a dedicated training and mentoring program build by the partners.

Results: The results consisted in developing and implementing a common approach (including common tools and methodology) to help the 290 SME cluster members (and beyond) increase their innovation and business acumen, learn from one another and collaborate inter-regionally so as to better leverage the opportunities offered by Traceability and Big Data.

Conclusion: It was formed an inter-regional network of cluster managers, sharing their experience of funding and support tools in existence in their region and building on each other's strengths; this will give them an ideal position to act as innovation and business facilitators for the SMEs of their regions.

Keywords: *agrifood industry 4.0, big data, traceability, vegetal based agrifood chain*

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FINDINGS REGARDING CLUSTER MANAGEMENT QUALITY

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Introduction: Cooperation is becoming more and more important in the developing world. From the beginning of history, humanity had to co-operate to survive in order to acquire the essentials for life. When we talk about cooperation, we automatically talk about a dialogue between several individuals or groups, where information is exchanged. On this premise, clusters based on the cooperation of some groups, enterprises, universities, state institutions were born in order to obtain mutual benefits from this co-operation. With their development, the necessity to be able to classify them over time has aroused, and the best classification method is cluster quality. In this context, the European Union has come to support these forms of cluster organizations by strengthening the excellence of a cluster.

Aims: This research aims to identifying the main relevant indicators of the European certification process, and identifying the opportunities and challenges of such certification for Romania analysis of the European certification process - GOLD label.

Materials and Methods: As the materials used, research included European clusters, analysis of European Union cluster policies, the study of tools that support the development of clusters, the study of distribution, quantity, quality level and industry type. As research methods, analyzes were performed using the European Cluster Collaboration Platform (ECCP) and European Secretariat for Cluster Analysis (ESCA) data.

Results: There is a difference between European and American clusters, European clusters are characterized by national programs, important role of government in initiating cluster efforts, low level specialization across regional economies and lower level of rivalry (business hub is close). Most of the clusters are located in southern and central Europe, such as Portugal, Spain, Italy, France, Germany and in the Benelux countries. This is mainly related to the high level of development of these regions and highly developed industry. In the context of the “world-class cluster” concept, cluster management excellence depends on the following factors such as: the existence and implementation of a strategy for the further development of the cluster, the provision of professional services that address the needs of the cluster members through the cluster management, sustainable financing of the cluster management organization and appropriate staffing of the organization and additionality. There are three types of benchmarking labels that clusters can get: bronze label, silver label and gold label.

Conclusion: The participation of enterprises in clusters allows for the increase of prestige and also brings many economic and managerial benefits. European certifications are known under several labels and represent European recognition for the very good performance of an organization. With the help of some indicators, performance is measured in the organization's management. Such European certifications are needed in Romania because they can be defined as the passport for the development of partnerships and projects at European and international level.

Keywords: *cluster, European Union, quality*

ANALYZING THE IMPORTANCE OF TRADITIONAL PRODUCTS FAIRS FOR THE CONSUMERS IN CLUJ-NAPOCA

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Introduction: Traditional products represent an important part of the culture, identity and heritage of any country, often being the main factor for a complete tourist experience (Bessiere and Tibere, 2013). Often the traditional products are affected by lack of availability and the consumers have access to purchase them only within the specialized fairs.

Aims: In Cluj-Napoca there are some traditional products fairs, from where consumers can purchase traditional products, but their number is still at a low level, therefore the present research aims to analyse the importance of the fairs for the consumers and the attitudes toward them.

Materials and Methods: A research was conducted in Cluj-Napoca using the questionnaire which was distributed to a sample of 226 respondents. Descriptive statistics was used to analyse the information.

Results: The results indicated that the traditional products fairs are not the most important place of purchase for the consumers, but the private farms. The relative low percent of participants to these fairs is due to the fact that they are not strong promoted, they are not frequently organized and the prices are very high. Other reasons include the aspects related to hygiene, many consumers considering that placing the products outside is not safe. The main motivations for participating to traditional products fairs are to purchase food products and feel the specific atmosphere.

Conclusion: In order to maintain and expand the market share of traditional products, additional improvements in safety, health or comfort are needed but also a marketing strategy. The fairs should be organized more often and the prices should be kept at an acceptable level taking into consideration the target market.

Keywords: *availability, food safety, marketing strategy*

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CONSUMER PERCEPTION ON ORGANIC AND CONVENTIONAL FOOD PRODUCTS

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Introduction: Organic food products are increasingly popular among consumers and the supermarkets try to assure them that no chemical or synthetic fertilizers were used during the process of production (Paul and Rana, 2012). Attributes like quality and food safety are more and more important during the decision-making process of food choice (Grunert, 2005), therefore, researches are focused on consumers' attitudes towards organic food. Even though the concept of organic food seems to be very popular among the consumers, organic food consumption remains at a very low level comparing to the conventional one (Fotopoulos and Krystallis, 2002).

Aims: Given the increasing importance of organic food, a study was conducted among the consumers in Cluj-Napoca in order to determine the perception of the youngsters on organic and conventional food.

Materials and Methods: The research was conducting using a questionnaire which had 24 questions. Respondents were represented by youngsters from Cluj-Napoca, over 18 years old. The study was conducted between January and June 2018. A number of 258 questionnaires were suited for final analysis.

Results: The results indicate that conventional food products are mainly consumed for their availability in every point of sale and for the lower price comparing to the situation of the conventional products. The variety of the conventional products represented another reason for their high consumption. Attributes like notoriety of the brand or appealing aspect were not so important for the consumers.

Conclusion: It can be concluded that analyzing the consumer behaviour of organic and conventional food products is useful for creating future marketing strategies, by improving the attributes which are important to the consumers and stimulate the level of consumption for this category of products.

Keywords: *marketing strategy, lower price, questionnaire*

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TERRITORIAL MOBILITY IN ROMANIA

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Introduction: The complexity of this reality called social and territorial mobility is reflected in the diversity of definitions and concepts that exist. The social and territorial mobility are one of the most important phenomena in the contemporary Romanian and European society.

Aims: This paper aims to define the concept of social mobility and territorial mobility, focusing on the realities of the Romanian rural space.

Materials and Methods: The study used data obtained from the Romania's latest statistical yearbooks and censuses. The analysis of these data is relevant for understanding the dimensions of this phenomena within the contemporary Romanian society.

Results: With approximately 18% of the population across borders, Romania is among the countries with the highest proportion of migrants from the European Union. The migrant population of Romania is equally divided among men and women, and is relatively young, with over 65% being located between the ages of 18 and 40 years. Italy and Spain are the main destination countries, with the highest concentration of Romanians working abroad. Regarding the internal migration, between the 1950s and the 1990s, its predominant direction was from the rural areas to the urban ones. Since 1990 the number of those who moved from rural areas to urban centers began to diminish, and mobility in the opposite direction (from urban to rural areas) increased, which was due to a great extent the economic transition and the decrease of the working possibilities in the cities. After 2000, the migration from the urban to the rural area exceeded the number of those who moved from the villages to urban centers.

Conclusion: In the present research work, we demonstrated that applied to rural space, the realities of migration are: the territorial mobility of the Romanian labour force in other European Union countries; the process of returning to rural area of some urban citizens; the increasing number of those who have changed their area of residence opting for villages in the proximity of the important Romanian urban cities, the demographic aging of the population.

Keywords: *social mobility, migration, rural, territorial mobility.*

COMMUNITY PARTICIPATION IN TOURISM DEVELOPMENT IN RURAL AREAS: A LITERATURE REVIEW

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Introduction: The growth of tourism in rural areas puts pressure on the rural communities, even though it provides a source of revenue for the local residents. Understanding the impact of tourism development on the rural residents is fundamental as the communities can have a significant contribution as key players in the tourism planning decisions (Phillips and Roberts, 2013).

Aims: The systematic review intends to identify and analyze the level of participation of local residents in tourism in rural areas.

Materials and Methods: The systematic review was carried out through structured searches in journal databases. The time span is 20 years, from 1997 to 2018.

Results: This review looks at the impact of tourism development on the local residents in rural areas by emphasizing residents' attitudes and perceptions towards tourism development and by identifying the main challenges decision-makers are facing. The importance of the involvement of local communities in tourism planning in rural areas has been recognized in several study cases worldwide.

Conclusion: Community participation in tourism development in rural areas has lately been recognized as an important topic of research. With an awareness and understanding of the implications of the positive and negative impacts of tourism on the community, decision-makers can better respond to the challenges of sustainable tourism.

Keywords: *rural areas, systematic review articles, tourism*

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ENTREPRENEURIAL INTENTION AND MOTIVATIONAL FACTORS: A REVIEW OF RECENT RESEARCH

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Introduction: Entrepreneurship represents the main factor for economic development and social asession of the population. SME represent 70-95% of the total enterprises and engaged more one third of the working force in the private sector (OECD, 2017). Previous studies pointed out that the main factor for entrepreneurship are economic, social, behavioral, psychological, or motivational (Shane and Vanketaraman, 2000; Mueller and Dato-on, 2013).

Aims: This paper examined the factors affecting the entrepreneurial intentions and their implications.

Materials and Methods: Bibliometric techniques were used to analysed the factors affecting the entrepreneurship behaviour across different regions. The chronological analysis of the databases was done for a period of ten years (2009-2018).

Results: This study reveal influence of the economic, social, psychological and motivational factors on the intentions and behaviour of entrepreneurs accros different regions and countries. The importance of the entrepreneurship and its implication was world-wide analysed and dabated both in developed and developing countries.

Conclusion: Entrepreneurship has expanded during the last years, and the factors affecting the entrepreneurship behaviour and motivation are different from one region to another. At the same time social factors tend to more ofen mention as the main factors to start-up a business.

Keywords: *social entrepreneurship, entrepreneurship intention, entrepreneurial behaviour*

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DETERMINANTS IN AGRIBUSINESS FUTURE INVESTMENT BEHAVIOUR. THE ROMANIAN CASE

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Introduction: Farm investment behaviour was studied in different regions of the world and in different moment of time aiming to identify enabling or limiting factors (Benjamin and Phimister, 1997). The overall improvement of the performances of the agricultural sector and the effects produced in the rural communities was also studied (Bartolini and Viaggi, 2013). In a recent survey made in six EU Member States, almost 60% of farms declared to be CAP payment dependent and 57% investment support dependent in the case of machinery and equipments investments (Lefebvre *et al.*, 2014). These kinds of researches are rather missing for the New Member States and especially for Romania.

Aims: The paper investigates the farmers's intention for new investments in Romania for the future CAP programming period. Also, it presents the relationship between farm investment behaviour, farm characteristics and the CAP payments and investment support.

Materials and Methods: Data was obtained by face-to-face interviews with visitors at the Agraria Fair in Transylvania (April 11-14, 2019). The sample of 352 participants was randomly selected being representative for 18,000 visitors.

Results: 32% of the sample population declared their intention to start a new investment in the future CAP programming period. More than 35% of farmers are CAP investment support depended and only 7% can rely on their own funds.

Conclusion: Future investment support public policies should better target especially young farmers in animal breeding and food industry sectors that still reported extremely low financial resources.

Acknowledgments: This research was supported by DLG Marketing Romania the organiser of Agraria Fair. Data was collected by 6 volunteer students.

Keywords: *agricultural investments, public policies, behaviour, Romania.*

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CONSUMERS AWARENESS, BUYING BEHAVIOUR AND USE OF FRESH BERRIES IN DIFFERENT COUNTRIES

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Introduction: In the recent past, there have been and still are several horticultural projects in order to stimulate the improvement of sustainability of berry production, quality and nutritional value in a changing environment. In terms of the whole supply chain, the consumer's perspective needs to be taken into consideration as well. In order to stimulate the demand of fresh berries among the consumers, it is crucial to know, what consumer's preferences are in matters pertaining fresh berries. With respect to production, there is statistical data available about fresh berries like e.g. strawberries, raspberries, blueberries, blackberries and currants. With respect to consumption, there are less data available and an information gap about consumer's preferences became obvious.

Aims: This aim of this study is to contribute to the consumer's perspective. The objective of this research is consumer's awareness, their buying behavior and consumption habits of fresh berries in different countries.

Materials and Methods: Available statistical data about fresh berries production is analyzed. With respect to data about consumption of fresh berries, a cross-national study (Schweden, Germany, Italy, Poland, United Kingdom) was performed with a sample size of 500 participants in each country. In order not to distort the sample because of foreign language competences, the questionnaire was designed in the native language of each country. The survey was carried out online in 2018.

Results: The paper will present selected results of this cross-national study about consumer's preferences like associations towards fresh berries ("mind set"), awareness of fresh berries, buying behavior and use and consumption habits in different countries.

Keywords: *cross-national study, fresh berries, market research*

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SUSTAINABLE CIRCULAR ECONOMY PROCESSES IN BIOENERGY ECOSYSTEMS: A CONCEPTUAL FRAMEWORK

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Introduction: The new circular economy's (CE) models should be disruptive, switching the mechanistic paradigm with a holistic approach of the anthropic and natural systems' nonlinear co-evolution, feedback chains and metabolisms network, as an economic circulatory system connecting and refining materials, focusing on resilience (instead of efficiency) and valuing each resource within the global social-ecological system (SES) (Webster, 2013).

Aims: The purpose of this study is to design a conceptual framework integrating all the research phases necessary to connect the bioenergy extended ecosystem's processes through the CE multi-scale and multi-level feedbacks, in a SES's sustainable development scenario for preserving its ecological resilience (multi-stability, adaptability, species diversity, evolvability and self-organization).

Materials and Methods: The conceptual framework was developed based on previous academic literature and concepts.

Results: The proposed model was built based on the body of literature review dealing with circular economy processes; sustainable development goal function; industrial ecology, systems ecology, complex adaptive systems and SES frameworks; ecosystems' and organisms' resilience, self-organization and cybernetic control processes. It integrates complex steps that need to be considered to assess the circularity and sustainability of the bioenergy systems within their natural environment.

Conclusion: The proposed framework involves modeling the systems, processes, flows and resources in the bioenergy context; defining the concepts and formal ground for analyzing the adaptive feedbacks and detecting the potential attractors, based on the CE patterns and their sustainability constraints, able to induce self-organizing processes within the bioenergy ecosystem.

Keywords: *bioenergy ecosystems, circular economy, sustainability*

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Acknowledgements: This work was supported by a grant of the Romanian Ministry of Research and Innovation, CCCDI-UEFISCDI, project number PN-III-P1-1.2-PCCDI-2017-0251/4PCCDI/2018.

THE MAIN TECHNICAL-ECONOMIC ASPECTS ON THE FRUIT MARKET AT IAȘI DEVELOPMENT RESEARCH STATION FOR FRUIT GROWING (D.R.S.G. IAȘI)

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Introduction: The fruit market is characterized by an increase of the cultivated areas yearly, especially of the intensive cultivation systems. The yields per hectare are very high, especially in countries such as Spain, France and Poland. There is a wide range of fruit on the European market, so the demand can be fully satisfied.

Aims: The authors made an analysis of Iasi county situation on the fruits market having a specific research unit from the branch as a reference. All the quantitative and financial data of this unit were analyzed for the last few years.

Materials and methods: The authors used as main sources of information primary sources having access to all the data of the reference unit used for the study. All the financial and quantitative data were used in analyzing the current situation of the fruits market at a regional and at the Iasi county level. The authors also used secondary sources of information.

Results: It was determined that Romania and especially Iasi county has a very high potential for fruits production. Also, the demand is very high but most of it is satisfied by imports due to the better policies applied abroad. The authors made a centralization in terms of quantities and financial figures of the most important fruit producers in Iasi county. The studied unit had a Fiscal value of over 5 million lei in 2018 being an important player in the fruits market of the area.

Conclusion: The policies on fruits have to be better studied and improved in Romania. The range of fruit products needs to be diversified so that Romania can enter the European markets. In addition, Romanian producers should be encouraged by introducing tax exemptions and by granting new types of subsidies.

Keywords: *fruits, market, policies*

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CLUSTER POLICIES AND COMPETITIVENESS

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Introduction: The cluster according to Prof. M. Porter a geographical concentration (region, country) of interconnected companies (especially SMEs), specialized suppliers, service providers, companies from related industries, universities, research institutes and trade associations, local public administrations from specific fields, which compete but also cooperate. In the world, clusters are considered as an important driver for innovation, business development and attracting investment. Modern cluster policies are an expression of political commitment, composed of a set of specific government policy measures that aim to strengthen existing clusters and/or facilitate the emergence of new ones as described in the *Smart Guide for Cluster Policies*. Cluster policies influence competitiveness of a region/country measured by the company's productivity and innovation.

Aims: The paper aims to report the actual cluster policies in European Union and the world and also on the success of those policies measured by performance of SMEs on the region/state. Also, this paper aim to report on the success of cluster policies in NV region of Romania

Materials and Methods: the method used is literature review and yearend financial data review.

Results: In EU and around the world there are multiple initiatives to promote clusters and other similar initiatives. The year-end data of companies in Romania are collected from MF database and studied in order to demonstrate the influences of the cluster/cluster policies on company performance.

Conclusion: The modern cluster policies implementation influences the competitiveness of companies in the region. To be part of a cluster is demonstrated to be beneficial for the performance of a company.

Keywords: *cluster policies, competitiveness*

TRACKING OPPORTUNITIES TO DEVELOP AND STRENGTHEN DATA COLLECTION AND BIG DATA IN AGRI-FOOD SECTOR IN ORDER TO INCREASE COMPETITIVITY OF SMES

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Introduction: Feeding the ever-growing world's population is becoming humanity's biggest challenge, but technology and innovation is stepping in to help face the challenge leveraging self-driving tractors, IoT sensors, drones, satellite imagery and precision farming to quantify the agriculture in vast new ways in order to make sure agriculture is getting ready to face its biggest challenge met so far.

Aims: The overall objectives are to support businesses to evolve, to increase industrial competition, and to develop relevant connections between clusters for information and technology exchange. Building a common vision of the challenges and obstacles to adapting new technologies in order to improve efficiency and traceability across the various agri-food chains. Also the need for a plan that will help stimulate innovation and digitisation, in order to improve efficiency and traceability, while enabling Internet Communication Technologies (ICT) boost precision agriculture and help setting up the foundation for information exchange between the ICT sector and the agri-food sector

Materials and Methods: the cluster environment in Europe and researching direct and indirect sources

Results: Discussion and results are related and focused on the status of Agricultural 4.0 in Europe and how we can influence the development of this trend in the future, for advanced production and better established agri-food chain.

Conclusion: The purpose of this study is to raise awareness of the importance that technology has in agriculture and how these new technological tools can help change the way we used to do farming in order to increase food security worldwide. All these combined will lead to better accommodated industrial sectors that will enable them to produce more with less, while helping to protect the environment and reduce waste.

Keywords: *agri-food, cluster, development, digitisation, precision agriculture*

AGROFORESTRY IN THE EU AND ROMANIAN PUBLIC POLICIES. A COMPARATIVE ANALYSIS BETWEEN SELECTED MEMBER STATES

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Introduction: Although there is not a general accepted definition for ecosystem services (ESS) (Spangenberg *et al.*, 2014) most of the researches acknowledge that it represents the “benefits that humans recognise as obtained from ecosystems that support their survival and quality of life” (Harrington *et al.*, 2010). In this context, it is proved that agroforestry delivers important ESS (Fagerholm *et al.*, 2016). To enhance the possibilities of agroforestry development, rules at different levels need to comply and to be consistent (Jakobsson and Lindborg, 2015).

Aims: 1) to understand how agroforestry is regulated at the EU level and what type of incentives are promoted by the policy-makers in order to deliver ESS through agroforestry development; 2) to understand how the EU regulations are applied by the national authorities (drivers; barriers); 3) to compare different examples of national and regional regulations across EU for good practices examples that can be further promoted in the debate for future policy reforms;

Materials and Methods: An analysis of the legal repository of the European Commission (<http://eur-lex.europa.eu>) from the year of 2000 to our own day is realised. The legal documents related to agroforestry issued by the national authorities were also analysed.

Results: Results reveal that agroforestry is recognised only marginally by the public policies as being eligible for the first CAP pillar payments. Also, there is a Rural Development measure that support investments in agroforestry, the system management falls under the forestry regulations. This acts as a barrier for the system development, especially in the New Member States.

Conclusion: There is the need to relax the management burdens in the harvesting process.

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Keywords: *public policies, ecosystem services, Romania.*

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GENDER CONSIDERATIONS IN FOREIGN LANGUAGE LEARNING BETWEEN ASSIMILATION- INCLUSION OR DIFFERENCE-ESCAPE

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Introduction: The paper explores the connection between such social categories as gender and language ideologies, in the construction of male and female identities towards social inclusion on the one hand or social difference on the other hand. Languages come with a baggage of gender ideologies (Pavlenko *et al.*, 2001), in a world and time when gender is a debatable subject across cultures and their learning makes way for alternative identities, either of *sameness* or *otherness*.

Aims: The review aims at analysing and evaluating the meaning of gender across cultures (as a system of social relations and language practices) and how this category may influence foreign language learning from a sociolinguistic and sociocultural perspective, as well as language performance.

Materials and Methods: The critical literature review focuses on structured searches in journal and book databases in sociolinguistics, starting with the 1990s when gender considerations on foreign language studies first gained more momentum, as well as poststructuralist literature.

Results: The critical analysis outlines the male universalizing, imperialist or even colonizing dimension of assimilation and inclusion through foreign language learning alongside the female differentiating, escapist, alternative and de-/reconstructive dimension of foreign language learning. Additionally, the paper provides an overview of gender-specific performance and motivation in foreign language learning (Tercanlioglu, 2005, Carr and Pauwels, 2006).

Conclusion: The review highlights the different sociolinguistic, sociocultural and performance coordinates for males and females across cultures in terms of foreign language study. As such, it wishes to provide a thorough theoretical benchmark for a quantitative study on these gender-related sociolinguistic, sociocultural and performance coordinates in foreign language learning, particularly English language learning, for both males and females in Romania and Morocco.

Keywords: *gender and language ideologies, foreign language performance*

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THE ATTITUDE AND PREFERENCES OF TOURISTS IN PRACTICING ADVENTURE TOURISM

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Introduction: Adventure tourism has grown exponentially worldwide over the past few years, as travelers are keen to visit undiscovered destinations. This is also the case of Romania, where adventure tourism has known a significant growth according to a study of the Adventure Travel Trade Association (2019), as natural and national parks represent an attractive setting for this kind of tourism. Adventure tourism is a complex concept because of its multidimensional and relative nature, being characterized by elements of physical and psychological challenges, risks, uncertain outcomes and exploration (Swarbroke *et al.*, 2003) and as such, there is a need to further investigate some important aspects of adventure tourism.

Aims: The paper determines the key motivational factors that are important for adventure tourists' decision to visit the parks, tourist preferences and their degree of satisfaction.

Materials and Methods:

Primary data collection was conducted by employing the online inquiry method and the questionnaire as a research tool used. The questionnaire was distributed in the February-April 2019 period, to specialized target groups that include adventure tourists in Romania. The questionnaire comprised 24 questions applied to tourists randomly, solely to adventure tourists, particularly a number of 135 respondents.

Results: Travel motivation is mainly driven by nature, the joy of admiring landscapes, adventure sports and outdoor activities. The degree of satisfaction with the facilities of the park area indicates that they are satisfied with the existing information panels and the existing tourist reception structures, but very dissatisfied with the state of the sanitary facilities and the maintenance of cleanliness. Access infrastructure and information points require improvement.

Conclusion: Tourism and recreation should be priority objectives for the management of national and natural parks, while in the planning of these activities they should aim to produce a minimal impact on the natural environment, as well as sustainable and efficient development which is beneficial to all stakeholders - tourists, local communities, administrators, entrepreneurs.

Keywords: *adventure tourism, natural and national parks, motivations and preferences.*

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ASSESSING THE QUALITY OF THE LOCAL DEVELOPMENT STRATEGIES IN ROMANIA. EVIDENCE FROM 2014-2020 PROGRAMMING PERIOD

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Introduction: The LEADER program has become an important component of EU Rural Development policy in the 2014-2020 Programming Period. The main goal of the program is to offer solutions that respond to the needs of the rural communities and territories.

Aims: The present paper aims to assess the quality of the Local Development Strategies, created and implemented by the Romanian Local Action Groups (LAGs) through the LEADER Program, and to find out how they respond to the local needs.

Materials and Methods: Two important types of data were used. The first set contains the key rural development indicators for each LAG, such as age structure, employment rate, unemployment and land cover, and is used to find out the main needs of their territories. The second set contained the objectives assumed by LAGs in their strategies. The aim was to find out how those objectives respond to the needs. The data was collected from the 31 Local Action Groups located in North-West development region.

Results: Most of the LAGs objectives and measures corresponded to the Priority 6 “Promoting social inclusion, poverty reduction and economic development in rural areas”, with a focus on job creation and fostering local development in rural areas, and to the Priority 2, that deals with enhancing farm viability and competitiveness. The objectives correspond to the some of the needs identified, yet not to all of them. The Environment problems are poorly addressed in the local Development Strategies.

Conclusion: The paper showed that the Local Development Strategies respond to some of the most urgent problems, but fail to address all of them. All these findings can help policy-makers and the Local Action Groups to improve the future programme implementation.

Keywords: *LEADER, Local Development Strategy, Rural Development Indicators*

ROMANIAN STUDENTS BEHAVIOR CONCERNING THE WINE CONSUMPTION

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Introduction: Wine has been produced for thousands of years. The earliest known traces of wine are from Georgia (c. 6000 BC), Iran (c. 5000 BC), and Sicily (c. 4000BC) and China (c. 7000BC) (Hames, 2010). Wine reached the Balkans by 4500BC and was consumed and celebrated in ancient Greece, Thrace, Rome and Dacia. Some studies have concluded that drinking small quantities of alcohol (less than one drink in women and two in men) is associated with a decreased risk of heart disease, stroke, diabetes mellitus, and early death (O'Keefe, 2014).

Aims: In this paper we have tried to assess the Romanian students' preferences concerning the alcoholic drinks consumption, the reasons and the moment of consumption and to perform a cluster analysis to identify the most important segments on market.

Materials and Methods: A research was conducted through a omnibus internet based questionnaire comprising 23 questions from 210 respondents.

Results: The wine colour and type are the most important criteria for choosing the type of wine and also the origin and package. The wine is bought for self-consumption and to be offered as a gift in the second case the willingness of consumer to pay a higher price.

Conclusion: The Romanian consumer prefers the quality of wine instead of use of more quantity but low quality wine.

Keywords: *wine, students, consumption habits*

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PLANNING INSTRUMENTS AND CAPITALIZING WAYS OF PRODUCTION: PRELIMINARY RESULTS

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Introduction: Majority of the Romanian farms are still small, and that is why it results a strong connection between using planning instruments and production increasing. In the present, farmers need to face with several challenges such as: access to the markets, climatic changes and consumer behaviour. The planning instruments and planning activities in farms are necessary to become more competitive on markets and also for more efficient management of farm resources.

Aims: The purpose of the paper is to identify the main ways of capitalizing the production and the planning instruments farmers are using in their planning activities.

Materials and Methods: The research area is represented by three counties from Romania. Data were collected using a questionnaire applied to 127 farmers; as a method of data analysis, descriptive statistics were used.

Results: Farm register is the most common planning instrument used as reported by 39% of farmers from Satu Mare county, 52% from Bistrita-Nasaud county and 31% from Salaj county. Other planning instruments were the Gantt diagram for scheduling the activities.

Regarding capitalizing the production, 40% of farmers from Satu-Mare county exploit the production directly from their farms, in Bistrita-Nasaud county 43 % and in Salaj county 27 %, followed closely by market capitalization.

Conclusion: The capitalization of direct production on farms is an increasingly common and used way for farmers and activity planning is frequently used through planning tools.

Keywords: *capitalization, planning instruments, production.*

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RESEARCH ON THE ESTABLISHMENT OF A BUSINESS OPPORTUNITY BASED ON HOOKAH CONSUMPTION IN A SMALL TOWN FROM THE CENTER OF ROMANIA

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Introduction: The past, marked by smoking opium and hashish, has brought a negative image to today's hookah. However, today's society has begun to accept the hookah as a pipe for tobacco, to let it be charmed by its various flavours, and especially by the way it can relax or help in socializing.

Aims: This article aims to investigate the attitude of consumers towards the opportunity to implement and develop a local business based on consumption of hookah in a small town placed in the centre of Romania.

Materials and Methods: In order to accomplish this study, we have proposed and applied a questionnaire to measure consumers' availability for hookah consumption, both in terms of past or present consumption and potential consumption, along with consumer preferences such as flavour, preferred location, reasons to consume, the accepted price, but also the attitude towards the potential effects on the health of consumers.

Results: The study sample comprised 201 respondents selected by an online survey and focused in particular on the young 18-24 year old population considered to have the best possible approach to hookah consumption, but also considered other age categories. Responses included information on age, consumer frequency, sex, level of education, incomes, consumer preferences, potential consumption, accepted price, flavour, location, reasons, and risks. Correlations between categories of information were also carried out using modern statistical methods.

Conclusion: The obtained results recommend hookah consumption as a business opportunity even in a smaller city, highlighting the need to socialize the population with a level of education and incomes above average, the availability of diversification of leisure, the awareness of potential health risks, but especially the cosmopolitan character of a centuries-old habit.

Keywords: *business opportunity, entrepreneurship, hookah consumption, social status*

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SESSION 6: ANIMAL SCIENCE

BREEDING RAMS OF ENDANGERED LIPE ZACKEL SHEEP
-ASSESSMENT OF SOME REPRODUCTIVE TRAITS-

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Introduction: The breeding value of rams is an important measure in sheep management. Testicle circumference and the health of the reproductive tract are essential for ensuring good lambing rate. Breeding rams over 1,5 years should have over 33cm scrotal circumference. Ideal testicles of ≥ 35 cm can ensure sperm production to serve over 40 ewes over the mating season.

Aims: Taking into account the importance of health of the reproductive tract and the testicle size of breeding rams, assessment of the reproductive tract were done in breeding rams of the endangered Lipe sheep.

Materials and Methods: A total of 20 breeding rams in good body condition, aged 2-4 years, from ten flocks of Zackel sheep – Lipe type, were analysed in April 2019 in Serbia. Testicle circumference scoring was done using the morphometric classification: insufficient (≥ 28 cm), weak (28-32cm), good (33-35cm) and excellent (≥ 35). Clinical examination of the reproductive tract included palpation and adsppection method.

Results: The average scrotal circumference was 38.35 cm. The individual scrotal circumference scores were grouped as: poor (1 ram), acceptable (2 rams), good (4 rams) and excellent (13 rams). No pathological findings were registered during adsppection and palpation of the scrotum, testis and epididimis. All the tested testicles were mobile in the scrotum, with well defined epididimis. Adsppection of the prepuce and glans penis resulted in diagnosis of ballanitis (1 ram) and in ballanopostitis (1 ram).

Conclusion: The present research work, supported by the Project TR31085, showed that the size of testicles in the majority of the tested breeding rams of Lipe sheep was satisfactory, with good overall genital health status. Analysing the results, better breeding programmes and improvements can be made, which could strongly support the conservation processes of the endangered Lipe sheep.

Keywords: *Lipe sheep, breeding ram, reproduction*

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BOTANICAL ORIGIN DETERMINATION IN HONEY SAMPLES WITH OVERREPRESENTED POLLEN: PALYNOLOGICAL AND PHYSICO-CHEMICAL ANALYSIS FROM APHIS LABORATORY

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Introduction: Pollen analysis is the basic method for the determination of the botanical origin of honey. However, the presence of over-represented pollen in honeys may lead to false results of the analysis. This can be more severe if this pollen is present in unifloral under-represented honeys of commercial importance (e.g. thyme or acacia honey).

Aims: In the present study, we investigated the abundance of over-represented pollen grains on several quality characteristics in honey samples. In particular, the physicochemical (water, electrical conductivity, sugars and HMF content) analysis were made in order to confirm the declared botanical origin.

Materials and Methods: Refractometric method was used for water content determination, electrical conductivity determined by potentiometry and chromatographic determinations for HMF content (photodiode array detection) and sugars (HPLC refractive index detection). Melisopallinology was the method used in principle for honey botanical origin determination.

Results: The present study confirms that, in the case of presence of over-represented pollen in honeys, pollen analysis alone cannot give reliable results for the determination of the botanical origin.

Conclusion: Consequently, pollen analysis should be combined with other analyses, especially in honeys with under-represented and over-represented pollens, to give precise results for the botanical characterization and labeling of honeys.

Keywords: *honey, melissopallinology, physico-chemical analysis*

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FISHES OF ROMANIA FROM PETRU BĂNĂRESCU TO NOWADAYS

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Introduction: More than half a century ago, the most important Romanian scientific work in the field of ichthyology and fish systematics „*Fauna Republicii Populare Romîne, Pisces-Osteichthyes (Pești ganoizi și osoși)*” written by Petru Bănărescu and published 1964 appeared. Subsequently, many articles and scientific books of real value have been published (Oțel, 2007), but they are more punctual at a regional level regarding the current situation of the fish fauna in Romania. Fish species are in a continuous dynamic in terms of distribution. These changes are due to several factors, of which we can state: the anthropic interventions, the climatic changes and last but not least - the hazard. Based on the analysis of numerous published studies in specialized journals (Cocan and Mireșan, 2018), we managed to update and establish the distribution area of 224 fish species, classified in 18 orders, present in Romania today. We placed a special emphasis on the newly emerged species and how they entered the territory of our country.

Aims: The main goal of this paper was to give an up-to-date review of the fish species found in Romania but also to annotate their changes regarding the systematics.

Materials and Methods: Books, articles, websites, databases, catalogs were analyzed to “track the changes” and summarize information.

Results: A complete list of Romania's fish species was compiled based on changes that occurred in the last half of the century.

Conclusions: This paper represents an updated review of the Romanian ichthyofauna based on past and recent books, articles, and online databases, and answers to a simple question: How many species there are in Romania?

Keywords: *ichthyology, fish fauna, taxonomy, systematics*

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Acknowledgments. This study was funded by the Ministry of Research and Innovation through Program 1 - Development of the National Research and Development System, Subprogram 1.2 - Institutional Performance - Projects for Financing the Excellence in CDI, Contract no. 37PFE/06.11.2018.

**CONTRIBUTION CONCERNING THE BEHAVIOR KNOWLEDGE
BEFORE NATURAL SWARM IN HONEYBEES
(*Apis mellifera carpathica*, Linnaeus)**

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Introduction: The most detailed description of swarming process was done by Huber in 1792 (cited by Delia Allen, 1955), but without account data and it is difficult to understand the behavior of honeybees before swarming. In conditions of our country, after winter outcome, the queen bee begins to lay eggs on more greater surfaces in the combs' cells, hereby unto acacia tree harvest end, the family reaches a culmination of numerical development associated to a nest blockage with nectar and pollen (Căuia *et al.*, 2009). Such status settlement determines honeybees to build queen cells on lateral sides of nest honeycombs, and the entire family will get into so named "swarm cold" (Ruttner, 1980).

Aims: Having in view the former studies, we want to stand out the potential of honeybee families based on behaviour knowledge before natural swarm.

Materials and Methods: The study was effected during May 25 and June 15, 2019, after acacia tree harvest (*Robinia pseudoacacia*, L.), on a number of 20 honeybee families (*Apis mellifera carpathica*, Linnaeus) maintained in vertical stationary beehives, on 12 frames, in Jucu area of Cluj County. The biological units were daily monitored determining the surfaces with covered and uncovered brood using Netz framework. As concerns the ages of queen bees, from the beehive accountancy there were of 1, 2 and 3 years old.

Results: In experiment start, the average surfaces with covered brood have 55.8%. Making a comparison, after the first week, we can appreciate that irrespective of queen bees' age, all the honeybee families rapidly came in "swarm cold", and the average surfaces occupied by covered brood were more widespread (73.73%) given to those ones occupied by larval brood (26.27%). In the same connection, as concerns the queen cells' situation covered after first week, these were in a greater number (84.3%) given to those uncovered ones (15.7%).

Conclusion: Even the queen bees' age do not emphasized relative great differences among honeybee families as concerns the evolution of behavior before natural swarm, we appreciate that an important role could be assigned to bio-apicultural zones, which provided an appropriated development of biological unit.

Keywords: *Apis mellifera carpathica* L. brood, queen cells, natural swarm, biological unit

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PLANTS USED IN ETHNOVETERINARY MEDICINE IN COWS. A REVIEW

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Introduction: Parts of the plant or even the whole plant present in the spontaneous flora and sometimes the bark, branches and leaves of some trees, due to its content in various principles, can be used in ethnoveterinary medicine because of the actions they have: antibacterial, antifungal, antiviral, anti-inflammatory, anti-edemic, analgesic, antitussive and expectorant. Along with well-known plants, with therapeutic effects, even those considered toxic, in small amounts and collected by connoisseurs, participate in treating gastrointestinal disorders, reducing inflammation and minimizing pain, treating certain reproductive disorders, eliminating internal or external parasites.

Plants used in ethnoveterinary medicine. *Achillea millefolium*, *Calendula officinalis*, *Symphytum officinale* L., *Hypericum perforatum* L., *Taraxacum officinale*, *Arnica montana* are plants whose action is known and appreciated among the connoisseurs, the actions being: antiseptic, anti-inflammatory, disinfectant or healing (Lans C. et al., 2007; Laudo M., 2013). Against external parasites but also anthelmintic action is attributed to plants, some of them considered to be toxic: *Lupinus albus*, *Nicotiana tabacum* L., *Juglans nigra*, *Fraxinus ornus* (Farrah D., 2009, Mayer, 2014). Along with other plants, *Hyoscyamus niger*, *Plantago major* are used to treat diseases of the hoof (Suroowan et al., 2017, Shah et al., 2012). *Digitalis lanata*, *Convallaria major*, even if they are toxic plants by the content of glycosides, saponins, digilanides A, B and C, in small quantity leaves, root or seeds are used to treat cardiovascular disease (El Mahdy et al., 2017, Tikofsky, 2013). *Artemisia absinthium* L., *Sambucus nigra* L., *Achillea millefolium* L, essential oils from *Linum usitatissimum* seeds, *Tanacetum vulgare*, *Melilotus alba*, *Colchicum autumnale*, *Solanum nigrum*, helps in the treatment of gastrointestinal disorders such as colic, digestive disorders, tympanism and meteorism, indigestion, laxative effect [Mayer, 2014, Pieroni, 2004, Kumari et al, 2009].

Conclusion: Many spontaneous flora plants can be used in ethnoveterinary medicine to treat certain diseases in cows.

Keywords: *action, cows, ethnoveterinary, plants*

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REVIEW OF *APIS MELLIFERA*, *VARROA DRESTRUCTOR* AND THE POTENTIAL OF GENETIC RESISTANCE

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Introduction: *Varroa destructor* is a parasitic mite that represents a major global threat for the Western honeybee *Apis mellifera*. This parasite managed to switch from its natural host the Eastern honeybee, *A. cerana*, and within a few decades, it spread among *A. mellifera* populations around the globe (Rosenkranz *et al.*, 2010). Today beekeepers are using a variety of different acaricides to keep the parasite population under control. However, but for many of these substances, the parasite evolved resistance asking for the development of novel compounds. Hence the treatment is less suited as a sustainable tool in honeybee health; other alternative options are needed (Evans and Cook, 2018, Dietemann *et al.*, 2012).

Conclusion: As over the past decades, various resistant honeybees have been reported to this parasite breeding for *Varroa resistant* honeybees have been suggested as a more sustainable solution. We here review the efforts which have been successful and the apicultural procedures that needed to be implemented in order to achieve resistant honeybees. We also address the underlying resistance mechanisms; discuss the benefits of breeding within regional populations that also consider biodiversity aspects of *A. mellifera*.

Keywords: *A. mellifera*, breeding, resistant honeybees, *Varroa destructor*

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IARA RIVER FISH COMMUNITY DISTRIBUTION AND DIVERSITY

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Introduction: Iara River is a left side tributary of Arieș River, located in Cluj County and has a total length of 48 km and is integrated into Nature 2000 site ROSCIO263. The river crosses eight villages: Caps, Valea Ierii, Frășinet, Moara de Pădure, Băișoara, Iara, Surduc, and Buru, where it flows in Arieș River. On Iara River, there is one fragmentation point, the Caps dam (Iara-Fântânele deviation). The dam blocks downstream-upstream migration of fish because there is no fish pass construction. Fish communities from mountain water bodies are heavily influenced by several anthropic factors such as deforestation, overfishing, pollution, micro-hydropower plants and dam constructions. A fish survey is necessary to protect aquatic ecosystems.

Aims: The purpose of this paper was to analyze the fish community from Iara River by its number of species, their distribution and to determine diversity indices.

Materials and Methods: Fish specimens were captured using single-pass electrofishing techniques. Samus 725 MP electrofisher apparatus was used, powered by a 22 Ah rechargeable battery. The frequency of the electrofisher was set to 45Hz. GPS coordinates were collected using a Garmin eTrex 20x device. The collected fish specimens were identified, measured and photographed. Diversity indices were calculated based on field counts and determinations

Results: Eleven sampling stations were made in order to achieve a global view of the river ichthyofauna. A total number of 189 specimens belonging to 9 species were captured and identified as follows: 77-*Salmo trutta*, 14-*Cottus gobio*, 1-*Phoxinus phoxinus*, 1-*Eudontomyzon danfordi*, 59-*Barbus petenyi*, 12-*Gobio obtusirostris*, 15-*Alburnoides bipunctatus*, 7-*Squalius cephalus*, and 3 *Carassius gibelio*. The highest relative abundance was calculated for *Salmo trutta* (40.7407%) and the lowest was for *Phoxinus phoxinus* and *Eudontomyzon danfordi* (0.5291%). The calculated values for diversity indices were: Shannon $H' = 1.5415$, Simpson $D = 0.2771$, Margalef $d = 1.5262$, Berger-Parker = 0.4074 and Species Evenness $J' = 0.7016$.

Conclusion: The distribution of fish species in Iara River is influenced by anthropic activities. The most abundant area was at the confluence of Iara River and Arieș River (4 species). The presence of *Carassius gibelio* in sub-mountain fast flowing water is very unusual, but it is explained by the short distance to Arieș River. In four out of eleven sectors we found only one fish species (Sector 1-*Salmo trutta*; Sector 2-*Salmo trutta*, Sector 8-*Barbus petenyi*, Sector 10-*Barbus petenyi*). The presence of *Thymallus thymallus* in Iara river was reported by Petru Bănărescu (1964), but in our study it was not confirmed. A similar study conducted in 2012 by Imecs & Nagy did not confirm the presence of *Thymallus thymallus*.

Keywords: ichthyofauna, electrofishing, Natura 2000, salmonidae, habitat fragmentation

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FUNCTIONAL CONNECTIVITY OF THE IALOMITA RIVER FOR THE RED DEER (*CERVUS ELAPHUS*) AND THE WILDBOAR (*SUS SCROFA*)

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Introduction: Two of the most commonly applied methods to survey large- and medium-sized mammals are the track plot recording and camera trapping, both non-invasive methods which permit the estimation of species presence and/or abundance (Wemmer *et al.*, 1996). As an important tool for obtaining such data, photo trap camera have become increasingly common into wildlife research. It is known that the photo trap camera method has some limitations due to imperfect species detectability and the use of capture rates as surrogates for abundance (Varman and Sukumar, 1995).

Aims: The researches carried out in the Ialomita basin aimed at assessing the functional connectivity of specific habitats for red deer and wild boar species. The work has primarily sought to identify ecological barriers and fragmentation of specific habitats along the corridor.

Materials and Methods: Taking into account the specificity of the research area, a data collection device comprising 20 segments was used. These segments are located along the entire Ialomita river basin, have an average length of about 10km and within them were placed relatively randomly 3 tiles (primary sampling units) with a size of 1x1km. Within each plot, all relatively randomized, 2 transects (secondary sampling units) were established. The field data collection was done using the snow tracking method and the photo trap method.

Results: The main results obtained were the monitoring protocols for red deer and wild boar for the connectivity areas. GIS maps with the motion model and genetic data base have also been the results of the project.

Conclusion: The results of the project have demonstrated the important role of the Ialomita basin in the connectivity of wild boar and red deer populations between the two major ecosystems of the Danube Meadow and the Carpathian Mountains.

Keywords: *connectivity, monitoring protocol, photo trap camera, transect*

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A REVIEW OF *NOSEMA SPP.* A MICROSPORIDIAN PARASITE: ITS CHARACTERIZATION AND IMPACT FOR BEEKEEPING

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Introduction: Nosemosis is one of the most serious diseases of adult honey bees occurring in nearly every country with beekeeping practices and it affects the development of the fat-protein body as well as the levels of proteins and fatty acids in the bee haemolymph (Chen *et al.*, 2009; Gajger *et al.* 2009). Two microsporidia have been described infecting honey bees worldwide, *Nosema apis* and *Nosema ceranae*. Both species infect the epithelial cells in the gut ventriculus of the bees, in case of *Nosema ceranae* some studies suggesting that the parasite occurs in other tissues (Chen and Huang, 2010). The infecting forms of the parasites are the spores, ingested by the adult host insects. Studies demonstrated that the infection with *Nosema spp.* range from less than 1 to 100 percent, this disease reduces worker longevity by 22-44% which in turn reduces honey production and causes incomplete crop pollination (Lotfi *et al.*, 2009). For this reason, the beekeepers use different products for prevent or/and combat bee nosemosis. The most used antibiotic is fumagillin, which it is authorized in USA, but in EU is no longer available since January 1st, 2000. Risks related to the use of antibiotics for the control of honeybee diseases are persistence of the infection, reappearance of the disease and honey contamination (Directive 86/23/CE and further amendments). However, current trends offer great importance to the antimicrobial effects that some medicinal plants can have on bee colonies. Gajger *et al.* (2009) showed that herbal preparation (Nozevit) was reduced number of nosema spores to 48.31% on 12 day after treatment.

Conclusion: The studies show that for reduce high mortality in honeybee populations, the beekeepers must present growing interest to natural treatments based on medicinal plants which can be used in the prevention and treat nosemosis in bee colonies.

Keywords: *Apis mellifera*, honey bee pathogen, nosemosis

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ECOSYSTEM SERVICES OFFERED BY FAUNA OF CLUJ COUNTY, ROMANIA

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Introduction: Cluj County is very heterogeneous in terms of relief, which determines the existence of a large number of forested and non-forested habitats and implicitly a large number of trophic niches. In these conditions the fauna is very diverse, inhabiting mountainous to hilly and high plains landscapes. The area benefits from the presence of a large number of lakes very propitious for the development of fish species from hilly areas.

The ecosystem services approach plays a central role în biodiversity conservation demonstrating how important is natural capital in supporting human well-being and to integrate their values into species management.

Aims: The purpose of the study is to achieve a hierarchy of ecosystem services offered by a heterogeneous group of species from the fauna of Cluj County, in sense of implementing a durable management of biodiversity.

Materials and Methods: In this context, 19 criteria was used in the analytic hierarchy process (AHP) for classifying both, common hunting species and some rare game species (wood-cock and quail). Considering the large number of existing aquatic reservoirs, there were also included two of most appreciated fish species by fishermen's: the cat-fish and crucian-carp.

Results: The analysis carried out showed that the most important species in terms of ecosystem services offered (economic criteria analysis) are: red-deer, wild boar, chamois and quail. Less important is the otter because it is currently a strictly protected hunting species and there are no obvious ecosystem benefits of economic nature.

Conclusion: The hierarchy was made taking into account 19 economic criteria of ecosystem services eg.: harvesting period, harvesting cost, complexity of harvesting process, perishability, market potential, market demand and so on.

Analytic hierarchy process (AHP) was successfully applied in order to facilitate the pair-wise comparisons highlighting the most important fauna species in terms of economic ecosystem services from Cluj County: red-deer, wild-boar, chamois.

Keywords: *analytic hierarchy process, biodiversity management, ecosystem services*

**PHYSICO-CHEMICAL WATER PARAMETERS IN THE
SUMMER SEASON FROM THREE RAINBOW TROUT
(*ONCORHYNCHUS MYKISS*) FARMS**

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Introduction: Water quality determines to a great extent the success or failure of a fish culture operation (Piper *et al.*, 1982). Water is an essential requirement for fish farming, so any proper-prepared plan for aquaculture must describe the quality and quantity of water available for this purpose (Summerfelt, 2000).

Aims: The aim of this study was to evaluate the physical and chemical water parameters in Rainbow trout culture, in the summer season from three trout farms, due to the environmental changes that are nowadays happening and affect the fish culture operation. Although the quantity of water available is of a great importance, only water quality parameters are considered here.

Materials and Methods: The water samples were collected from Bistrița-Năsăud County, from three trout farms: Strâmba, Șoimul de Jos and Fiad. The period of the data collection was the summer of 2018, between May and August. For the determination of water parameters, we used the Hanna HI 9828/4-01 Multi-Parameter, with a range of -5.00 to 55.00 °C, resolution 0.01 °C and an accuracy ±0.15 °C. The samples collection was made in each farm from three different places: catchment, basins and evacuation waters. Physico-chemical parameters observed were the fluctuations of total ammonia, nitrates, nitrites, dissolved oxygen, total dissolved solids, electrical conductivity, resistivity, pH, temperature, salinity.

Results: The results of the study showed that the parameters observed from the three farms were similar, with minor differences in month July and August. It was found that the levels of all the studied physicochemical factors of the water were higher than standard amounts for trout farming culture.

Conclusion: The environment of fish aquaculture is a complex system, consisting of some water quality variables, only few of them plays a crucial role. Critical parameters are temperature, suspended solids, dissolved oxygen, nitrite and ammonia. However, the dissolved oxygen is the most important parameter, requiring continuous monitoring in aquaculture production systems, due to the fish aerobic metabolism which requires an elevated level of dissolved oxygen.

Keywords: *dissolved oxygen, nitrates, nitrites, pH, salinity*

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SESSION 7: BIOTECHNOLOGY

**STUDY OF THE ANTI-INFLAMMATORY AND HEALING
PROPERTIES OF THE RHIZOMES OF CARTHAMUS CAERULEUS L.
(ASTERACEAE) HARVESTED IN THE REGION OF TIPAZA**

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Introduction: In some regions of Algeria, in Tipaza, natural medicine still occupies a place of choice in the treatment of many pathologies, among these natural remedies are quoted extracts of the rhizomes of *Carthamus caeruleus* L are used to treat burns with these astringent properties (Hamadi *et al.*, 2014). Medicinal plant extracts contain a variety of phenolic compounds that are attributed to various biological activities (antioxidant and antimicrobial activity) (Ghazghazi *et al.*, 2013).

Aims: Our present study was conducted on the roots of *Carthamus caeruleus* L. harvested in the Tipaza region during the spring season. In order to promote this plant, we evaluated the anti-inflammatory activity and healing activity of the aqueous extract of the powder of the roots of *Carthamus caeruleus* L.

Material and methods: studying the anti-inflammatory effect by measuring the volume of the edema of the paw that has received carrageenan 1%. Circular incision of 2 cm in diameter was made in Wistar rats to evaluate the healing activity of the aqueous pasty extract of the rhizomes of *Carthamus caeruleus* L at 100 mg / kg.

Results: They show that aqueous extracts of *Carthamus caeruleus* L rhizomes at dose of 100 mg/kg are opposed to the increase oedema induced by the carrageenan 1% in rats with a percentage of inhibition of edema volume of 87.34% at the 6th hour. Concerning the healing activity, the results show that the application of the aqueous extracts of the roots of *Carthamus caeruleus* L. at dose of 100 mg/kg on the wounds causes their healing at the end of 14 days.

Conclusion: Aqueous extracts of the roots of *Carthamus caeruleus* L. show healing properties and anti-inflammatory effect. These results could justify the use of this plant in traditional medicine against the inflammatory diseases.

Keywords: *Carthamus caeruleus* L. rhizome powder, Anti-inflammatory activity, healing activity.

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SUGARS, HMF AND DIASTASIC ACTIVITY IN HONEY: A VALIDATED APPROACH AS INDICATOR OF POSSIBLE ADULTERATION

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Introduction: Honey is used for centuries both as nutrient and in medicine, being exhaustless source of benefic factors for health and also for different biotechnological processes. Honey is an “alive” product, demonstrated by our previous studies, using biocrystallization method of determination. Antioxidant, antimicrobial and antitumoral properties were proved in different studies of our department, studies published in high ranked journals, having hundred citations until now. Honey is a complex matrix which possesses antioxidant and antimicrobial properties due to its peroxidic activity and bioactive compounds.

Aims: A fully validated approach for the determination of sugars, hydroxymethylfurfural content and diastase activity in honey samples were presented in accordance with the official methods from International Honey Commission.

Materials and Methods: Methods were performed for honey samples received in the Laboratory for Quality Control of Bee Products and Bee Diseases and conclusions were set for correlation between the composition and the quality criteria. Spectrophotometric method was used for diastasic activity determination and chromatographic determinations for HMF content (photodiode array detection) and sugars (HPLC refractive index detection). The limits of detection and quantification were calculated. Accuracy, precision and uncertainty were determined in the spectrophotometric and chromatographic techniques using the certified reference material. Diastase activity, sucrose content and hydroxymethylfurfural (HMF) content were easily differentiated and these parameters were used for indication of a possible adulteration of the honey.

Results: The present study confirms that, in order to have an authentic honey sample, diastasic activity must be above 8 DN (diastasic number) and HMF content less than 40 mg/kg. Sugar spectrum is different for every honey type, but nectar honey

Conclusion: Consequently, physico-chemical analysis should be combined for the determination of authentic honey and proper labeling.

Keywords: *diastasic activity, honey, HMF, sugars*

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EXPLORING THE PHISICO-CHEMICAL PROPERTIES AND ANTIOXIDANT ACTIVITY OF FISH BY-PRODUCTS

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Introduction: Fish and its by-products are considered an excellent source of long-chain n-3 polyunsaturated fatty acids (PUFA) and peptides. They have been rigorously investigated due to their potential benefits in human health promotion and in the prevention of cardiovascular diseases. The fatty acid composition of fish differs depending on a variety of factors, including species, diet, as well as environmental factors such as salinity, temperature, season, geographical location, and whether the fish are farmed or wild.

Aims: To obtain and to analyze the fatty acids and protein hydrolysates from diverse sources of processed by-products from commercial Romanian fisheries.

Materials and Methods: The fatty acids were determined using a gas chromatograph-mass spectrometer and the protein hydrolysates were investigated using liquid chromatograph-mass spectrometer and FT-IR. Antioxidant activity was determined by using two radical scavenging assays (DPPH and ABTS).

Results: The fatty acids and protein hydrolysates obtained from sterletfish (*Acipenser ruthenus*) gonads from a Romanian aquaculture farm were analysed. The diverse fractions obtained could scavenge DPPH radical and ABTS radical in a dose dependent manner.

Conclusion: In the present research work, we demonstrated that we may obtain highly desired products, such as fatty acids and biologic active protein hydrolysates from by-products from fishery industry.

Keywords: fish by-products, fatty acids, protein hydrolysates, chromatography, mass spectrometry

VOLATILE ORGANIC COMPOUNDS: FROM PLANTS SIGNALLING TO FOOD FRAGRANCE

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Introduction: Volatile organic compounds (VOCs) are part of our everyday life. Their sources are very diverse and include plants emission (namely biogenic VOCs) and anthropogenic emission (from industrial sources or indoor emission). Almost all plant species are emitters of different VOCs. It is known that plants emit more than 100,000 compounds and at least 1,700 of these are known to be volatile. Even more, plants communicate between them and signal different information to herbivory using diverse volatile chemicals (Niinemets *et al.*, 2013). Regarding to food fragrance, pleasant smell or an “off” smell could be an important tool in monitoring the food freshens or provenience.

Aims: Volatile organic compounds could be used as promising tool either as linking plant stress strength and emission or also as a marker of origin for different food products.

Materials and Methods: The volatile organic compounds have been trapped in the tubs filled with adsorbents. The determination of compounds has been achieved using a gas chromatograph-mass spectrometer with a thermodesorption system.

Results: The volatile organic compounds emission has been correlated with the strength stress: anthropogenic (drought or flooding time, temperature, intensity of radiation) or biogenic (number of larvae, leaves damage). On the other hand, the emission of volatile compounds could be used as a marker for salami origin or for cheese maturation time.

Conclusion: In the present research work, we demonstrated that volatile organic compounds could be studied either from environmental also as from biotechnological or food safety perspective.

Keywords: *chromatography, food fragrance, plant stress, volatile organic compounds*

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OPTIMIZING A NEW TECHNOLOGY FOR PROCESSING CATTLE FROZEN SEMEN

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Introduction: Improving sperm dilution and preservation techniques, sperm obtained from an ejaculate can be divided into hundreds of doses that can equate as many females.

Improving the techniques of harvesting, dilution and preservation of semen through freezing has made it possible to increase the load of females on bulls used in artificial sowing.

Materials and Methods: The paper deals with the implementation of an original sperm harvesting technology where semen is collected directly into a macroscopic examination bag, sampling for microscopic exalting, dilution and direct aspiration into the spangle. The works were carried out at Semest Craiova where harvested bulls of known genetic value from different breeds. For the harvesting, own procedures were used to ensure a unique traceability of bull semen from harvesting to straining.

Results: By using the proposed technology, many advantages over semen quality are revealed.

By eliminating the seizures from one container to another the semen provides better sperm integrity, a thermal protection during harvesting and processing. Semen with low microbial load are obtained; simplified laboratory processing of semen. By applying dilution with synthetic diluents, a better sperm motility and a higher percentage of progressive sperm are ensured.

Conclusion: By implementing technologies that ensure direct traceability from the harvesting bag and up to stalling, a quality bull semen is produced with a 10% higher fertility compared to other processing technologies

Keywords: *fecundity, semen, harvest*

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EFFECTS OF MORPHINE ON PROLIFERATION OF TWO BREAST CANCER CELL LINES

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Introduction: Morphine, a highly potent analgesic, is one of the most effective drugs for the treatment of severe pain associated with cancer (Zhang *et al.*, 2017). Several *in vitro* and animal studies suggest that morphine is involved both in promoting and inhibiting tumor growth (Tuerxun and Cui, 2018) and its presence may result in an increase in cancer metastases (Juneja, 2014). Studies of morphine effects in breast cancer have often yielded contradictory results (Juneja, 2014), though it has become apparent that it plays a dual role in the regulation of tumors (Tuerxun and Cui, 2018).

Aims: Given the currently available evidence, our aim was to test the outcome of adding morphine to the culture media of cells from two of the most widely used breast cancer cell lines.

Materials and Methods: MCF-7 and T47D cells were seeded into 96-well microplates and cultured for 24 hours in MEM and RPMI-1640 media respectively. Afterwards, cells were exposed for 24, 48 or 72 hours to media containing morphine at the following concentrations: 0.05, 0.075, 0.1, 0.25, 0.5, 0.75, 1 μ M. Proliferation was assessed by the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) colorimetric method. Results were expressed as percentages with respect to an untreated control and EC₅₀ values were calculated.

Results: Exposure of MCF-7 cells to morphine for 24 and 48 hours kept multiplication similar to the control while after 72 hours, proliferation was significantly enhanced at 0.75 μ M and 1 μ M. Duplication of T47D cells in the first 24 hours was significantly increased by the presence of 1 μ M morphine. Regardless of concentration, the influence was less marked when exposure time increased, thus making cell multiplication similar to the control.

Conclusion: Our results show that morphine can increase cell proliferation in breast cancer cells depending on the type of cell line, treatment and exposure time.

Keywords: *cell multiplication, MCF-7, morphine, T47D*

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CAN CELLULAR AGRICULTURE BE AN ALTERNATIVE FOR SUSTAINABLE AND HEALTHIER LIFESTYLE?

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Introduction: Animal proteins represent an important diet component for most of the population. Producing animal proteins requires large areas of agricultural land and is a major source of greenhouse gases. Cellular agriculture, especially cultured meat, could be a potential alternative for both the environment and human health. According to Mattick (2018), cellular agriculture is a revolutionary technology that enables both meat and other agricultural products to be grown from cells in a bioreactor without being taken from farm animals.

Aims: This paper aims at an interdisciplinary review of literature focusing on potential benefits and risks associated with cellular agriculture analyzed from both environmental and medical point of views.

Materials and Methods: To achieve this goal, several international databases and governmental projects were thoroughly analyzed using keywords and phrases with specialty terms.

Results: Cellular agriculture is a growing scientific domain which has generated a series of debates about its potential effects, even though many of them are based on hypothetical models. On the one hand, there are scientific studies showing the potential beneficial effects, such as the reduction of agricultural land usage, pollution (Stephens *et al.* 2018), and the improvement of human health. On the other hand, Lynch and Pierrehumbert (2019) questioned if the cellular agriculture could be a sustainable alternative for reducing gas emissions, because the energy used for cultured meat could be higher due to the replacement of some biological functions such as nutrients circulation and digestion by technological processes (Mattick, 2018).

Conclusion: For potential effects to turn into results, a realistic understanding of the technology involved and more experimental studies are required.

Keywords: *Cellular agriculture, cultured meat, health.*

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BEE AND SERICULTURAL PRODUCTS USED IN OBTAINING NEW TYPES OF PREBIOTIC BISCUITS

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Introduction: Prebiotics are food ingredients, selectively metabolized by the beneficial bacteria from the digestive tract. They have a beneficial action on the body by stimulating or activating bifidobacteria and lactobacilli, thereby increasing the resistance against infection agent, reducing the ammonia in the blood, increase the immune response and reducing the risk of cancer (Manning and Gibson, 2004).

Aims: Starting from the premise that the bee and sericultural products are genuine sources of biologically active compounds beneficial to the human body, it has been sought through this research the creation of two types of prebiotic biscuits based on wheat bran, *Calluna vulgaris* honey, *Morus spp.* leaves or turmeric.

Materials and Methods: The main materials used are: *Calluna vulgaris* honey and *Morus spp.* leaves powder, bran wheat, turmeric and pepper. To identify the qualitative indices, the following methods were used: Atomic Absorption Spectrometry for mineral content, HPLC-PDA for phenolics, HPLC-IR for sugar spectrum, Soxhlet for lipid content, Kjeldahl for nitrogen determination.

Results: The identification of polyphenolic compounds from biscuits, show high concentrations of vanillin (55.14 μg/g), kaempferol (57.97 μg/g) and acetin (54.339 μg/g) in biscuits with mulberry leaf ingredient, ferulic acid (μg/g 31.084) para-benzoic acid (19.658 μg/g) in the biscuits with turmeric and pepper.

Conclusion: In summary, we recommend the consumption of these two sorts of biscuits with heather honey, mulberry leaf powder, turmeric and pepper respectively for their potential biological activity, for their lower energy value comparing to the biscuits existing on the market and an acceptable cost of production (6 lei/200 g).

Keywords: *prebiotic biscuits, honey, mulberry leaves, biologically active compounds*

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EFFECT OF SALIN STRESS ON THE BIOMASS AND BIOSYNTHESIS OF SENNOSIDES IN CALLUS OF CASSIA OBOVATA

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Introduction: It is easy to understand that the chemical complexity of living organisms is a source of original principles. But we also understand that biotechnological procedures and the ethnopharmacological exploration (Desnottes, 1998). The availability of these biomolecules may in the near future satisfied the needs of the pharmaceutical industry and agribusiness (Bouchard-Marchaut, 2000).

Aims: The work we are exhibiting is part of the valorization medicinal and aromatic plants which present an economic interest

Materials and Methods: The seeds are rinsed with tap water to rid them of traces of dust. In order to sterilize them, the seeds were soaked in (0.4% binomyl for 20min).

Results: The decrease in biomass is due to the inhibitory effect of salinity on growth; Our results agree with the work on different species of plants, according to the works of El-Bahr and Ghanem, 1990.

Conclusion: In a short time, many plants will disappear without having been studied scientifically and with them probably also many active ingredients that can cure pathologies as the modern Western medicine still does not know how to fight effectively.

Keywords: *Biomass, Callus, Cassia obovata, Sennosides, Salinity*

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EVALUATION OF BIOACTIVE PROPERTIES OF BEE BREAD EXTRACTS AS FUNCTIONAL DIETARY FOOD SUPPLEMENT

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Introduction. Beebread is a product of the hive obtained from pollen collected by bees, to which they add honey, digestive enzymes and subsequently is stored in the combs. Bee bread is the main source of proteins, lipids, microelements and vitamins and is the most nutritious food for bees. Flavonoids and phenolic acids are generally regarded to be responsible for the antimicrobial activity of bee bread.

Aims. The aim of this study was to evaluate the bioactive and antibacterial properties of bee bread produced by *Apis mellifera*. The antimicrobial effect was assessed against *E. fecalis*, *S. aureus*, *S. typhi* and *E. coli*.

Materials and Methods. Antimicrobial activity has been tested using spectrophotometric method performed by multichannel spectrophotometer with 96-well plates. Bacterial cultures were performed on LB liquid medium (normal and concentrated). The spectrophotometric method was also used to determine the phenolic compounds.

Results. The results of this study indicate that the tested bee bread extracts show a good antibacterial activity against *E. fecalis*, *S. aureus*, *S. typhi* and *E. coli*. Total polyphenols in the analyzed samples ranged between 23.51 and 31.25 mg GAe/g bee bread and the total flavonoid content ranged between 4.52 and 6.29 mg Qe/g bee bread.

Conclusion. The tested bee bread extracts are rich sources of polyphenolic substances and show a good antibacterial activity against the tested bacteria. It can be concluded that a positive correlation exists between antibacterial activity and the content of polyphenols and, also between antibacterial activity of extracts and some specific compounds from bee bread.

Keywords: antimicrobial activity, bee bread, flavonoids, polyphenols

SESSION 8: VETERINARY MEDICINE - FUNDAMENTAL AND PRECLINICAL SCIENCES

DIFFERENTIAL SPLICING: AN EFFECTIVE WAY TO EXPAND MOLECULAR DIVERSITY OF CASEINS AND THEIR ABILITY TO GENERATE BIOACTIVE PEPTIDES

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In addition to meet nutritional requirements for the proper growth and development of the young mammal, it is now clearly demonstrated that milk is playing a crucial role in preventing various disorders and diseases. Indeed, an increasing number of physiological and health-promoting effects are attributed to milk components, including proteins and peptides resulting from their proteolysis. Thus, caseins are an important reservoir of peptides with a wide spectrum of biological activities, such as antimicrobial, anti-hypertensive, immunomodulatory, etc.

Several splicing variants, impacting in particular the C-terminal region of α_{s2} -casein, have been found recently in different camelid populations in Kazakhstan (Ryskaliyeva et al., 2019). This casein that is known to be the source, in cattle, of peptides with antimicrobial and anti-hypertensive activities, is not the only one displaying multiple splicing isoforms. Indeed, α_{s1} -casein is also concerned by such a mechanism. The relative flexibility of the splicing machinery reported in camelids and previously observed in goats (Leroux et al. 1992) and equids (Miranda et al., 2004), seems to be an effective way to generate molecular diversity that increases the ability of genes encoding caseins to produce potentially bioactive peptides. Besides, milk contains other health-enhancing components such as extracellular vesicles and stem cells in which microRNAs with possible functional implications have been identified, focusing especially on infant immune development and protection against infectious diseases.

Key words: *exon skipping, exosomes, LC-MS, miRNA, milk proteins*

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GENETICS BASIS OF REPRODUCTION DISORDERS RELATED WITH SEXUAL CHROMOSOMES IN HORSES: ALTERATIONS FOUND DURING THE LAST FOUR YEARS (2015-2018)

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Introduction: A high percentage of reproductive alterations and unexplainable infertility/sterilities observed in the horse are undoubtedly due to chromosomal alterations mainly related to sex chromosomes (Villagomez *et al.*, 2012). The fact that they remain undiagnosed is due to several reasons among which we can point out the difficulty of identifying the relationship between chromosomal and reproductive alterations in this species, the scarce interest in the study of these problems and the lack of information on the part of professionals.

Aims: To analyze the cases received and studied during the last four years in our laboratory of animals with reproductive problems due to chromosomal alterations.

Materials and Methods: Cell cultures, harvesting of the cells, microscopical analysis and molecular analysis of the animals were done following the routine techniques used in our laboratory.

Results: A total of 22 cases of horses and mares with reproductive problems have been analysed in our laboratory. These have been carriers of various alterations such as Turner X0, XX/XY chimerism, XY female reversal sex, XX male reversal sex, X0/XX chimerism, X0/XX mosaicism, XX/XY+tri chimerism. To arrive at the correct diagnosis, we have applied the two methodologies, cytogenetic and molecular, together. Many of the alterations are impossible to diagnose with one of them and nevertheless the application of the other methodology has solved the diagnosis. From the molecular point of view, we applied the 17 microsatellites markers established by the ISAG and, in the case of our laboratory, we applied in addition seven more markers on the X sex chromosome and five on the Y chromosome.

Conclusion: The use of both molecular and cytogenetical techniques simultaneously allows us to diagnose 22 cases of horses with reproductive problems related with alterations in sexual chromosomes or in other autosomes. This methodology has proved to be very successful in solving the relationship between reproductive problems and chromosomal alterations in the horses.

Keywords: *horse, reproductive disorders, chromosomes, microsatellites*

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THE USE OF PREDATORY FUNGI IN THE BIOLOGICAL CONTROL OF PARASITES IN DOMESTIC AND WILD ANIMALS

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Introduction: New approaches on parasite control for domestic and zoo animals is of the utmost importance, since the control of their parasitic infections is focused almost exclusively on deworming, contributing to anthelmintic resistance and increased metabolic waste.

Aims: Predatory fungi (PF), like *Duddingtonia flagrans* or *Mucor circinelloides*, are able to trap, digest and kill the oocysts, eggs, larval stages (L1-L3), as external stages of development of animal parasitic protozoa and helminths.

Materials and Methods: The animals are fed with a previously calculated dose of fungi spores per Kg bw (5×10^5 - 2×10^6), impregnated in barley grains or aqueous media, and mixed with hay, silage, pellets or even in gels, administered *per os*. These spores cross the digestive tract and are shed with the faeces, being stimulated to reproduce by the above-mentioned exogenous stages.

Results: *D. flagrans*, showed a reduction of 62-72% in cultured L3 of horse strongyles and a significant reduction of pasture contamination by L3 during Spring/Summer. The association of *D. flagrans* plus *M. circinelloides* showed a very promising parasiticide action on zoo ungulates and carnivores, both *in vitro* and *in vivo*. Eggs per Gram (EPG) levels were kept below 200 in ruminants and 400 in equids for more than a year. Eggs from *Baylisascaris procyonis*, *Trichuris* spp. and Trematoda and oocysts of *Eimeria* spp. and *Cystoisospora* spp., were significantly reduced, in some cases around 50-70%.

Conclusion: PF spores as an additional food supply for animals in farms and zoos, provide a very effective sustainable control of gastrointestinal parasites, with low EPG counts for one year, avoiding frequent deworming, thus recommending this type of parasite control in domestic and wild animals in captivity.

Keywords: *Biological control, domestic animals, parasites, predatory fungi, zoos.*

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EXPERIMENTAL ASSESSMENT OF SEALING TIME, MAXIMUM WORKING TEMPERATURE AND THERMAL TISSUE DAMAGE FOR COMPARING THREE TISSUE-SEALING DEVICES IN A PORCINE MODEL

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Introduction. Thunderbeat® is a novel electro-surgical system integrating bipolar tissue-sealing function and ultrasonically generated frictional scissors. Bipolar tissue-sealing systems, such as LigaSure® and EnSeal® have been widely used in the surgical practice for some time. Although a few publications have already evaluated and compared the safety, efficacy and versatility of these systems, some results are conflicting.

Aims. The aim of this study was to thoroughly examine and compare the 3 systems used in different tissues in order to provide precise histological evidence. Three tissue-sealing systems (Thunderbeat, LigaSure and EnSeal) were compared regarding sealing time (ST), maximum working temperature (WT_{max}) and total as well as collateral thermal tissue damage caused by a 5-mm laparoscopic handpiece on 4 types of tissues (striated muscle, mesentery, liver and spleen) in an 'in vivo' pig model.

Materials and Methods. Tissue samples were taken for histopathologic measurement of the total (MTZ_{total}) and the collateral microscopic thermal injury zone (distance between the edge of the jaw and the edge of the thermal damage zone, MTZ_{collat}). Nitroblue tetrazolium chloride (NBTC) enzyme histochemistry was used to assess the width of thermal tissue damage using a SPOT Xplorer digital camera and a SPOT Advanced software.

Results. LigaSure had the lowest mean ST (seconds±SD) with 3.72±0.51 (muscle), 3.13±0.2 (spleen), 4.95±0.47 (liver) and 3.65±3.6 (mesentery), followed by Thunderbeat and EnSeal with significant differences (p<0.05) between all types of tissues and devices. The significantly lowest mean WT_{max} (°C±SD) was obtained for EnSeal in muscle (61.09±5.01), liver (63.72±6.15) and mesentery (59.44±2.14). LigaSure and EnSeal operated at the lowest temperature in spleen (54.25±9.76 vs. 57.33±4.49) without a significant difference between them. The significantly lowest mean MTZ_{total} (mm±SD) was caused by EnSeal and LigaSure in mesentery (4.99±0.63 vs. 4.93±0.67), muscle (5.3±1.08 vs. 5.14±1.35) and spleen (4.04±0.68 vs. 3.81±0.49) samples without significant differences between them, followed by the significantly higher values of Thunderbeat. Nevertheless, Thunderbeat produced the significantly lowest mean MTZ_{total} in the liver (4.78±1.23). EnSeal produced the lowest mean MTZ_{collat} (mm±SD) in the liver (0.16±0.23) and mesentery (0.04±0.11), followed by LigaSure and Thunderbeat showing significant differences by tissue types. EnSeal and LigaSure caused lower mean MTZ_{collat} in muscle samples (0.19±0.3 vs. 0.28±0.4) without a significant difference compared to Thunderbeat. EnSeal and LigaSure did not cause measurable MTZ_{collat} (e.g. the thermal injury did not exceed the edge of the instrument jaw) in the spleen, while Thunderbeat produced a significantly different MTZ_{collat} (0.79±0.38).

Conclusion: Based on the result of this study, Thunderbeat seems to be more invasive to tissue integrity even without the activation of ultrasonic scissor function than EnSeal or LigaSure, systems that operate at lower temperatures and were found to cause no measurable collateral thermal damage.

Keywords: *Enseal, Ligasure, thermal damage, Thunderbeat, tissue sealing*

INTESTINAL ECOSYSTEM: INTERACTION AND COEXISTENCE BETWEEN “PARASITOME” AND MICROBIAL COMMUNITIES

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Introduction: The vertebrate gut has been continuously populated with complex and dynamic microbial and eukaryotic communities, that over millions of years have coevolved both spatially and temporally (Kreisinger *et al.*, 2015). Due to the prolonged coexistence, intestinal parasites (protozoa and helminths) and resident microbiota have developed the ability to influence one another by several mechanisms: 1) produce changes at the level of intestinal mucus and epithelial barrier, 2) alter the host immune response or 3) direct interaction (Leung *et al.*, 2018).

Aims: The uncontrolled use of anthelmintics can lead to the elimination of commensal organisms and alteration of host immunity and intestinal microbial community composition. Thus, the aim of this research is to highlight the complexity of interactions between intestinal bacteria and parasites and their importance for the host.

Conclusion: The “parasitome”- microbiota relationship is a complex phenomenon that plays an essential role in host intestinal homeostasis, the absence or alteration of either of these organisms being able to cause a severe disruption of host immune system (Leung *et al.*, 2018). Is therefore essential to acquire a deeper understanding of the molecular mechanisms of interaction between these two communities.

Keywords: *coevolution, helminths, interactions, microbiota, parasitome.*

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IN VIVO AND IN VITRO PHARMACODYNAMICS OF ANTHELMINTIC MEDICATION USED IN SHEEP

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Introduction: The parasitic resistance against anthelmintic medication is an important phenomenon, with real economic implications and having as result a lack of anthelmintic treatment solutions.

Aims: To evaluate the efficacy of anthelmintic treatments in sheep, as well as the resistance occurrence risk for the most commonly used substances.

Materials and Methods. Anthelmintic medication therapeutic efficacy in sheep was evaluated on 30 animals from a private farm in Sălaj County. *In vivo* studies were performed by using Fecal Egg Count Reduction Test (FECRT) and testing an albendazole-based (ABZ) product. *In vitro*, we used Egg Hatch Assay (EHA) and Larval Development Assay (LDA) for albendazole (ABZ), mebendazole (MBZ), fenbendazole (FBZ), thiabendazole (TBZ), and ivermectin (IVM) (only for LDA).

Results: FECRT showed that intestinal nematodes developed resistance phenomena against the ABZ-based product, with an extensivity of 80% at seven days post therapy, an egg reduction percentage of 41.89% at seven days post-therapy and 43.9% at 14 days post-therapy. The *in vitro* EHA highlighted a superior efficacy of TBZ (egg hatch percentage at reference concentration being 51.21) compared to ABZ (71.89%), MBZ (84.46%) and FBZ (79.22%), with a minimum risk of anthelmintic resistance. The LDA test revealed the superior efficacy of FBZ (MIC 0.59 µg/ml) and IVM (MIC 0.078 µg/ml), with a minimal risk of inducing parasitic resistance.

Conclusions: All *in vivo* and *in vitro* tests revealed a limited ABZ efficacy, recommending avoiding the therapy with this substance.

Keywords: EHA, FECRT, LDA, pharmacodynamics, sheep

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DIAGNOSIS OF MENDELIAN INHERITED DISORDERS IN DOGS: LITERATURE REVIEW

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Introduction: According to Online Mendelian Inheritance in Animals (OMIA) database, there are 324 Mendelian disorders in dogs of which 247 have their likely causal gene variation identified. Genomic research provides information on the hereditary character of diseases, furthermore leading to the development of specific diagnostic markers meant to identify dogs carrying gene mutations and selective breeding in order to avoid the emergence of such diseases. In addition, there are multiple diseases in dogs that can serve as genetic model in future research of human diseases and thus leading to the description of the causative genomic variants in both humans and dogs. Knowledge regarding the diagnostic methods is mandatory for future research in this specific field of study.

Aims: Providing an insight on the methods of diagnostic of Mendelian inherited disorders in dogs.

Conclusion: Genome-wide SNP (Single nucleotide polymorphism) genotyping, exome sequencing, Sanger sequencing, RNA sequencing, reverse transcription PCR and Real-Time PCR have been identified as the main diagnosis techniques in the identification of likely variation of causal gene of inherited disorders in dogs. Additionally, proteomic studies may provide further aid in the identification of genes which code specific proteins found in inherited diseases.

Keywords: *Mendelian inherited diseases, dog, diagnostic methods*

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BONE MARKERS EVALUATION REGARDING A NOVELTY BONE CEMENT TREATMENT

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Introduction: The healing of bone defects is a multiple process of reconstruction and bone remodeling (Li, 2015). Bone cement is a material used to fix implants and orthopedic prostheses, to fill cavities with defects following traumatic surgical procedures (Vaishya *et al.*, 2013).

Aims: The purpose of this study was to test composite bone cement, based on polylactic acid, by evaluating systemic and tissular specific bone markers response.

Materials and Methods: The effectiveness of the treatment has been investigated using an experimental non critical femoral bone defect protocol (Hoerth *et al.*, 2015). A number of 35 Wistar rats were divided into 7 equal groups, negative and positive controls and experimentally treated groups. Blood and bone tissue samples were collected at 30, 60 and 90 days, postoperative. Serum bone regeneration markers (PHA and osteocalcin), oxidative stress markers and local bone markers (TNF α and osteocalcin) were evaluated.

Results: There was a positive correlation between serum alkaline phosphatase and serum concentrations of osteocalcin, based on their growth throughout the study. Bone cement treatment had a protective role by maintaining higher glutathione and glutathione peroxidase levels, thus decreasing cellular damage and osteoresorbption. The moderate increase in tissue necrosis factor does not prevent the expression of osteocalcin, both promoting the bone remodeling process.

Conclusion: According to systemic and local bone markers evaluation, the treatment with polylactic acid, hydroxyapatite and calcium phosphate based bone cement is osteoinductive.

Keywords: *bone cement, bone markers, osteoinductive*

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EPIDERMAL AND MELANOCITIC TUMORS IN DOGS AND CATS: A REVIEW

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Introduction: Skin is the organ-barrier which assures the isolation and the protection of the organism, but in the same time, it is vulnerable because of its continuous exposure to physical, chemical and microbiological factors from the environment. Unfortunately, the prevalence of cancer in pet animals continues to increase, especially the skin cancer, which is a common cause for concern in dogs and cats. Even if it has not yet been established the incidence rates of skin cancer in cats and dogs and most probably varies from one region to another, several studies have been conducted on this theme, revealing that regarding dogs, tumors of the skin are the most common, accounting for approximately 30% of all tumors. Similarly, skin tumors in cats are very often diagnosed, accounting for approximately one fourth of all tumors in the species (Meuten, 2012; Withrow and Vail, 2007).

Aim: Considering the importance of deepening the studies related to skin cancer in dogs and cats, this study aims to emphasize the most common types of epidermal and melanocytic neoplastic lesions, highlighting their prevalence, the associated factors, the gross morphology and the histological features.

Conclusion: Future investigations should target the study of skin tumors, gathering more data related to epidemiology, pathogenesis and morphological features being a crucial step in order to understand the behavior and development of these lesions through time and also to get to the final target of discovering new therapeutically approaches and more effective methods of prevention.

Keywords: *skin cancer, dogs, cats*

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BIOLOGICAL PROPERTIES OF OXIDATIVE MATERIALS WITH POTENTIAL IN MEDICAL APPLICATIONS

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Introduction: The biomaterials with a bioactive and a bacteriostatic activity which are used to repair and replace damaged tissues have considerably contributed in improving the quality of life in recent decades (Hertz and Bruce, 2007).

Aims: The first-time preparation of 8 bioactive powders starting from copper, strontium, aluminium and boron oxides with different concentrations, in order to determine their antimicrobial effect.

Materials and Methods: The glass system with the formula $(100-x)\text{H}_3\text{BO}_3 \cdot 5\text{SrO} \cdot 5\text{Al}_2\text{O}_3 \cdot x\text{CuO}$, with x taking the following values 0; 0,25; 0,5; 1; 1,5; 2; 4; 8, was prepared using the named reagents, by the melt-quenching method. In order to test the antimicrobial effect of the system, the obtained concentrations were plotted as amount of dissolute ions. For the antimicrobial test, the following reference strains were used: *Escherichia coli* 25922, *Pseudomonas aeruginosa* 27853, *Staphylococcus aureus* 6538P, *Salmonella enteritidis* 13076 and *Bacillus cereus* 11778.

Results: Our results show that the addition of new oxides increased the dissolution gradient. Furthermore, the bacteriostatic effect manifested by the radius of the inhibition zone increased proportionally with the addition of copper oxide.

Conclusion: The bacteriostatic effect of the samples was observed in both gram negatives and gram positives strains, with more significant results on *Staphylococcus aureus* strain. Moreover, the best antibacterial effect it was obtained only by using controlled-granulated powder, instead of diluted samples.

Keywords: *bacteriostatic, bioactivity, copper*

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INTESTINAL MICROBIOTA, THE ADVANTAGES AND DISADVANTAGES OF DIFFERENT METHODS ESTABLISHED FOR ASSESSING THE RESIDENT BACTERIAL POPULATIONS

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Introduction: At the level of the gastrointestinal (GI) tract exists a consortium of living microorganisms like bacteria, fungi, protozoa and viruses that represent the intestinal microbiota. This term, microbiota, comes from Greek, where ‘bios’ means ‘life’ and nowadays this is the right word to use, even if in the older literature the authors used the term microflora with the same meaning (Suchodolski, 2016).

Aims: For describing the intestinal microbiota, there are more methods available, each of them having advantages and disadvantages. The aim of this literature study was to compare the data available regarding each method used for assessing the intestinal microbiota.

Advantages and disadvantages: Among the five methods available in the present to assess the intestinal microbiota, none of them is considered a gold standard. The first method used, the bacterial culture, is now considered an unsatisfying technique because it is not able to take into account all the bacterial groups. The most commonly used methods for characterization of the intestinal microbiota are represented by FISH- Fluorescence in situ hybridization, qPCR- quantitative real-time PCR, NGS- next-generation sequencing (e.g. 454-pyrosequencing, Illumine) and Metagenomics (shotgun sequencing of genomic DNA). FISH is a great technique because it is able to do the identification, quantification, visualization of bacterial cells in tissues, but it requires a long time. qPCR allows detection and relative quantification of bacterial groups in a sample, in a short time (few hours), but the assays need to be designed for each bacterial group of interest. NGS can identify all bacteria present in a sample, being a semi-quantitative method. More than that, it can indicate relative changes in bacterial groups within a community, but it requires advanced bioinformatics and it has a long turnaround. Metagenomics provides not only identification of the bacteria, but also gives information about the functional genes in the sample. It is a very expensive technique that requires advanced bioinformatics, this being the biggest disadvantage (Suchodolski, 2016).

Conclusion: In this literature review we made a comparison between the methods available for assessing the intestinal microbiota, showing that in the present there is not a golden standard for this and that the methods used have advantages and disadvantages.

Keywords: *bacterial culture, microbiota, molecular biology*

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AN OVERVIEW OF SPECIFIC PATHOGENS IN GOAT MASTITIS

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Introduction: Goat milk ranks fourth in terms of global milk production, after cow milk, buffalo and sheep milk. Lately, goat milk and goat milk products have become increasingly popular among consumers, due to their high nutritional value and benefits for human health. Unfortunately, udder health is frequently affected by the pathogenic effects of microorganisms.

Mastitis is one of the most common diseases that affect small ruminants, including dairy goats, with serious economic consequences and food safety matters. The prevalence of clinical mastitis is lower than 5% and the main aetiological agents are staphylococci, *S. aureus* being the most frequently isolated pathogen (Bergonier *et al.*, 2003). On the other side, the prevalence of subclinical mastitis is between 5-30% and coagulase negative staphylococci (CNS) represent the most often isolated microorganisms (Contreras *et al.*, 2003). Somatic cell count (SCC) is considered to be an indicator of the inflammatory process; the bacterial infections being the most important cause of the SCC increase (Bagnickaa *et al.*, 2011).

Aim: The aim of this paper is to highlight the main aspects regarding the aetiology of goat mastitis, as well as the importance of the somatic cell count in the diagnosis process.

Conclusion: Although the inflammation of the mammary gland in goats is not as frequently diagnosed compared to cow mastitis, there are several aspects worth to be discussed in order to fully understand the pathogenesis of intramammary infections.

Keywords: goat, mastitis, *Staphylococcus*

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THE NUMERICAL AUTOSOMAL CHROMOSOMAL ABNORMALITIES (TRISOMIES) IDENTIFIED IN DOMESTIC ANIMALS AND PRIMATES

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Introduction: Chromosomal abnormalities can occur as a result of alterations in number and structure of chromosomes. The most frequent cytogenetic anomalies cited in animals are the sexual chromosomes abnormalities, autosomal translocations, trisomy and mutations.

Aims: The aim of this paper is to highlight the most frequent autosomal chromosomal abnormalities identified in animals and their consequences.

Chromosomal abnormalities can occur as a result of alterations in number and structure of chromosomes. The most frequent cytogenetic abnormalities cited in animals are the sexual chromosomes abnormalities, autosomal translocations, trisomy and mutations.

Case studies of autosomal abnormalities are seldom studied in veterinary medicine and they are presented as individual case studies.

The most recent studied case studied of autosomal chromosomal abnormalities presented in the literature are represented by an autosomal trisomy (65, XY + 27) which was identified in a *Standardbred Colt* by Brito *et al.* in 2008.

A case of autosomal trisomy, was identified researchers from Primate Research Institute from Kyoto University in a *captive chimpanzee*, named Kanako (49, XX + 22) (Hirata *et al.*, 2017). Due to the fact that pair 22 of chromosome in great apes is analogous to the pair 21 in humans, the symptoms in this case are similar to those present in Down syndrome in humans.

Conclusion: In conclusion, in animals the most frequent chromosomal abnormalities are the disorder of sex development presenting the same symptoms like in humans and they are not so studied in veterinary medicine, being reported as case studies.

Key words: *autosomal trisomies, domestic animals, primates.*

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HISTOLOGICAL ASPECTS OF THE BRUNNER'S GLANDS IN CHINCHILLAS (*CHINCHILLA LANIGERA*)

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Introduction: Since their discovery, the submucosa duodenal glands (Brunner's glands) have been an attractive subject of research that has pursued many aspects of these particular glands. In most mammalian species, the Brunner glands are present from the gastrointestinal junction and extend over variable distances in the proximal part of the jejunum. The duodenal submucosa glands consist of a single or two types of secretory cells, depending on the species.

Aims: This study aimed to investigate by optical microscopy techniques the structure, the topography, and the degree of development of the Brunner's glands in chinchillas.

Materials and Methods: Transversal fragments from the duodenum were histologically processed by classical paraffin from 5 chinchilla males.

Results: The Brunner glands are much more developed and, as proportional representation, occupy at least three times more space than the Lieberkühn glands. In many places, the Brunner glands are clustered like a bunch, suggesting that more than one such gland spills its secretion product through a common Lieberkühn gland in the space between villi.

Conclusion: We can affirm that the Brunner glands, after the disposition, the appearance and the absence of distinct muscularis mucosae, are disposed into the thickness of the mucosa and submucosa in Chinchilla (together with the Lieberkühn glands) and not strictly submucosa like the other mammals.

Keywords: *Brunner's glands, chinchilla, structure*

CORRELATIONS BETWEEN STRUCTURE AND DIGESTION FUNCTION OF THE CECUM IN CHINCHILLA

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Introduction: The morphology and physiology of the digestive tract are closely related to the diet, size of the animal, environment, etc. The segments of the digestive tube can have structural and functional particularities in different species, some authors affirming that in the majority of herbivores, most of the digestion happens in the cecum (Marcus et al., 2018). In order to rear healthy animals, have good economic outcomes, it is important to have a rich database regarding chinchillas. Our study comes to assist breeders, owners, but also researchers around the world using chinchilla as an animal model.

Aims: We aimed to shed a light on the microscopically structure of the cecum in order to see the extent of its participation in digestion in chinchilla.

Materials and Methods: We harvested the cecum from 5 adult chinchillas, brought for necropsy examination in the Department of Necropsy (UASVM Cluj-Napoca). The samples were processed for paraffin embedding and stained with three different procedures: Goldner's trichrome method, PAS reaction and Alcian blue stain.

Results: The cecum in chinchilla presents the four characteristic tunics for the digestive tract, having a rather thin wall. The mucosa has no villi but presents a simple columnar epithelium with microvilli, which form short crypts from place to place. Lamina propria is well represented due to the rarity of crypts and has a loose aspect. Muscularis mucosae is thin, but continuous, separating the mucosa from submucosa. The loose aspect of the submucosa allows it to adapt to repeated volume variations. Muscularis externa is thin and serosa has a typical aspect. There are no goblet cells present here, as shown by the special staining procedures.

Conclusion: The cecum has a thin wall and a simple structure in chinchilla, which suggests that the participation of the cecum during digestion process is important, given its big surface, but not predominant.

Keywords: *cecum, chinchilla, digestion, structure*

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COMMON EDUCATION AND TRAINING FRAMEWORK – STRATEGIES AND PERSPECTIVE

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Introduction: Directive 2010/63/EU on the protection of animals used for scientific purposes stipulates that personal involved in laboratory animal science should have adequate knowledge and skills. Furthermore the Commission established and Expert Working Group to develop a common education and training framework for the European Union.

Aims: The aim of the present review was synthetize the actual stage and the perspectives of the common education and training framework at European and Romanian level.

Competence of personnel. According to Directive 2010/63/EU, the staff involved in laboratory animal science should be educated and trained to carry out and designing procedures on animals, taking care and / or killing animals. However, directive does not impose a model of education for the member states, but the Commission started to develop a framework that assures the competence & skills and assists the free movement of the personnel. The vision on the general process includes a training stage, pass assessment followed by a period of working under supervision. The person can be considered competent to perform tasks after evaluation of deeper learning. Furthermore, the maintaining of skills should be maintained by a process of continuous education. When performing one of the functions there is a likelihood of causing any harm the training modules should be performed before supervision.

ETPLAS (Education and Training Platform for Laboratory Animals) was founded in 2014, and it was concerned with the Education and Training (E&T). ETPLAS facilitates mutual recognition, information exchange as well as providing stakeholders for E&T.

E&T for Laboratory Animals in Romania is not established yet. Despite the fact that the law 43/2014 on the protection of animals used for scientific purposes stipulates that personal should have appropriate knowledge and skills, we have no E&T network, and no clear competence requirements for personnel involved in laboratory animal science.

Conclusion: Our recommendation is to implement a national education framework in close cooperation with European relevant associations FELASA and ETPLAS, for developing, certifying and further improving the knowledge and skills of the personal involved in conception, authorization and execution of the projects.

Keywords: *3R, laboratory animals, education and training platform*

MODULATION OF MOUSE PERITONEAL-DERIVED MACROPHAGES PHENOTYPE BY SILVER–GOLD ALLOY NANOPARTICLES (AU-AG NPS)

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Introduction: Macrophage activity and the immune response can be either stimulated or suppressed by various extracellular signals or foreign materials as nanoparticles (NPs) (Derek *et al.*, 2019). These immune effects are mediated by macrophage M1/M2 phenotype modulation, and dictated by various properties of NPs such as chemical structure, shape or size. Determining the above-mentioned effects on macrophage function has a major role in establishing the potential particle toxicity and is essential for further biomedical usage of NPs (Huang *et al.*, 2018; Murray, 2017).

Aims: In this study, we evaluate in vitro the effects of Au-AgNPs on the mouse peritoneal-derived macrophages (MPM) functional polarization.

Materials and Methods: Au-AgNPs were synthesized by two-step digestive-ripening method and further characterized in terms of physicochemical proprieties by UV-Vis, dynamic light scattering (DLS), zetapotential, FT-IR spectroscopy and atomic force microscopy (AFM). Resident peritoneal macrophages were harvested by peritoneal lavage and further incubated for 24h with Au-AgNPs in ascending doses. After repetitive washing, the exposed macrophages were further characterized by Flow cytometry and fluorescent microscopy in respect of TNF- α , IL-1 β and IL10 production.

Results: We demonstrate that Ag-Au alloy NPs can modulate the polarization of MPM toward the classically activated macrophage (M1 phenotype). AgAuNP increase the secretion levels of both TNF- α and IL-1 β proinflammatory cytokines by MPM, indicating a functional polarization toward the acute-inflammatory, bactericidal active M1 macrophage functional phenotype. No changes were observed in IL10 production.

Conclusion: The presented findings highlight the potential strategy for using Ag-AuNP for modulating macrophage activation and polarization to promote a potent microbicidal macrophage phenotype and an effective immune response towards bacteria.

Keywords: *inflammation, functional polarization, macrophages, silver–gold alloy nanoparticles*

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SESSION 9: VETERINARY MEDICINE - CLINICAL SCIENCES

CONTROL OF PUERPERIUM IN A DAIRY FARM USING AN INTRAUTERINE SUSPENSION

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Introduction: Reproductive performance of dairy cows after the voluntary wait period is highly related to the health status of the uterus after calving (Kasimanickama *et al.*, 2004). The puerperium is a critical period for the reproductive tract and for the performance of this in the next period. Postpartum endometritis has a negative effect on reproductive performance as it increases services per conception, the calving to first service interval and the calving to conception interval, reduces the risk of pregnancy, and decreases the conception rate (Fourichon, 2000).

Aims: The purpose of this research was to evaluate a product developed at the Faculty of Veterinary Medicine of Cluj Napoca and his efficiency in the control of the puerperium at cows.

Materials and Methods: The study was carried out between January 2017 to December 2018 in a dairy farm from Mures county, Romania. In this study were enclosed 60 cows, randomly divided in 3 groups: Puerperal group (group 1), Puerperal and Estrumate group (group 2), and control group (group 3). For each group the treatment applied for the control of puerperium was different.

Results: In case of first group 90% of animals showed a physiologic evolution of puerperium, the first estrus cycle appeared at 48.16 days after the parturition, the average of service period was 62.5 days with limits between 43 days and 72 days. Regarding group 2 in 95% of animals was observed a physiologic evolution of puerperium, the first estrus cycle appeared at 41.13 days after the parturition, the average of service period was 66 days with limits between 50 days and 86 days. In group 3 in 65% of animals presented a physiologic evolution of puerperium, the first estrus cycle appeared at 52 days after the parturition, the average of service period was 132 days with limits between 55 days and 292 days.

Conclusion: Intrauterine suspension Puerperal it's a good variant for control of the puerperium and for avoid the postpartum complications.

Keywords: *puerperium control, endometritis, puerperal*

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FAST SPLENECTOMY VERSUS SPLENECTOMY BY USING BIPOLAR VESSEL SEALING DEVICE IN DOGS

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Introduction: Total splenectomy in dogs is a common and frequent surgical indications for neoplasia, splenic torsion, splenomegaly plus emergency cases with splenic rupture which request the fastest approach possible (Mokhyeon *et al.*, 2018). In the recent years has gained tremendous popularity splenectomy techniques (fast or by using bipolar vessel sealing device) (Wright *et al.*, 2016) that may have reduced postoperative pain, a reduction of surgical time and the incidence of surgical site infections (Patten *et al.*, 2016).

Aims: This is a retrospective study and the aims were to describe the two ways to safely perform splenectomy and to establish the best approach (the guidelines) for canine splenectomy based on surgical outcome.

Materials and Methods: 11 client-owened dogs that underwent total splenectomy were included in the study. History, signalment, results of clinical examination, results of abdominal exploration and splenic disease staging, surgical technique details, duration of surgery, complications, histopathologic diagnoses, and perioperative outcome were recorded. LigaSure Maryland™ (5 mm) or Atlas™ (10 mm) probe was used as bipolar vessel sealing device for haemostasis.

Results: All 11 dogs underwent total splenectomy, via fast splenectomy (n = 7) and splenectomy by using LigaSure (n=4), with initial ventral mid-line laparotomy, abdominal exploration followed by insertion of a wound retraction device (Alexis retractor), progressive exteriorization of the spleen, ligation or sealing of hilar vessels, and splenectomy. Splenectomy was performed for treatment of a splenic mass (n = 7), splenic rupture with surgical hemoabdomen (n=3), and refractory chronic diffuse splenomegaly (immune-mediated) (n=1). No major intraoperative complications occurred.

Conclusion: Results indicated that both procedure were surgically feasible in dogs and not associated with major complications. Further evaluation is required.

Keywords: bipolar, canine, fast, sealing, splenectomy

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IMPACT OF SEPSIS ON COAGULATION AND HEMATOLOGIC PROFILE IN RATS WITH NORMOTHERMIA AND INDUCED HIPOTHERMIA

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Introduction: Sepsis is a clinical significant form of bacteraemia and frequently associated with a systemic inflammatory response those results in a complex network of adaptive and maladaptive alterations in homeostatic mechanisms (Satran *et al.*, 2003; Zachary *et al.*, 2016). Sepsis related coagulopathy ranges from mild laboratory alterations up to severe disseminated intravascular coagulations which is a common phenomenon in patients with sepsis, but the clinical implications of this condition are not clear (Saracco *et al.*, 2011). Protective effect over tissues and the potential clinical application of induced hypothermia is more and more studied and applied in medicine, including sepsis. Its mechanism of action is not deeply understood, its side effects can complicate the outcome and more studies are needed to enlarge the use of induced hypothermia (Mayer and Sessler, 2004).

Aims: Evaluate the possible complications of plolimicrobial sepsis and induced hypothermia in sepsis experimental study in rats.

Materials and Methods: 15 Wistar rats were included in this study and divided in 3 groups of 5 each. First group control group (C) didn't suffer any procedure. To second and third group acute sepsis was induced by caecal ligation and punction. After the procedure was performed second group was maintained in normotermia 35.9-37.5°C and the third group was maintained in moderate hypothermia 30-32 °C. General hypothermia was slowly induced by extracorporeal cooling procedures. After 8h of clinic monitoring, blood samples were collected for coagulometry (apTT, TQuik, fibrinogen), hematologic profile and blood culture.

Results: Bacteriemia was confirmed in al samples from SN and SH group. Sepsis in SN and SH increased severely apTT and TQuik with no significant changes in fibrinogen values. By comparison with SN SH improved the coagulation parameters. Variation in hematologic profile was observed between groups with severe lymphopenia in SN group.

Conclusion: PLC acute inducing sepsis alters the coagulation values in normothermic condition. Induced hypothermia improves the coagulation parameters but induces severely lymphopenia.

Keywords: rats, sepsis, induced hypothermia, coagulopathy

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LOCOMOTION DISODERS IN PIGS ON COMMERCIAL FARM (REVIEW RESEARCH)

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Introduction: The problems with the musculoskeletal system in all categories of pigs are common at industrial swine farms representing one of the major issues leading to exclusion of pigs, sows and boars from the production process. Topographic-anatomic relationships of bone and joint system of pigs make the diagnosis difficult in cases of illness affecting the upper parts of the limbs, pelvis and spine. In most cases, the presenting clinical sign is lameness, the cause of which can be determined only by a careful clinical examination.

Aims: Presence of locomotor system disorders was monitored in pigs, sows and boars on two commercial farms.

Materials and Methods: Development of health problems associated with locomotor system in pigs, sows and boars was monitored on two commercial farms.

Results: Arthritis, wounds in the region of joints, mechanical acropodial lesions. Lesions in the region of the foot corium. Inflammation of the periarticular tissue of the front right leg. Clinical picture is predominantly characterized by difficulty walking and painful swelling spreading from the shoulder joint to the carpal joint. Inflammatory process develops over time

Conclusion Presence of locomotor system disorders was monitored in pigs, sows and boars on two commercial pig farms. Presence of arthritis was evidenced in the higher percent of cases, while aseptic inflammation of the soft parts of feet and chronic inflammation of the foot pads were sporadic. As for the acropodial diseases, panaritium was the most common. Locomotor system disorders cause economic losses and exclusion from the reproduction program.

Keywords: *Disorders, locomotion, pig,*

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PLGA-ENROFLOXACIN NANOPARTICLES FOR THE TREATMENT OF MASTITIS IN DAIRY CATTLE

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Introduction: Mastitis in dairy cattle represents a major production problem in terms of economic loss and antimicrobial resistance, with an important impact on public health. Nanoparticles are a promising advance in medical treatment because its special properties allow it to potentiate the effect of drugs used in standard therapy.

Aims: The aim of the study was the synthesis and testing of PLGA-enrofloxacin nanoparticles (PLGA-Enro Nps) that could be used for the treatment of mastitis in dairy cattle.

Materials and Methods: Enrofloxacin was loaded in PLGA nanoparticles by using a single emulsion evaporation technique, as described by Astete and Sabliov (2006). Particles size and polydispersity index were determined by DLS. We tested the antimicrobial activity of PLGA-Enro NPs compared to that of enrofloxacin alone by establishing the minimum inhibitory concentration (MIC). Cells cytotoxicity was established by using the MTT technique on HFL1 cells. The *in vivo* experiment was performed on 18 cows previously diagnosed with mastitis.

Results: We have been able to synthesize nanoparticles with a size of 190.1 nm. The MIC results showed a better efficacy of PLGA-Enro NPs on *E. coli* when compared to enrofloxacin alone. The cell viability was higher than 90% for all the concentrations of nanoparticles tested. The treatment with PLGA-Enro NPs required only one application/cow whereas enrofloxacin had to be administered multiple times.

Conclusion: The results suggest that the combination of PLGA nanoparticles with enrofloxacin allows an antibacterial action that is similar or superior to enrofloxacin alone. Another important point is that a single administration of PLGA-ENRO nanoparticles coupled to the antibiotic is sufficient for complete healing of the mammary gland.

Keywords: *enrofloxacin, mastitis, microparticles, PLGA.*

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THE EFFICIENCY OF PHYSIOTHERAPY PROCEDURES IN CANINE PATIENTS WITH RUPTURE OF THE CRANIAL CRUCIATE LIGAMENT

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Introduction: The term cranial cruciate ligament disease implies a variety of diseases that affect this anatomical structure, being the most common cause of hind limb lameness in dogs. Diseases include traumatic avulsion of femoral or tibial insertion, acute traumatic rupture secondary to excessive force, and progressive degeneration of unknown cause that causes partial or total ligament rupture (Tobias, 2012).

Aims: The study aimed to apply physiotherapeutic methods in patients with cranial cruciate ligament rupture remediated by extracapsular surgical method. We have established customized protocols for each patient accordingly.

Materials and Methods: The biological material used for research was comprised of 10 dogs of different age, race, and sex. The physiotherapy methods used were hydrotherapy individualized protocols completed by laser therapy, electrostimulation, massage, passive exercises for an average of 25 sessions. The circumference of the leg was measured before and after the protocols. The objective was to apply the psydiotherapy metodes to resolve secondary problems in patients as: amiothrophy, pain, muscle rigidity and joint stiffnes.

Results: Hydrotherapy has led to full recovery of joint mobility and reduction of amyotrophy, thus increasing muscle mass. The circumference difference measured 3 cm in the thigh area and 2.6 cm in the calf area. Laser therapy has been shown to reduce inflammation and joint pain in the joint from an average of 2/4 to 1/4 - 0/4. Pain was evaluated using the Colorado acute and chronic pain scale.

Conclusion: All patients presented signs of full recovery of mobility of the joint, gained muscle mass and did not present signs of pain at the end of the individualised protocols. The average number of sessions was 25 for each patient.

Keywords: *Cranial cruciate ligament, Medical rehabilitation, Physiotherapy*

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STATUS EPILEPTICUS AND EEG PATTERNS ARE NOT LINKED TO THE FINAL OUTCOME IN INTENSIVE CARE UNIT

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Introduction: Status Epilepticus (SE) and cluster seizures represent an emergency in the veterinary neurology, often referred to the Intensive Care Unit (ICU). The outcome depends on the aethiology, comorbidities and the time between the overt and the therapeutically decision. (Bhatti, 2015). When the patient presents tonic-clonic seizures, the EEG is not mandatory, as long as the clinical motor manifestations are obvious. On the opposite side, in the Partial Status Epilepticus, electric Status Epilepticus and New Onset Refractory Status Epilepticus the different EEG patterns bring valuable information about topography, size and involvement of various cortical areas. (Tipold *et al.*, 2015)

Aims: Considering the different types of SE, we aimed to differentiate the EEG patterns and correlate with the final outcome after the protocol therapy in dogs.

Materials and Methods: 11 dogs with different types of SE referred to the ICU were recorded video EEG. History, laboratory tests, imagery, CSF, was provided for an accurate diagnosis. EEG patterns were analyzed by two independent doctors.

Results: Respecting the therapeutically protocol for SE, 7 out of 11 dogs needed anesthesia as third line, mainly in the group with first seizures. 5 out of 11 had sudden onset with refractory SE (NORSE = New Onset Refractory Status Epilepticus).

Conclusion: The EEG pattern is very useful in the diagnosis of partial SE and the electric SE. In the present work, we conclude that the aethiology of the SE and the time door-to-needle influenced the survival as unique factors.

Keywords: EEG, Epilepsy, Status Epilepticus

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EARLY ULTRASONOGRAPHIC FINDINGS AFTER OVARIOHYSTERECTOMY OPERATION IN BITCHES

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Introduction: Ovariohysterectomy operation (OHE) is one of the most frequently, performed surgical operations in dogs. Complications of OHE in bitches are similar to those that are normally associated with abdominal procedures, and include: hemorrhage, anaesthetic complications, delayed wound healing, abscesses, and infection.

Aims: Early ultrasonography (USG) findings of the abdominal/pelvic cavity and incision line following OHE performed in the anestrus or diestrus periods of dogs were evaluated.

Materials and methods: Healthy 20 female dogs, varying of ages between 1 to 5 years old were spayed after sexual cycle determination based on anamnesis and vaginal cytology findings. Dogs were operated on the median line. Intraoperative body temperature (T), respiration (R), pulsation (P) values and the duration of the operation were recorded. Daily postoperative examinations (T, R, P, mucosal pigmentation, lymph nodes, appetite, urination, defecation and pain symptoms) were done for seven days, postoperatively. On the 1, 4 and 7th days postoperatively, ligation areas and the incision line were assessed based on the visualization levels, morphological characteristics and possible complications by using B-Mode ultrasonography with 5-6,6-8 MHz intervals micro convex probe.

Results: The results of the study showed that intraoperative pulsation values were between 66-170 bpm, which were increased by 90% (18/20) when comparing to preoperative values. Ligation areas were visualized 25% (5/20) and 50% (10/20) for the left and right ovary, respectively. All ovarian ligations could be monitored by 30% (6/20) on the 1st-day, 45% (9/20) on the 4th-day, and 35% (7/20) on the 7th-day, respectively. The highest rate of the cervical ligation visualization was 60% (12/20), which was recorded on the 7th-day postoperatively. Moreover, no differences were detected in ligation areas, which were more significant on the 4th and 7th-day postoperatively. It is recorded that the visualization of right ovary ligation having a higher risk of complication was easier than the left one. The complications rate of the incision line was 60% (12/20), which can be more visualized on the 4th and 7th days.

Conclusion: As a result, it is concluded that transabdominal/transdermal ultrasonography during the first week can be helpful for postoperative monitoring of dogs undergone OHE.

Keywords: *Complications, dog, ovariohysterectomy, ultrasonography.*

SURGICAL THERAPEUTIC PROTOCOL IN UNILATERAL TYROIDECTOMY IN DOGS. CASE REPORT

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Introduction: The thyroid gland is an endocrine gland formed from two lobes linked together by an isthmus, having a very complex function in the body, being in close correlation with the other endocrine glands. Thus, when this gland suffers pathological, degenerative, inflammatory and/or tumour phenomena, numerous metabolic dysfunctions and neuroendocrine disorders based on hipo or hyperthyroidism may occur.

Aims: The main objective of this paper is to highlight the particularities of the surgical therapeutic protocol in unilateral thyroidectomy, which has a very complex character, especially due to perithyroidal anatomical topography.

Materials and Methods: Patient: dog species, Bichon breed, 11 years of age with the following symptoms: swelling in the left ventricular cervical region, hard consistency and mild dysphagia. In the sanguine exam, the following were found: TT4 = 1.4μg/dL; haematological exam without modification; blood chemistry - amylase test = 405U/L (reference values 500-1500U/L). The clinical examination was completed by an ultrasound examination, where the presence of a nodular, circumscribed, hyperecogenic formation, placed paramedian left in relation to the larynx and trachea, was emphasized. After diagnosis, clinical and imaging, the surgical ablation of the formation was followed by the diagnosis of certainty by histological examination (hemangiosarcoma). The postoperative therapy consisted of: antibiotic therapy (Amoxicillin with Clavulanic Acid for 10 days); antialgic therapy (Tramadol, 5 days and Onsior, 3 days).

Results: The nodular formation was a tumour of vascular origin (hemangiosarcoma). At the wound level, a subcutaneous serum appeared within the first 10 days postoperatively, which was provided with drainage by declivity. At 14 days postoperatively wound healing was complete and at 4 months postoperatively the patient had a very good general status without local recurrence.

Conclusion: Realization of thyroidectomy is decided by corroborating the data obtained from the blood, imaging and clinical laboratory examination.

Keywords: *Thyroidectomy, Surgery Ablation, Hemangiosarcoma*

MINI-INVASIVE EXTRA-ARTICULAR STABILIZATION OF THE CRANIAL CRUCIATE DEFICIENT STIFLE IN DOGS

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Introduction: The rupture of cranial cruciate ligament is a common injury of the canine stifle. While numerous techniques have been developed for surgical treatment, extra-articular methods with placement of a lateral suture remain a popular treatment method. In vitro testing has demonstrated that techniques in which the stabilizing suture is anchored to bone provide superior load failure rather than the circumfabellar suture placement.

Aims: The purpose of this work was to describe three mini-invasive techniques for extra-articular stabilization of the deficient stifle based on bone anchors inserted in quasi-isometric sites.

Study design: Ex vivo study – 8 dogs.

Materials and Methods: One of the hind limbs was randomly assigned to undergo technique 1 or 2 or 3 and control (intact stifles - nonstabilised) (n=4). In femoro-tibial specimens with intact passive joint restraints, femoral sites adjacent to the distal (F2) poles of the fabella, and tibial sites immediately cranial to (T2) the long digital extensor tendon, were fluoroscopically identified. Each stifle was tested by cranial drawer test and tibial compression test before and after arthroscopic transection of the CCL and after performing the assigned procedure. Suture stabilization of the stifle consisted of placing a suture (monofilament nylon leader line or polyethylene suture) between: *technique 1* (F2 - Securos anchor and T2 – tibial single tunnel), *technique 2* (F2 - Securos anchor and T2 – tibial two parallel bone tunnels), and *technique 3* (F2 - Securos anchor and T2 – Livantec anchor).

Results: Described are the F2 and T2 palpation and fluoroscopic sighting, the mini-invasive surgical approach technique and the insertion of Securos and Livantec anchors. The results of the cranial drawer test and tibial compression test do not show statistically significant differences between the three applied techniques.

Conclusion: All three techniques provide passive stability to the deficient stifle. Further clinical study is required.

Keywords: dog, cranial cruciate ligament, cranial cruciate ligament injury, extracapsular stifles stabilization, bone anchor

MONITORING OF MYCOTOXINS IN FEED FOR DAIRY COWS AND SWINE FROM MUNTENIA REGION, ROMANIA

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Introduction: Mycotoxins have a strong negative impact on crops, animal health and human health. These secondary metabolites are toxic can cause major economic losses and illnesses (Zain, 2011).

Aims: This study aimed to evaluate the presence of the most prevalent mycotoxins, aflatoxin B1 (AFB1), ochratoxin A (OTA), deoxynivalenol (DON) and zearalenone (ZEN), in feed intended for dairy cows and swine from farms located in the Region of Muntenia (Călăraşi, Giurgiu and Teleorman), Romania.

Materials and Methods: 136 samples of fodder and forage intended for cattle and 37 samples for pigs were collected during 2017-2018. Some of the samples were analyzed within the national surveillance program and some on request. AFB1 has been extracted and purified in an immunoaffinity column specific for AFB1. Detection and quantification of toxic secondary metabolites were performed by high-performance liquid chromatography (HPLC) and Enzyme-Linked ImmunoSorbent Assay (ELISA).

Results: All four mycotoxins were detectable and quantifiable. The level of contamination was generally low. The maximum allowable limits for AFB1, OTA, DON and ZEN were not exceeded.

Conclusion: The low level of contamination indicates no potential risks for animal and human health and suggests that the best practices in the management and storage of feed were applied in the studied area.

Keywords: *dairy cows, feed, mycotoxins, monitoring, swine*

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THE ORIENTAL EYE WORM, *THELAZIA CALLIPAEDA*, IN ROMANIA: EMERGENCE AND SPREADING

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Introduction: *Thelazia callipaeda* (Spirurida, Thelaziidae) is a vector-borne nematode parasitizing the conjunctival sac of various host species, including carnivores, lagomorphs and humans. In Europe, the first cases were recorded in Italy, but during the past two decades, several European countries have become endemic.

Aims: Considering the emergence of *T. callipaeda* throughout the European continent, the aim of this review is to provide comprehensive data regarding the distribution, temporal dynamics, and host spectrum of this parasite in Romania.

Materials and methods: Between 2014 and 2019, we documented a series of clinical cases in domestic carnivores and evaluated the occurrence of the parasite in nine wildlife carnivore species (gray wolves, *Canis lupus*; golden jackals, *C. aureus*; red foxes, *Vulpes vulpes*; wild cats, *Felis silvestris*; Eurasian lynxes, *Lynx lynx*; pine martens, *Martes martes*; European polecats, *Mustela putorius*; beech martens, *Martes foina*; and European badgers, *Meles meles*).

Results: In domestic carnivores, the first autochthonous case occurred in 2014, in a dog originating from northwestern Romania. Subsequent reports published in 2016 and 2018 revealed a wider distribution for *T. callipaeda* in dogs, including locations from the western, southwestern and southern regions of the country. The parasite was also reported in a domestic cat in 2018. In wildlife, between 2014 and 2019, the infection was recorded in six host species, from various locations: *Canis lupus*, *C. aureus*, *Vulpes vulpes*, *Felis silvestris*, *Martes foina* and *Meles meles*. Furthermore, the prevalence of infection in red foxes, *Vulpes vulpes*, from western Romania was of 29.4%, indicating a reservoir role for this species. Despite its zoonotic potential, surprisingly, so far there are no reported human cases in Romania.

Conclusion: This study demonstrates the establishment and spreading of the zoonotic eye worm, *T. callipaeda*, in Romania, highlighting the need of an increased public awareness.

Keywords: *Thelazia callipaeda*, hosts, distribution, Romania

BIOLOGICAL CONTROL OF COCCIDIA FROM FREE-RANGE CHICKENS: AN ACCURATE AND SUSTAINABLE METHOD

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Introduction: The appearance of multi-drug resistance in the most pathogenic parasites of domestic animals stimulated the search for novel solutions to control those organisms, such as the use of nematophagous fungi.

Aims: The current pioneer study aimed to test the potential use of the nematophagous fungi *Mucor circinelloides* on coccidia from free-range chickens, stimulating its ovicidal activity against oocysts of *Eimeria* spp.

Materials and Methods: Suspensions of *M. circinelloides* were used to perform two types of assay. First, three Petri dishes with water-agar (2%) medium were used, two with oocysts previously isolated from faecal samples of free-range chickens, in which were inoculated spores of *M. circinelloides* ($3,3 \times 10^5$ spores/ml) and one as control. Incubation was at 26-27 °C, during 2 weeks. The plastic boxes assay was performed outdoor, during two weeks and in each season of the year, in which were mixed different concentrations of *M. circinelloides* with coccidia positive free-range chicken faeces. The type of ovicidal activity was analyzed.

Results: On both assays, was identified with success ovicidal activity of *M. circinelloides* against coccidia, having been detected oocysts with morphological changes and walls destroyed. Winter was the season in which the action of *M. circinelloides* against oocysts was faster.

Conclusion: The results obtained with this study suggest the use of nematophagous fungi on the Biological Control of poultry coccidia and allowed to conclude that temperature, moisture and the concentration of spores affect the intensity and speed of action of nematophagous fungi.

Keywords: *Biological Control, Coccidia, Mucor circinelloides, Nematophagous Fungi, Portugal*

QUALITY ASSESMENT OF MEAT FROM BAZNA PIGS- A FORGOTTEN NATIVE ROMANIAN BREED

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Introduction: Bazna is a native Romanian breed of swine, originating in Transylvania. Even though the pork meat obtained from Bazna pigs was initially very much appreciated by consumers for its marbling characteristic, tenderness, succulence and aroma, the Romanian food industry lost interest in the breed. This occurred for two main reasons: Bazna was not suitable for intensive farming systems and it was less economical.

Aims: The aim of the present study was to demonstrate the quality of Bazna pork meat and meat products which were subsequently obtained.

Materials and Methods: The main parameters responsible for the nutritional quality were taken into study for both fresh meat and meat products. They were represented by moisture, protein, collagen and collagen/meat protein ratio. For fresh meat, pH was determined in order to assess the technological quality and colour, appearance, consistency and flavour for sensory quality. All samples were collected from Bazna pigs raised in a traditional farming system and slaughtered at the age of 1 year. The samples were represented by fresh meat from the leg and neck regions and associated meat products.

Results: Certain particularities were observed in the distribution of proteins, water content, fat and collagen in meat from two anatomical regions, leg and neck. The organoleptic exam revealed that the meat from the neck region has more palatability due to its degree of perselation and marbling characteristic.

Conclusion: Bazna pork meat is a nutritive red meat, with excellent organoleptic properties from which consumers that are in agree with traditional animal husbandry can benefit.

Keywords: *Bazna, fresh meat, meat products, chemical composition*

NON-INVASIVE MECHANICAL VENTILATION IN VETERINARY PATIENTS: A LITERATURE REVIEW

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Introduction: Non-invasive ventilation is becoming increasingly popular in the settings of acute respiratory failure in human patients, with indication for respiratory system support. This technique has been implemented as a tool in the therapeutic management of acute and chronic respiratory failure. In comparison to invasive mechanical ventilation, non-invasive ventilation requires minimal sedation, reduces the risks associated with endotracheal intubation, is more comfortable and it is available also as a portable unit for personal home care. The most used interfaces for non-invasive ventilation both in human and veterinary medicine, are represented by nasal prongs and cannulas, facial masks and helmets.

Aims: The aim of this study is to raise interest on the clinical use of different non-invasive ventilation (NIV) techniques: non-invasive positive pressure ventilation (NIPPV), continuous positive airway pressure ventilation (CPAP) and high flow oxygen therapy (HFOT) in healthy or in respiratory distress cats and dogs.

Material and methods: The literature was reviewed from 2000 to present by searching the following databases: PubMed, Google Scholars and JSTOR. Keywords like non-invasive, mechanical ventilation, CPAP helmet, CPAP mask, high flow oxygen therapy were used in combination or separately.

Results: A total of 10 research papers were reviewed. In addition, references of included articles were searched for eventual missed papers. The search retrieved four papers on HFOT in healthy and hypoxemic dogs using nasal cannulas, two papers on CPAP delivered through a paediatric helmet in dogs, two papers on CPAP with facial mask, in dog, respectively, in cat, one paper on CPAP with different interfaces in dogs and one on NIPPV in cats. Studies on invasive CPAP applied in equine and rabbit patients were excluded. Relevant data like cardiovascular parameters, ventilation parameters, arterial blood gases, air leak and sedation score were recorded.

Conclusion: Non-invasive ventilation using different interfaces is possible in small animal patients with its limits. The documented studies offer strong motivation for further investigation into these ventilation modalities.

Keywords: *CPAP, mechanical ventilation, non-invasive*

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THE CONSERVATIVE APPROACH TO DENTAL CROWN FRACTURES IN DOGS AND CATS

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Introduction: Dental crown fractures in small animal pathology are a common morbidity in every day practise. Cats, usually fracture their canines, due to their exposure in the geometry of the dental arches. Dogs have a higher level of activity and do interact with the environment more than felines, so they have a wider range of teeth' types that are fractured. The conservative approach to dental crown fractures involves endodontic treatment and coronal reconstruction in order to keep the fractured teeth on the dental arch.

Aims: We wanted to study whether the conservative approach to dental fractures may be a reliable alternative to dental extractions in order to provide best dental medical care for our patients.

Materials and Methods: They were taken into study only dental crown fractures involving the pulp chamber, leaving the root undamaged. 9 cats with 6 upper canines, 3 lower canines: 6 coronal reconstructions with light curing filling materials and 3 prosthodontic crowns: 2 metal alloy crowns and one zirconia. 52 dogs, with 49 single rooted tooth, 16 multirrooted teeth, 61 coronal reconstructions with light curing filling materials and 4 prosthodontic crowns: 2 metal alloy and 2 zirconia crowns. The endodontic treatment followed latest endodontic protocols and the root canal fillings were made by cold lateral condensation with mineral trioxide aggregate (MTA) and gutta-percha.

Results: One year follow up, clinical and radiological check-up revealed us no periapical lesions, only 3 missing fillings made with light curing materials and no crown loosening.

Conclusion: In the present research work, we demonstrated that the conservative approach to dental crown fractures in dogs and cats, when the selection criteria correspond to the indications of the specialized literature is a reliable alternative to veterinary dental extractions.

Keywords: *cat, dental fractures, dog, endodontic treatment, dental crown.*

MESENCHYMAL NASAL HAMARTOMA IN A DOMESTIC SHORTHAIR CAT

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Introduction: Nasal hamartomas are an uncommon, benign lesion in people that have striking similarities to inflammatory polyps of the nasal turbinates in cats. Also arising in the nasal passages, nasal hamartomas are consistent with the excessive growth of tissues indigenous to the site of origin and can be composed of mesenchymal or epithelial tissue (McDermott *et al.*, 1998; Hsueh *et al.*, 2001). Mesenchymal hamartomas are the more common nasal hamartomas and have been termed lipomatous, chondroid, angiomatous, or chondromesenchymal, depending on the nature of the mesenchymal elements. Nasal chondromesenchymal hamartoma and sinonasal fibro-osseous hamartoma of children have clinical and pathological features that are strongly analogous to those of inflammatory polyps of the nasal turbinates of cats (McDermott *et al.*, 1998; Boudewyns *et al.*, 2006).

Aims: The aim of our study is to present, clinical, diagnostic imaging and histopathological findings of a 2-year-old domestic shorthair cat with mesenchymal nasal hamartoma. The present case describes also the surgical management of the condition.

Materials and Methods: A 2-year-old, spayed female Domestic Shorthair cat was presented with an obvious deformation of the dorsal nasal region. The cat had been treated several weeks with antifungal and antibiotic agents without any improvement. A small piece of the mass was collected by the owner during an acute episode of sneezing. Histopathological examination identified the nasal hamartoma. Radiography and computed tomography identified lesion as a soft tissue density together with the loss of the turbinate pattern in both nasal cavities and almost total occlusion of the rhinopharynx. The frontal sinuses were unremarkable. The mass was removed by a dorsal rhinotomy.

Results: There was no epistaxis or episodes of ptyalism postoperatively. Normal dry food diet was introduced second day after the surgery and the appetite was present. Follow-up was performed 10 days postoperatively when the cat was presented for stitches removal. The cat was clinically normal. The nasal wound had healed without complication and cosmetic appearance was excellent. No residual nasal deformity, discharge and sneezing were present.

Conclusion: To the authors knowledge, the dorsal rinothomy for management of a bilateral nasal hamartoma in a domestic shorthair cat has not been previously described.

Keywords: *cats; hamartoma; nasal mass; sneezing*

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GASTROINTESTINAL HELMINTHS ON THE IBERIAN WOLF POPULATIONS FROM NORTHERN SPAIN – A GENERAL VIEW

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Introduction: Wild canids are under several pressures in human landscapes, especially the predators, like the Iberian wolf. This wolf species is one of the last large carnivores of Iberian Peninsula and parasitism is an important factor regarding its conservation and biodiversity, under the scope of One Health.

Aims: The purpose of this study was to evaluate the diversity of gastrointestinal helminths of Iberian wolf populations in northern Spain.

Materials and Methods: Wolf fecal samples (N=752) were collected from the environment, frozen at -20 °C, and coprology was made using flotation and natural sedimentation methods.

Results: Parasitic forms were found in 53.0% (399/752) of the samples, namely: *Capillaria* spp., 17.1% (129/752), Ancylostomatidae (*Ancylostoma/Uncinaria*), 16.2% (122/752), Taeniidae, 10.7% (81/752), *Trichuris* spp., 8.1% (61/752) and *Toxocara* spp., 6.5 % (49/752).

Conclusion: Performing the regular monitoring of the wild fauna health status is an emerging need. Parasitic or infectious agents can exert their negative impact, making wildlife populations vulnerable, but also, the most part of these agents found have zoonotic potential, and are shared with other domestic carnivores, being a typical case for Conservation Medicine under a One Health approach.

Keywords: *Gastrointestinal parasites; Iberian wolf; Iberian Peninsula; One Health; Zoonoses.*

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STUDIES REGARDING THE PRESENCE OF SULFONAMIDE RESIDUES IN POULTRY MEAT

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Introduction: The excessive or uncontrolled use of sulfonamides in poultry farming can lead to contaminated food products. Subsequently, the human consumption of products contaminated with these synthetic bacteriostatic antibiotics increases the global phenomenon of antibiotic resistance which is nowadays an urgent threat to human health. In this context, the development of analytical methods and continuous monitorization of sulfonamides are extremely important.

Aims: The aim of this study was to develop and validate a high-performance liquid chromatography (HPLC) method for the identification and quantification of 13 sulfonamide residues and to determine the level of contamination in poultry meat samples from Cluj, Romania.

Materials and Methods: The material consisted in fresh meat collected from a poultry slaughterhouse located in Cluj county. The HPLC method validation was performed in accordance with 2002/657/EC: Commission Decision of 12 August 2002 implementing Council Directive 96/23/EC. Additionally, 24 poultry meat samples were analyzed using the validated method in order to reveal the level of contamination in the area.

Results: The method had good selectivity, linearity ($R^2 \geq 0.99$), precision ($< 6\%$) and low limits of detection (LOD) (3.27-5.09 $\mu\text{g}/\text{kg}$) and quantification (LOQ) (9.81-15.27 $\mu\text{g}/\text{kg}$); The procedure proved to be very effective, with an analyte recovery between 97.7-109.6%. The additional monitorization revealed the presence of sulfaquinoxaline residues in 2 samples, at levels of $31.98 \pm 5.18 \mu\text{g}/\text{kg}$ and $23.70 \pm 3.84 \mu\text{g}/\text{kg}$. These levels did not exceed the Maximum Residue Level (MRL) of 100 $\mu\text{g}/\text{kg}$.

Conclusion: The present study brings an important contribution to the process of stopping antibiotic resistance through new methods of detection and quantification of sulfonamide residues and monitorization procedures.

Keywords: *contamination level, development, HPLC method, sulfonamide residues, validation*

RETROSPECTIVE STUDY OF CAPRINE BRUCELLOSIS IN ALGERIA

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Introduction: Brucellosis is an anthroponotic and ubiquitous disease which strikes primarily the domestic cattle (ruminants and suidae) especially when they share the same pastures and installations (Acha and Szyfres, 2005). Algeria has experienced brucellosis since the beginning of the 19th century until today and it continues to spread on farms, causing heavy economic losses (Benkirane, 2001), The infection has a significant impact on human health also, where we count 6122 cases of human brucellosis for the year 2011 (INSP, 2012).

Aims: This study aims to determine the situation of caprine brucellosis and the factors affecting its persistence.

Materials and Methods: A sero-epidemiological study was carried out on a total of 51475 goats during the decade from 2009 to 2018 in Algeria. The sera were screened by card agglutination test, and the positive samples were confirmed by the complement fixation test.

Results: An average seropositivity prevalence of 14.7% was found during the ten years of the study. A significant difference ($P < 0.05$) was observed between southern provinces and northern ones with respectively (20.2%) and (6,9%). The effect of sex is highly significant ($P < 0.05$); a higher prevalence of infection (15.6%) was found in female compared to male with (7.1%). Also a significant difference was found regarding age of animals, with a prevalence of (15.8%) for aged animals against a prevalence of (8.5%) for young animals.

Conclusion: In the present study, we found that the caprine brucellosis persists in the different provinces of Algeria, and it is necessary to implement a scheme to fight and prevent this infection.

Keywords: *Algeria, brucellosis, caprine, seroprevalence.*

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SESSION 10: GEODESY, GEOMATICS AND PROPERTY VALUATION

GENERATING A SURFACE BY B-SPLINE INTERPOLATION

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Introduction: The B-spline interpolation describe a surface defined by a completely specified network of points to be interpolated. This problem reduces to determinate an appropriate set of B-spline control vertices which, when input to the B-spline surface formulation, would generate a description of a surface which interpolates the given network of points. An appropriate set of B-spline control vertices which will generate an interpolating surface can be determined by solving a set of simultaneous linear equations. These equations are derived, efficient algorithms are designed to solve them rapidly, and the implementation of this theory in a computer-aided geometric design system is presented.

Aims: In this paper we will apply principles of numerical integration to approximate a surface of and to approximate the calculation of stockpile volume The problem is to determine an appropriate set of B-spline control vertices that generates a surface which interpolates a completely specified network of points for the spatial data obtained with the drone.

Materials and Methods: Using the spatial data obtained by measurements with the drone, we determine the function which characterises these points by applying the B-spine interpolation's method with the help of the application Matlab. With this function we apply integrative methods for determining the volume of the object of interest.

Results: The accuracy of the overall calculation will depend on the accuracy of the program of the B-spline interpolation in the application Matlab and the number of chosen points we obtained from measurements with the drone.

Conclusion: The analysis of the results clearly confirmed the suitability of the applied equipment and software used for processing data. Given the needs of engineering works on aspects of precision, the volume calculation showed the importance of developing algorithms and methodological procedures for determining the value with high precision.

Keywords: *B-spline interpolation, integration, volume*

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AUTOMATING THE REPRESENTATION OF SPATIAL DATA TAKEN WITH RTK GNSS TECHNOLOGY

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Introduction: Codes are numerical or alphanumeric combinations that are assigned to each point in the field when a topographic measurement is performed. These codes are designed to classify each point in a particular family (lines, polygons, symbols, etc.). Thus, the points will be characterized by the position, that is X, Y, H coordinates and the assigned codes that will identify each point as a point-feature, as belonging to a line, polyline or geometric object. The use of codes is incontestable, the advantages of this being both in the simplification of field work, the disappearance of field sketches and office work, by eliminating some stages in the graphic design process.

Aims: GNSS-RTK tools have gained a growing popularity in recent years, especially due to ease of use and speed in obtaining spatial data, relative to classical methods of data collection in the field, especially in topographic and cadastral measurements.

Materials and Methods: An alternative to graphic representation programs is to create a coding system for collecting field data using RTK technology and to design a program to interpret these codes to automatically get the digital plan. The authors propose their own field coding system and the use of a Visual LISP program to interpret these codes in order to automatically obtain the digital plan with minimal operator intervention. The aim was to use the coding system with any GNSS RTK technology instrument. We have classified the characteristic codes into two major categories: numerical and alphanumeric. Numeric codes will be used to collect field data that will be later represented by conventional signs. Alphanumeric codes will be used to collect field data which will represent graphic elements such as constructions, household annexes, roads, alleys and property limits, so when measured points represent details of geometric shapes such as lines, arcs, circles, rectangles, etc.

These numerical and alphanumeric codes will be interpreted later using a Visual LISP program to automatically get the digital plan.

Results: Computer-aided design is currently becoming more and more popular due to the accuracy and speed that the computer puts at the disposal of the geodetic engineer. There are a lot of products on the market of IT products with this specific, the vast majority of them being designed especially for certain areas of activity. The authors have focused their attention on AutoCAD, which has retained its popularity over time and is being used successfully by most geodetic engineers.

Conclusion: This paper aims to deepen some automation possibilities for obtaining the digital plan. This automation can not only be done in the office phase, but must be correlated with a field-based data collection methodology using the GNSS RTK tools and using characteristic codes. Data collection technology does not impose many restrictions, and the benefits of automating the process of getting the digital plan are much greater.

Keywords: *AutoCAD, codes, GNSS, RTK, Visual LISP*

CURRENT SITUATION OF GNSS NETWORKS IN ROMANIA

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Introduction: Nowadays, the need for a more precise positioning is a very high, therefore very demanding one, and this is one of the reasons why very large research funding is allocated in satellite technology, the second reason being global geopolitics situation. New satellite constellations are being developed, existing satellites that have completed their mission are being replaced with satellites that incorporate technology far superior to their predecessors. Currently we have four constellations with global coverage, NAVSTAR-GPS and Glonass, Galileo and Compass. With the development of these global satellite systems, it is also necessary to develop the user segment, so this requires terrestrial reference stations to be updated to recognize the new signals from them. The article presents the situation of the global satellite systems and the situation of the permanent reference networks in Romania, which are developed by state or private companies.

Aims: The paper aims to highlight the rapid development of permanent station networks that try to incorporate the new technology, but also the need to develop rules in relation to the implementation and exploitation.

Materials and Methods: Permanent stations position are known and they transmit to users, real-time corrections over the internet, using mobile networks.

Positions determined by GNSS are expressed in different Coordinate Reference Systems (CRS) or datum as ITRS (International Terrestrial Reference System), ETRS89 (European Terrestrial Reference System 1989), WGS84 et al. For daily applications coordinates expressed in such reference systems can be transformed in local datum, as S42 (Krasovski ellipsoid 1940) in Romania.

Results: In Romania, there are more than five service providers for RTK, the private networks of permanent reference stations providing real-time corrections to users is growing, providing more and more coverage at national level.

Conclusion: A large number of permanent stations are deployed in Romania, and there is a need for common standard.

Keywords: *RTK, permanent stations, satellite constellations*

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GNSS PPP: AN ALTERNATIVE METHOD TO RTK?

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Introduction: PPP (Precise Point Positioning) allows a single GNSS receiver user to determine position at the decimetre / centimeter error level in kinematic / static mode using precise satellite orbits and clocks. PPP uses state space representation (SSR) correction products such as precise satellite orbits, clocks and signal biases from either commercial or/and public (e.g., IGS) that are delivered to the user via satellite and/or internet. R.J. Anderle introduced the method for a single positioning station with precise orbital solutions and Doppler satellite observations in the early 1970s. The PPP method provides an accuracy of decimeter to centimeter. Organizations such as the International GNSS Service (IGS), the Information-Analytical Center (IAC), the European Space Operations Center (ESA / ESOC) have begun to provide information on satellite orbit and GLONAS watch products. Globally there are several companies that offer PPP commercial services such as: OmniSTAR, Trimble, FURGO, NavCOM, C-NAV, Veripos, TeraSTAR, Novatel, Hemisphere.

Aims: The paper aims to highlight a relatively new method that is in continuous development at a global level, soon in Romania being a good alternative for RTK services that are receiving corrections from permanent stations.

Materials and Methods: RTX Post-Processing makes use of the precise orbits and clocks derived by the Real-time CenterPoint RTX System. Orbit, clock and additional bias information is derived by the real-time server systems and stored in a compressed data format for use by the postprocessing system. The underlying update rate of the satellite clocks is 1 Hz, i.e. allowing maximum accuracy and high update rates for kinematic rover positioning.

Results: PPP products are used in many areas such as surveying, agriculture, navigation, self-driving vehicles. Unlike RTK, PPP can provide uniform global accuracy without the need for direct connection for simultaneous observations to a reference network. Lately, attempts and attention have been shifted from "PPP post-processing" to "real-time PPP".

Conclusion: The method is a reliable, already implemented and used by users, very good for areas where there is no coverage of mobile operators and permanent stations, which is in a continuous development, presents advantages and disadvantages.

Keywords: PPP, RTK, RTX

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SMART AGRICULTURE: GENERAL ASPECTS AND FUTURE

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Introduction: Precision agriculture smart agriculture is a very discussed and sought after field in the last period of time, and the ratio of tons of cereals / hectare must reach the best value. Studies show that the need for food is increasing, in this context every part of the land must be cultivated. The technology evolved being accessible, the drones became financially accessible, the sensors mounted on the drones are getting smaller, offering a good quality, and slowly they replaced the satellite images, which were very expensive and difficult to access. The future brings an automation of the entire production process, the introduction of artificial intelligence in agriculture will lead to a technological revolution in this field.

Aims: The paper aims to highlight a relatively new method that is in continuous development at a global level, farmers in Romania are interested and invest in this domain.

Materials and Methods: Using drones leads to much greater accessibility of the domain, especially for small farmers. In order to position the images as accurately as possible in the coordinate system used and to determine the digital terrain model, it is necessary to use GNSS technology. The use of multispectral satellite imagery remains a good alternative. Various software solutions are developed that have very good results and obtain many parameters from the images, having a vision of what is happening in the field, being able to anticipate certain phenomena.

Results: Drones are beginning to be used in many areas. With the help of drones and multispectral sensors that can be equipped, we can have very good results in agriculture. Drones in agriculture are not just used for taking images, but currently are used for herbicide and monitoring.

Conclusion: The method is a reliable, already implemented and used by farmers, very useful for agriculture, and is in a continuous development, artificial intelligence will be the next step.

Keywords: *Agriculture, drones, GNSS, precision*

ROMANIAN GEODESIC EDUCATION BETWEEN PAST AND FUTURE

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Introduction: Romanian geodesic education started in Iasi in 1813 through the School of Border and Engineering at the Royal Academy. The university education in the geodesic field continued in Iasi, Galati and Bucharest. If in 1818 we had the first 32 geodesic engineers, today we have about 500 geodesic engineers annually. After 1990 the field of geodetic engineering became attractive in 12 university centres in our country (Bucharest, Cluj, Timisoara, Iasi, Craiova, Brasov etc.)

Aims: Given the increased interest in training engineers in this field we are trying to see what the future of this job is from the perspective of those who will practice it.

Materials and Methods: We will analyse the current situation at the level of each university centre from the perspective of the curriculum, the number of graduates, the degree of employment in the field and the dynamics of the modernization of the educational process.

Results: At the end of the study we will try to answer the questions that grind many colleagues: do we have enough geodetic specialists at national level and are they able to meet with the demands of the labour market?

Conclusion: Starting from the fact that we must prove that everything is a measure, but that everything can be measured we must impose by university standards respect for the job of geodesic engineer.

Keywords: *Educational standards, geodesic education, university education*

MAPPING THE SPATIO TEMPORAL EVOLUTION OF GREEN AREA USING GIS

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Introduction: Along with the development of satellite imagery acquisition, normalized difference vegetation index (NDVI) was used for qualitative and quantitative estimation in different domains as agriculture, environmental changes and even in epidemiology. (Pettronelli, 2013)

Aims: The aim of this paper is to study the spatio temporal evolution of the green area in the neighbourhood of Florești County. For the last decades the city and the built area extends beyond the farmland and green area.

Materials and Methods: For this study were performed analyses of the satellite images based on NDVI and DEM data layers using a multisource classification (Salahuddin, 2018)

Results: The NDVI method was applied according to different threshold values. From digital elevation model were obtained terrain attributes: slope, aspects and altitude. The NDVI and these attributes were correlated in order to obtain the spatial temporal evolution of green area. The relation between NDVI and aspect, NDVI and slope and NDVI and altitude explain the evolution of built area. The correlation coefficients between NDVI and terrains factors are given. All results are included in a geographical information system and based on the considered factors the evolution of the built are and the decreasing of the green area were estimated.

Conclusion: Developing a GIS based on Landsat images and DEM data layers we emphasises the spatio-temporal evolution of built area and surroundings of Florești. More than 40% of the farmland area become built area over the decades. Using this geographical information system, scenarios can be created regarding the evolution of the green area.

Keywords: *DEM, GIS, NDVI*

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USING THE LASER SCANNING TECHNOLOGY IN THE EVALUATION OF A BUILDING SITUATED ON ION NECULCE STREET FROM CLUJ-NAPOCA

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Introduction: Laser scanning describes a method by which a surface is sampled or scanned using laser technology. The advantage of laser scanning is that it can record a large number of points, at high accuracy, in a relatively short period of time. In a century dominated by information as the most important development resource, the science of evaluation is called upon to provide crucial information to the exponents of economic activity. Realistic, accurate estimates lead, among others, to the establishment and stabilization of loans and investments that promote a development of real estate in the sense imposed by the society.

Aims: The science of valuation has become more and more sophisticated as the development of society in general and of the economy in particular, in order to meet, eventually, complex information needs. The main idea of this project is to carry out scanning works in the framework of the evaluation report of a property.

Materials and Methods: For this project, was used the Leica Scanstation C10 laser scanner and the following methods were used for the scan operation: Backward Intersection Method, Deletion Method. For the valuation we used Market approach and Cost approach.

Results: The use of the laser scanner led to the expected results, namely the retrieval of an enormous volume of information collected from the field, of extremely high accuracy which subsequently helped to model a large number of details necessary to improve the evaluation process.

Conclusion: In conclusion, I would like to point out that the use of laser scans in real estate appraisal processes should most likely be imposed only when evaluating high value properties, and with outstanding architecture, such as houses considered historical monuments in the centers of many cities, or stadiums of teams that are the subject of large transactions.

Keywords: *Appraisal, Laser Scanner, Market Value*

CREATING AN INFORMATION SYSTEM FOR THE PREVENTION OF ROAD ACCIDENTS ACCESSIBLE TO THE GENERAL PUBLIC IN THE REPUBLIC OF MOLDOVA

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Introduction: A geographical informational system directly depends on hardware and software. It is certain that the GIS market has a steady annual dynamics of about 15% over the last 5-10 years. Thanks to the information associated with the graphics, GIS benefits from all the interrogation opportunities offered by modern database systems, and, moreover, can easily provide analysis oriented to specific geographical areas – thematic maps.

Aims: This paper shows the importance of creating and developing an online road accidents record system, the capability and characteristics of a geographical informational system in the road accidents field, ways and procedures of querying a database, spatial analysis and the interoperability of a GIS, representation of the collected data on road accidents, the description of the road accidents record procedure, sources of information used to complete the map, and the actual analysis of the map and the applications used for analysis.

Materials and Methods: In order to highlight and subsequently prevent road accidents, an interactive GIS map was created using ArcGIS Online, which allows the introduction of road accidents data at any time. To add data, a basemap was selected. Since simple maps are not suitable in the given paper, the map has been added from an external source, specifically from carto.com website.

Results: The data entered on the map is available to the general public on the accidente.iharta.md site. Anyone with a good internet connection can view, in real time, data about the most frequent road accidents, who is most often involved, how many accidents occurred on a particular day and even at what time.

Conclusion: In the field of road accidents, GIS demonstrates its wide range of applicability and possibilities of collecting, editing and manipulating data. Thanks to the GIS standards implemented in both European Union and in the Republic of Moldova, it can be firmly stated that this road accident record system ensures the correctness of the information, the comfortable display for the consumer, and, last but not least, the quality of the system.

Keywords: *geoinformational systems, mapping, road accidents*

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ASPECTS REGARDING THE CORRECTIONS APPLIED TO NORMAL ALTITUDES IN SUPERIOR ORDER LEVELING NETWORKS

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Introduction: Considering the fact that in our country, from 1951 the system of normal altitudes which has the cvasigeoid reference surface is used, an analysis of the corrections that are applied to the level differences measured by geometrical geodetic levelling is required to obtain normal altitudes.

Aims: Increasement of the network of geometric geodetic levelling in the Constanta port area, with normal altitudes. The application of the corrections due to the gravity anomaly and the nonparallelism of the level surfaces to the measured level differences.

Materials and methods: Leica DNA 03 precision levelling and special coding bars with coded bars were used for the measurements. Based on known elevation points from the National Levelling Network, taken from the O.C.P.I Constanta, there were made geometric levelling paths supported on the end points. The data collection and storage, regarding the level differences and the gates and levels distances, was performed with the aforementioned level, after which, the data were transferred to the PC, with the LEICA Geo Office program.

Results: The normal elevations of the points of the geodetic levelling network were obtained based on the measured level differences and the corrections applied. The values of the non-closures of the levelling paths were entered in the allowable tolerances.

Conclusion: The use of digital levels allows to increase the working efficiency and to avoid recording errors. The use of specialized software for calculating and compensating the levelling lines will increase the working efficiency. In order to determine the gravimetric anomalies with precision, it is required that the levelling measurements be accompanied by gravimetric determinations on the topographic surface, which will be reduced to the geoid by applying the Faye, Bouguer and relief corrections.

Keywords: *cvasigeoid, gravity anomaly, measured gravity, normal altitudes, normal gravity*

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CONSIDERATIONS REGARDING THE CALCULATION OF THE CORRECTIONS APPLIED TO THE GEOMETRIC GEODETIC LEVEL NETWORKS

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Introduction: Taking into account the fact that, in our country, the system of normal altitudes is used, which has as a reference surface the *cvasigeoid*, it is necessary an analysis of the corrections that are applied to the level differences measured by geodetic geometrical leveling, to obtain the normal altitudes.

Aims: Enriching the geodetic geometric leveling network in the municipality of Bistrița, with normal altitudes. The application to the measured level differences of the corrections due to the nonparallelism of the level surfaces and to the normal gravity anomaly.

Materials and methods: The precision level Ni 007 and special 3 m invar beams, with two graded bands, with the constant of the 606500 were used for the measurements. Having as basis the leveling points known from the National Leveling Network, were done some geometric leveling routes based on the ending points with two viewing horizons. In order to determine the distances, the readings on the beams were carried out on the stadimetric wires and on the leveling wire of the scale from the left of the beam.

Results: The normal heights of the geodetic leveling network points were obtained on the basis of the level differences measured in four series and the corrections applied, due to the nonparallelism of the level surfaces and to the gravity anomaly.

Conclusion: It is necessary to verify the processing accuracy by using different compensation and adjustment software. To avoid recording errors and increase working efficiency, it is recommended to use digital levels for automatic download of data to the PC.

Keywords: *cvasigeoid, gravity anomaly, normal altitudes, normal corrections*

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THE IMPACT OF AIRBNB PLATFORMS ON THE ROMANIAN REAL ESTATE MARKET

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Introduction: *Airbnb* or other similar platforms have evolved greatly in recent years and managed to change the perception of accommodation, in the same manner as Uber has changed the perception of public transport. Renting for tourism purposes, through Airbnb type platforms, has a direct impact on investors, state institutions, real estate markets and so on.

Aims: The purpose of this paper is to analyze the effect of Airbnb type platforms on the Romanian real estate market and to describe the difficulties encountered in evaluating the properties that produce hotel rental income. These analyzes are intended in order to highlight an empirical perspective on this trend.

Materials and Methods: The study consisted of a thorough online research, that took also into consideration legislation in force. In this paper I have presented a series of assessments of the impact on the market value of residential properties in Romania, which the properties listed for rent on Airbnb, seem to have.

Results: However, there are certain limitations to this study. The use of properties taken from the home-sharing sites has an impact on the real estate offers. This research points out to various possible directions for future research. It would be beneficial to achieve an in-depth understanding of the process of evaluating complex properties, in order to better display how a tourism rental income is estimated.

Conclusion: Airbnb is an innovative accommodation product that managed to change the view on hospitality throughout the entire tourism industry. The services provided by Airbnb offer homeowners the possibility to manage their own property for tourism renting purposes. This leads to an increased number of offers and the diversity of available rental properties, and to the way in which consumers will not have to opt for the purchase of a property. This trend is a favorable aspect of the real estate rental market.

Keywords: *Airbnb, home-sharing, real estate, valuation*

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COMPARING RGB-BASED VEGETATION INDEXES USING UAV PHOTOGRAMMETRIC METHOD FOR PRECISE AGRICULTURE

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Introduction: Vegetation indexes are used to combine or filter multispectral data sets into a single value raster image. Usually a vegetation index it is expressed as a mathematical relation between multispectral bands. As output we have a raster image containing the new values, which are usually reclassified and assigned a color, creating in this way a false-color raster. The coloring meant to put into value the minimal and maximal values so that one can evaluate the vegetation health.

Aims: Taking into consideration the rapid development of consumer grade drones, and also the fact that most of them are not capable to capture NIR data without a camera modification, or acquiring a new NIR sensor, we propose the use of some vegetation indexes that are based on RGB data only. By this paper we compare some vegetation indexes and we aim to develop a workflow in order to evaluate the vegetation health by using only RGB cameras.

Materials and Methods: In order to capture photogrammetric data we used a Phantom 4Pro Drone witch has a built-in 20megapix 1 inch sensor. For georeferencing the data two dual frequency South S82V GNSS receivers were used, and for processing the captured data AgisoftPhotoscan was used. All the indices were computed using Leoworks.

Results: After processing the results, the obtained orthomosaic was separated in the main bands (Red, Green, Blue). This separation had made possible further analyses and evaluation of plant health using RGB based vegetation indices as VI, VARI or TGI.

Conclusion: In the present research work, we demonstrated that, other not so well known vegetation indexes as the NDVI can provide reliable information in order to identify the vegetation health. Also we point out the possibility to capture RGB images and index maps using the same drone, without having to modify your camera.

Keywords: *index maps, plant health, UAV, vegetation index*

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HOW TO CREATE AN EFFECTIVE THEMATIC MAP

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Introduction: The sustainable development of any country cannot be achieved without taking care of its population's health. The current paper therefore presents the use of modern cartographic capabilities in order to create effective thematic maps.

Aims: Considering the evolution of automatic mapping programs and the huge amount of available data, the key elements that go into creating thematic maps are presented so that those less familiar with map-making might be able to craft correct, reliable and suggestive maps.

Materials and Methods: To exemplify the process of creating thematic maps, data concerning emergency calls in Romania were used together with ArcGIS Online. These freely-available data were classified using Natural Brakes, Equal Interval, Quantile and Manual Brakes so as to highlight their relevant aspects. The maps were then created using combined choropleth and symbol methods.

Results: The resulting thematic maps present links between the number of emergency and non-emergency calls, the number of people in different areas of the country, as well as their season and year.

Conclusion: In the present work, we have explained how to create effective thematic maps from a given dataset. The steps needed in order to achieve this goal have been described, starting with adding a layer from the Web or a file, then tables, methods of classification and a number of classes, methods of representing one or more types of data and, finally, the interpretation of the final map. The basic method for representing the population was the choropleth method. The Romanian counties, classified under five classes, have been coloured in monochrome, but using different transparency grades according to their population density. On the resulting map, the other sets of data pertaining to emergency calls have been represented with symbols of different shapes and colours. The findings of the present paper could be used by those who want to represent their own data in a very suggestive and reliable manner, without having any cartographic training beforehand. They could also more easily interpret their datasets and thus be able to take the necessary measures in their own domains of activity.

Keywords: *classification, emergency calls, symbolization, thematic maps*

POSTER PRESENTATIONS

SESSION 1: AGRICULTURE

EFFECT OF ELEVATED IONIZED AMMONIUM (NH_4^+) CONCENTRATIONS ON GROWTH PERFORMANCE AND MORTALITY OF BURBOT (*LOTA LOTA* L.)

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Introduction: Recently, burbot has been introduced as a new aquaculture species in Belgium for both flow-through and recirculating aquaculture systems (RAS). While this fish species can be successfully cultured in RAS, the impact of long-term exposure to high concentrations of NH_4^+ on burbot performance is unknown. The effects of toxic un-ionized ammonia (NH_3) are well-studied for several aquaculture species, but there appears to be no literature on the chronic effects of elevated ionized NH_4^+ concentrations. For commercial farms, it is crucial to identify the maximum tolerable NH_4^+ concentration, in order to adequately dimension the biofilter capacity.

Aims: In order to design an optimal RAS for intensive burbot aquaculture, this species' tolerance towards NH_4^+ has to be determined. Therefore, the effect of elevated NH_4^+ concentrations on burbot growth performance and mortality was evaluated.

Materials and Methods: Burbots with an average body weight of 47.11 ± 7.97 g were stocked in six 50 liter aquaria at a density of 30 fish per aquarium. The fish were exposed to two NH_4^+ concentrations: 0.09 ± 0.22 mg.l^{-1} and 1.94 ± 0.48 mg.l^{-1} . They were raised in these conditions for 48 days and weighed and measured every three weeks.

Results: Burbots reared at high and low NH_4^+ concentrations showed specific growth rates (SGR) of 0.80 ± 0.13 $\%.\text{day}^{-1}$ and 0.77 ± 0.16 $\%.\text{day}^{-1}$ respectively. Survival was $96.67 \pm 5.77\%$ in the high NH_4^+ treatment and $94.44 \pm 5.09\%$ in the low NH_4^+ treatment. We observed no significant effects of the elevated NH_4^+ concentration on growth performance or mortality.

Conclusion: In this study, an NH_4^+ concentration up to 1.94 mg.l^{-1} did not affect burbot growth performance or mortality. Based on these observations, we assume this level of NH_4^+ is safe for burbot grow-out in RAS, providing the formation of toxic NH_3 is prevented by suitable water quality management. In order to determine the maximum NH_4^+ tolerance for burbot, the effects of exposure to higher concentrations should be tested.

Keywords: *ammonium, aquaculture, burbot, RAS.*

SENSITIVITY OF SEED GERMINATION TO TEMPERATURE AND LIGHT IN *HELICHRYSUM AMORGINUM*

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Introduction: *Helichrysum amorginum* Boiss & Orph is a perennial dwarf shrub with yellow flowers, endemic in the Greek island Amorgos and used for medicinal, cosmetic and ornamental purposes (Chinou et al. 2004). The investigation and understanding of traits associated with germination and seedling survival is considered as essential for the establishment and cultivation of endemic and threatened species (Sawilska 2007)

Aims: The objective of this study was to investigate the effect of temperature and light on germination of *Helichrysum amorginum* seeds.

Materials and Methods: A set of experiments was conducted under completely randomized design with four replications of 25 seeds at three different suboptimal germination temperatures (20, 25 and 30°C) in light and dark conditions for 10 days. Seed material was collected from two different plantations in the Greek island of Amorgos (Aigiali and Katapola). The germination performance was evaluated by final germination percentage and mean germination time.

Results: The effect of temperature and light on seed germination percentage and mean germination time was significant at $p < 0.01$. The presence of light enhance germination, especially at the optimum temperature of 25°C. The mean germination time increased at the lower temperature of 15°C. Seeds from Aigiali exhibited higher germination ability than the seed lot from Katapola.

Conclusion: Knowledge of seed germination behavior is of major importance in order to establish effective protocols for seed propagation in *Helichrysum amorginum*.

Keywords: *germination percentage, germination time, Helichrysum amorginum, light, temperature*

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THE EFFECT OF BASIC NPK FERTILIZATION AND SOME NITROGEN FORMS APPLIED TO POTATO AND SUGAR BEET CROPS AFTER PLANTING

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Introduction: Potato and sugar beet crops have high requirements for balanced fertilizer management without which crops growth and development are compromised and production and quality are diminished. NPK complex fertilizers are an important source of fertilizer.

Aims: The identification of complex fertilizer assortments and the development of differentiated methods of application of nitrogen fertilizers to potato and sugar beet crops are major objectives of fertilization technologies. These fertilization technologies are adapted to the cultivation conditions in order to reach the maximum production potential in terms of quantity and quality and with the profitability provided for the two crops.

Materials and Methods: Within the experimental field of the National Research and Development Institute for Potato and Sugar Beet Braşov, six variants of fertilization recipes have been experimented with two NPK complexes in 2014 and nine variants of fertilizer recipes that included three NPK complexes for basic fertilization, at soil preparation before planting/sowing and fertilizers with various forms of nitrogen for phaseal fertilization applied to potato and sugar beet. The effect of basic NPK fertilization and some forms of nitrogen applied after planting the crops has been studied on the Christian potato variety and Clementina sugar beet variety.

Results: After the application of fertilizer recipes to the Christian potato variety, production yields ranged between 4.1 and 13.3 t / ha (15-50%) compared to the unfertilized variant where total production of tubers was 26.6 t / ha. The fertilizer recipes used for Clementine sugar beet hybrid resulted in significant production increases between 13.50 t/ha and 19.00 t/ha (25.71 - 36.19%) compared with the unfertilized variant, which achieved a total production of 52.50 t/ha.

Conclusion: The experimental data recorded in 2014-2015 show that all fertilizer recipes tested on potato and sugar beet respond with significant production increases.

Keywords: *potato, fertilization, production, sugar beet*

REGARDING MONITORING OF CONTAMINATED SOILS USING IT&C SOFTWARE

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Introduction: The polluted soils are permanently in the attention of specialists both in the field of soil sciences and of environmental protection, because they directly affect the productivity of the soil and the quality of the food, so our health.

Aims: The paper presents the GeoGebra software as an easy-to-use and possible software to use, on a much larger scale, in the graphic work of the scattered data collected from the field or of the data strings taken from the analysis bulletins.

Materials and Methods: GeoGebra software and soil toxicity indicators.

Results: This paper mainly concerned with the expression of soil toxicity indicators, with alert and/or intervention thresholds. GeoGebra currently has several versions, including GeoGebra v. 4.0, 5.0, GeoGebra 3D, etc., but remains unique due to the quality it offers due to the performance specific to Computer Algebra System (CAS) software.

Conclusion: In conclusion, the authors are trying to show how the monitoring of polluted soils opens up to interdisciplinary fields and to the landowner, the first one interested in the fertility of the land he owns.

Keywords: *aplicații IT&C, monitoring, soluri contaminate.*

FOURIER TRANSFORM INFRARED SPECTROSCOPY ANALYSIS OF *IRIS GERMANICA* L. RHIZOMES

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Introduction: *Iris germanica* is a very old European garden plant, cultivated since ancient times for pleasant-scented orris butter (distillate rich in myristic acid) obtained from aged rhizomes. Triterpenoids called iridals found in the fresh rhizomes were shown to be precursors of the valuable irones present in aged rhizomes (Crișan *et* Cantor, 2016).

Aim: Aim of the study was to identify variations in *Iris germanica* rhizome phytochemical structure and prospect potential for orris biofortification.

Material and Methods: Rhizome samples from six *Iris germanica* cultivars were collected 9 months after planting in Agro-Botanical Garden UASVM Cluj-Napoca. Samples were aged/dried 17 months using traditional method to obtain “white orris”. Orris powder underwent FT-IR analysis at Spectroscopy laboratory from Life Sciences Institute “King Michael I of Romania” Cluj-Napoca. Measurements were conducted using KBr spectral pellet technique. Scan range was 350-4000 cm⁻¹, accumulation 256 and resolution 4.0 cm⁻¹. Spectra were screened for changes in band position and intensity.

Results: For comparative analysis were defined 3 spectral regions with 19 distinctive peaks. Based on results, were identified six fingerprint spectral regions which could be useful in distinguishing between *Iris germanica* cultivars.

Conclusion: FT-IR is a sensitive tool useful for biochemical characterization of plant constituents. This technique allowed quick identification and comparison for main primary and secondary metabolites present in *Iris germanica* rhizome based on functional groups fingerprints.

Key words: *field conditions, orris, perfume.*

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BREEDING BIRD COMMUNITIES AS AN INDICATOR FOR AGRICULTURAL LANDSCAPES ECOLOGICAL QUALITY IN BULGARIA

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Introduction: The ecological quality of agricultural landscapes affects both productivity and biodiversity conservation. The processes of intensification and abandonment are main drivers, forming farmland landscapes in Europe. Common farmland bird communities are proved to be good indicators for agro-ecosystems quality assessment. Landscape elements, such as woody vegetation hedges, small woodlots and shrubby vegetation islands are essential microhabitat for many bird species.

Aims: The aim of the survey is to study the relationship between bird communities and landscape composition in areas along agricultural intensification gradient in Bulgaria, and use it as an indicator of the state and quality of local agro-ecosystems.

Materials and Methods: The research was conducted in two case study areas (CSAs) in Western and Central Bulgaria; 20 study plots (500x500 m) were randomly selected in each CSA. The point count method was used for bird species surveys - five counting points per study plot, each with a diameter of 200 m. Intensity of land use in each study plot was determined by expert assessment using a predetermined scale from 1 (extensive land use) to 5 (intensive land use) based on the density and structure of the respective agricultural crop.

Results: Presence data for 72 bird species was collected and used for the assessment of community structure. Composition and configuration metrics, calculated at point and landscape level, showed significant differences between the landscapes at the two CSAs. The analyses also showed the habitat preferences of the different guilds and the landscape elements that ensure rich species diversity.

Conclusion: Birds are sensitive to landscape composition at field and landscape level and some landscape elements in agricultural habitats are important predictors for biodiversity assessment. In order to minimize the loss of farmland bird diversity in the rural areas, a sustainable development should be reinforced by a proper implementation of policy measures at landscape level.

Keywords: *agro-ecosystems, bird communities, landscape heterogeneity*

CHOICE AND CHANGES IN THE ECOLOGICAL APPROACH TO THE CAP IN BULGARIA: CURRENT AND FUTURE CHALLENGES

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Introduction: Promoting effective ecosystems, sustainable food systems, and healthy lifestyles, using active tools and policies, are priorities outlined in Horizon Europe research. One of the key policies of the European Union, which is focused on the community's expectations of ensuring food safety and quality, environmental protection and ensuring a healthy lifestyle, is the CAP. The experience gained from the implementation of the CAP demonstrates its importance for the development of sustainable agricultural sector in Bulgaria. However, in order to make agriculture an attractive business and to stabilize and increase the incomes of its employees, the CAP needs to adapt of the dynamic environmental impact.

Aims: The main aim of this publication is to analyze the current and future challenges in the environmental approach in implementing the CAP in Bulgaria, highlighting the relationship ecosystems services-food security-well-being life.

Materials and Methods: In order to achieve this aim, the Statistical Yearbooks of NSI, agrarian reports of the Ministry of Agriculture and Foods, newsletters of the Agro statistics Directorate at the MAF were used.

Results: Various sources of information - scientific journals, publications of Bulgarian and foreign authors, on-line (electronic) editions, as well as author's research were analyzed.

Conclusion: In the present research work, we demonstrated that interaction between the scientific potential using ecological engineering and existing traditions and active CAP actions will help build a knowledge, practical skills and innovation for the agrarian sector in order to encouragement the deployment of innovative practices among all stakeholders.

Keywords: *CAP, ecosystem services, food security, sustainable agriculture.*

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A NEW ROMANIAN POTATO VARIETY, CEZARINA AND ITS SPECIFIC TECHNOLOGY

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Introduction: National Institute of Research and Development for Potato and Sugar Beet Brasov is working to create potato varieties that align to international demand, to correspond both in terms of yield capacity as well as resistance to pests and diseases, culinary and technological quality, as well as the suitability for processing (Draica et al., 1996). Some research should be resumed and reinterpreted according to new biological conditions, technical, economic and even social (Ianos, 1997).

Aims: To obtain a patent for Cezarina variety and registration in the official catalog of varieties and also to establish a specific technology.

Material and Methods. The research was carried out between 2016 – 2018 using the classical breeding scheme for potato and applying a specific technology.

The starch content and the processing quality were determined in a specialized laboratory and late blight (*Phytophthora infestans*) resistance and virus resistance were determined in fields. The resistance to black wart (*Schynchitrium endobioticum*) was determined to National Station of Testing Pojorâta.

Results: Rational use of fertilizers, in autumn a deep tillage (35 cm) followed in spring by soil leveling for a good germinative bed, weeds control without any sensitivity to herbicides, late blight control with minimum number of fungicides spraying due to a relatively high level of resistance. Seed material quantity limited due to fact that generally the tubers are large and very large size.

Conclusions: Potato variety Cezarina proved a good yield capacity, being adapted to Romanian climatic and soil conditions. Variety resistance to diseases, especially late blight, helps to reduce the number of treatment which is cost saving and environmental protection.

Keywords: *consumption, processing, potato variety, technology, yield.*

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ISOLATION OF BIOLOGICAL CONTROL AGENT OF SOFT ROT DISEASE IN VIETNAM

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Introduction: Recently, there is an increase in the awareness of the healthy food and healthy environment. Therefore, many researchers have been focusing their effort on developing alternative measures to synthetic chemicals for controlling plant pathogen. They have referred using microbial antagonists as biological control. However, there is limited information available on these antagonistic bacteria against soft rot disease caused by *Erwinia carotovora* bacteria. **Aims:** The present work was carried out to explore a potential usefulness of bacteria as a biological pesticides and bio-fertilizer.

Materials and Methods: A total of 80 bacterial strains were isolated on selective King's B agar, PDA agar and MRS agar mediums from various crop plants including maize, grass, rice, cauliflower and cabbage bodies before harvest time in crop fields, different soil varieties in Ha Noi, Hung Yen and Dien Bien province in the north of Vietnam.

Results: Antibacterial activity of the isolated probable antagonistic bacteria was tested in vitro against the pathogen of *Erwinia carotovora* that cause crops soft rot disease.

Conclusion: Only two isolates B1 and B2 significantly inhibited the in vitro growth of *Erwinia carotovora*. The ability of these isolates to suppose using these bacterial strains as potential biocontrol agents.

Keywords: *bacteria, Erwinia carotovora, health, environment.*

GENOTOXIC ASSESSMENT OF A BINARY MIXTURE OF CYANOTOXINS IN RATS BY THE STANDARD COMET ASSAY

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Introduction: Cylindrospermopsin (CYN) and Microcystin-LR (MC-LR) are toxic secondary metabolites produced by different species of cyanobacteria. Humans can be in contact with them by diverse routes, oral intake through the consumption of contaminated water and food (crops, fish, molluscs, food supplement) being the main one. Following the recommendations of the European Food Safety Authority (EFSA), it is required to evaluate its genotoxicity *in vivo*.

Aims: Assess the genotoxic potential of a mixture of CYN-MC-LR in the liver, stomach and blood of male and female Wistar rats by the standard comet assay (OECD, 489).

Materials and Methods: The level of single and double strands breaks in the DNA was measured by the standard comet assay, after the oral administration of CYN-MC-LR (75 µg/kg + 750 µg/kg, 23.7 µg/kg + 237.3 µg/kg and 7.5 µg/kg + 75 µg/kg) in the liver, stomach and blood of male and female Wistar rats (7 weeks old).

Results: The data obtained for the standard comet assay did not show DNA strand breaks at any of the studied concentrations in any of the sexes.

Conclusion: In the present study, oral exposure to CYN-MC-LR mixtures did not induce genotoxicity by the Comet assay. However, additional tests are necessary to predict the genotoxic profile of these cyanotoxins.

Keywords: *Comet assay, Cylindrospermopsin, In vivo, Microcystin-LR, Wistar rats*

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TRANSCRIPTION FACTORS INVOLVED IN SUNFLOWER - BROOMRAPE DEFENSE RESPONSES

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Introduction: One of the most studied induced defense responses in plants is a systemic acquired resistance (SAR) its triggered by increases in salicylic acid (SA) level, as a result of local infection by certain phytopathogens (Durrant, 2004). Signaling transcription of a plant defense response involves more than 1500 transcript factors (TF).

Aims. The investigations were focused on the use of bioinformatics tools and data resources to elucidate a new aspects of defense responses mechanisms using the experimental model *sunflower (Helianthus annuus L.) – broomrape (Orobancha cumana Wallr.)* interaction.

Materials and Methods: The *sunflower* defense responses to *broomrape* infection have been analyzed for the *A. thaliana*. We have using *Orobancha Resistance* and *Sunflower Defensin* as key words for selection of candidate genes. Gene Ontology (GO) term enrichment was realized by DAVID program, according to their functions, processes and cellular localization. The Gene Network for was developed with GeneMANIA.

Results: The obtained list of genes contained multiple actors involved in to diminish excessive signaling on multiple levels. Gene particularly mediate the detection of *biotic stimulus, trigger the kinase-signaling cascade, ROS metabolism* or represents the important TF in defense responses.

WHY1 is a member of WHIRLY family, dually localized primarily in the chloroplast as well as in the nucleus. *WHY1* interact with the transcriptional coactivator *nonexpressor of pathogenesis-related genes1 (NPR1)*, which translocates into the nucleus when SA level increase. Thus, NPR1 is a key transcriptional coregulatory in plant defense responses (Despres, 2003). Recent evidence indicates that its interaction with TGACG motif-binding protein family, two of which *TGA2* and *TGA5* were found in our study. In addition, for this TF the interaction network was generated, to find the genes that are regulated.

Conclusion: The analysis of *WHY1*, *NPR1*, *TGA2* and *TGA5* regulation has revealed the genes with which they interact. This allowed us to extend and integrate previously published data regarding the role of SA in plant growth and development.

Keywords: *defense responses, WHY1, NPR1, TGA.*

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STUDY OF THE INFLUENCE OF LEAD MICROELEMENT ON THE PROCESS OF WATER ACCUMULATION IN (*PHASEOLUS VULGARIS*) PLANTS

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Introduction: Due to its high nutritive value, bean is an important vegetable, the high lead content in plants negatively influences germination and growth (Dobrota, 2012).

Aims: The aim of this research was to survey the influence of lead microelement regarding the quantity of moist and dried substance in the surveyed vegetative organs: roots and stems of *Phaseolus*.

Materials and Methods: The seeds of the Borlotti variety were soaked in each experimental variant: V1 – control (distilled water); V2 – 0.001% lead acetate solution; V3 – 0.005% lead acetate; V4 – 0.01% lead acetate and V5 – 0.1% lead acetate. The seeds were put in germinator, starting with the 8th day, 10 vigorous plantlets were taken from each variant; they were fixed in test tubes then allowed to grow for 14 days, after which the amount of moist and dried substance for the root and stem was determined in each variant. After the constant weight, average moisture and dry weight were calculated.

Results: The obtained results showed that, in high concentrations (0.1%), lead produces a strong inhibition of root growth through reduced plant material before drying 0.80g, compared to the control 3.76g. At this concentration, it is also observed the significant decrease of the vegetal material after drying 0.14g, in contrast to the control where it was 0.66g. As for the control, the value of the weight of the wet substance (3.76g) is 4 times higher than of the highest tested lead concentration. Analyzing the results for stem, the weight before drying was 3.21g for the control, for V2 (0.001%Pb) a small stimulation of growth of 3.45g, for V3 (0.005%Pb) it was 2.98g, leading to V5 (0.1%Pb) 0.85g.

Conclusion: Was noted that the control had a high quantity of humid substance, showing that the water contained in the vegetable material has a great importance in the growth of these organs. At 0.1% lead acetate we observed with a strong inhibition of growth.

Keywords: *growth, lead, seeds.*

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INFLUENCE OF INTERACTION BETWEEN THE NUMBER OF PLANTS ON ROW (B) AND THE DISTANCE BETWEEN ROWS (A) ON THE MASS OF *PRIMULA OFFICINALIS* HILL. PLANTS

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Introduction: *Primula officinalis* Hill. grows spontaneously in our country, being an endangered species as a result of unreasonable harvesting; it is necessary to cultivate it in the natural growth areas (Crăciun et al., 1977, Păun, 1995). This species (*Primula officinalis*) is under partial legal protection in Poland; the plant can be harvested from areas where the species is widespread, in low hill areas and in lower mountain areas (Zajac and Zajac, 2001).

Aims: Based on these considerations, we have conducted an experimental study to introduce this species (*Primula officinalis* Hill.) in to the field .

Materials and Methods: The research was carried out on the *Primula officinalis* Hill. spp. from the spontaneous flora, the plants were acclimated in the greenhouses of Medicinal and Aromatic Plants Laboratory from NIRDPSB Braşov. Research has begun by setting up a bifactorial experience, based on the randomized block model.

Results: The *Primula* plant mass in the three experimental years was influenced by both analyzed factors (A: distance between rows and B: distance between plants per row).

Conclusion: Under the climatic and soil conditions from NIRDPSB Braşov, *Primula officinalis* Hill species finds good growth and breeding conditions.

Keywords: culture, row, *Primula officinalis* Hill, technology.

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DIGESTIVE PATHOLOGIES CAUSED BY E.COLI BACTERIA IN NON-TREATED DAIRY PRODUCTS

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Introduction: At present, the world of bacteria is constantly growing and are the main cause of the outbreak of infections of different types and at different levels.

The microbiology of dairy products it is similar because they contain some of the microorganisms initially present in the milk from which they are made, it is special because dairy products can contain microorganisms that once existed in the milk from which they were made.

Aim: The purpose of this review was to summarize current possibility of contamination of milk and dairy products and human pathologies that may occur if these products are not treated properly

Material and Methods: Scientific literature was consulted for observation methods of contamination of milk and dairy products and thus the study will be carried out by cultivating on the culture media the products taken.

Results: In raw or pasteurized milk stored at 5°C it is not reported that it may grow E. coli, but may grow slowly at higher temperatures (1). However, because the infectious dose of this pathogen is considered to be very low, efficient pasteurization and prevention of post-process contamination are essential to ensure product safety. E.coli is considered a high risk potential pathogen in cheese, due to its unusual ability to tolerate low pH values for long periods and its association with unpasteurized milk.

Conclusion: Cultivation on culture media is one of the main analyzes that can be done in the laboratory to detect the contamination of milk and dairy products following the technological process of processing, treatment and packaging. Also on the culture media can be sown pathological products taken from patients who have specific symptoms of infection with microorganisms in dairy products.

Keywords: *contamination, dairy products, microorganism, milk, pathologies.*

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EXTRAFLOREAL NECTARIES AND THEIR ROLE IN DEFENSE – A SHORT REVIEW

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Introduction: Knowledge of plant defence systems against pests is crucial to understanding trophic relationships in terrestrial ecosystems. These defence systems can act both alone and combined during foliar germination. In most food chains, grazing insects are one of the main issues regarding crop survivability. Thus, it is not surprising that the pests have led to the evolution of a wide range of effective plant defence mechanisms, one of which is the extra floral nectaries. However very few studies regarding this subject have been conducted to date.

Aims: This paper aims to present a short review regarding the properties of extra floral nectaries and their role in defence.

Results

Conclusion: Plants defence mechanisms against pests are not limited to physical and chemical barriers that directly aim to affect attackers, thus becoming increasingly obvious that plants also use indirect defence strategies. The survival strategies of plants are associated with their secretory tissues in different environments, which probably result from the two evolutionary tendencies: one aimed at protection against pests and the other related to attracting pollinators.

Keywords: *defence mechanism, extra floral nectaries, plant pests*

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RELATIONSHIP BETWEEN NONDESTRUCTIVE AND DESTRUCTIVE DETERMINATION METHODS OF CHLOROPHYLL CONTENT IN SPRING WHEAT

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Introduction: Chlorophyll is the green pigment found in plants that allows them to convert sunlight into usable energy through a process called photosynthesis. More specifically, chlorophyll molecules are described as photoreceptors due to their light absorption properties. The leaf chlorophyll concentration is usually determined by extraction from leaf samples and subsequent spectrophotometric measurements (Porra et al. 1989). There are also more rapid methods for estimating the leaf chlorophyll non-destructively, in vivo. These methods exploit the optical properties of leaves and are based on the reflectance and/or absorbance of radiation by chlorophyll.

Aims: the objectives of this study are to establish a relationship between leaf chlorophyll concentration determinate through spectral reflectance and spectrophotometry method.

Material and Methods: two spring wheat variety was studied regarding the chlorophyll concentration during the vegetative growing stage. SG 106-01 and GK Tavaszi spring wheat varieties were grown in a controlled climatic chamber during Zadoks stage 0-59. The concentration of chlorophyll (Chl) content per unit area was estimated in attached leaves by taking MC-100 Chlorophyll Concentration Meter (Apogee Instruments, Utah, USA), meter readings were made every two weeks, leaves were subsequently harvested for spectrophotometric measurements.

Results: chlorophyll concentration range between 36.7 units of quantity per area of leaf surface to 408.1 for SG 106-01; and between 37.87 to 420.34 units for GK Tavaszi variety. Also, regarding the spectrophotometric measurements the chlorophyll concentration varied according to growth stage and genotype.

Conclusion: the results of the present study suggest that measurements with the MC-100 meter can offer a rapid, non-destructive and accurate estimation of Chl content in spring wheat leaves.

Keywords: *chlorophyll content, leaf, spring wheat*

EFFECTS OF RHIZOBACTERIA IN CONJUNCTION WITH MINERAL AND ORGANIC FERTILIZER ON ACID PHOSPHATASE ACTIVITY OF SOYBEAN UNDER LOW SOIL MOISTURE

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Introduction: Low plant-available phosphorus in the soil, associated with drought are major abiotic factors severely constraining crop production, especially in limited finite resources of the Republic of Moldova. The bioavailability of soil inorganic phosphorus in the rhizosphere varies considerably with soil edaphic factors as well as with microorganisms' application (1).

Objectives: The objective of the present study was to determine the acid phosphatase activity in leaves and contents of mobile phosphates in rhizosphere of soybean in relation to *Bradyrhizobium japonicum* inoculation alone or in combination with *Pseudomonas putida* together with mineral or organic fertilization under low phosphorous (P) and temporary drought.

Materials and Methods: A greenhouse experiment was carried out with rhizobacteria *B. japonicum* applied separately or in combination with *P. putida* in conjunction with mineral P (100 mg kg⁻¹ dry soil) and cow manure fertilization and two soil moisture regimes: 70% of whole holding capacity (WHC) as control and moderate water stress 35% WHC. Plants were subjected to water deficit at flowering stage for 12 days.

Results: The activity of acid phosphatase in leaves significantly increased during the drought stress. Under normal soil moisture, the combined application of both strains increased the APase activity in leaves compared to application of *B. japonicum* alone. The same trend was registered in treatment with integrated use of P fertilizer and rhizobacteria in similar water conditions. The combination of *B. japonicum* and *P. putida* improved the P availability in soil under well-watered conditions more effectively than single applications of *B. japonicum*. Rhizobacteria application in conjunction with manure did not affect significantly the studied traits.

Conclusion: Experimental results demonstrate that application of *B. japonicum* and *P. putida* has the potential to modify the acid phosphatase activities in soybean leaves and improved P availability in soil.

Keywords: *acid phosphatase, drought, phosphates, rhizobacteria, soybean.*

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DECOMPOSER PROFILE IN ROOT-SOIL INTERFACE – A SHORT REVIEW

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Introduction: The soil-root interface of plants is a unique habitat, root exudates stimulating the installation of active microbial groups. The requirement for nutrient solutions in rhizosphere leads to the emergence of competition for microbial colonization. In soils, the nutritional limitations of microbial groups are mainly due to nitrogen and carbon.

Aims: An assessment of the soil-plant-nutrient system is necessary to identify the potential for decomposition of organic matter in an ecosystem.

Materials and Methods: The systematization of information is based on existing research, by reviewing the literature and proposing new projections on the development of decomposition processes in relation to soil and rhizosphere.

Results: The internal circuit of the elements in ecosystems supports the natural fertility of soil, with climate acting to limit the activities of microflora and fauna. Compensation with organic fertilizers of nutrients removed through yield leads to the introduction into the ecosystem of an organic matter with different degrees of decomposition. Nutrient recirculation is the main microbial process in soil, especially mineralization of organic carbon through a variety of respiration and fermentation processes. The organic matter introduced post-harvest into ecosystem is degraded by 70% in the first year. The strategy of reaction of soil microorganisms to the limitations imposed by substrate availability is channelled either to a low affinity to the substrate, or to the efficient use of substrates completed by a reduced population growth.

Conclusion: The succession of the activity of microorganisms is due in particular to the climatic and nutritional conditions, with latency stages superimposed over strong proliferations, releasing metabolism products in soil in exchange for energy consumption.

Keywords: *microorganism, soil, nutrient recycling.*

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THE INFLUENCE OF CLIMATIC CONDITIONS UPON FOLIAR AND EAR DISEASES DYNAMICS IN AUTUMN WHEAT DURING 2015-2018 PERIOD

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Introduction: Wheat crops are damaged by numerous diseases which caused quantitative and especially qualitative yield losses under Transylvania conditions. The complex of foliar diseases: powdery mildew (*Blumeria graminis* f. sp. *tritici*), leaf and glume blotch (*Zymoseptoria tritici* and *Stagonospora nodorum*), rusts (*Puccinia* sp.) and tan spot (*Pyrenophora tritici-repentis*) as well as head blight (*Fusarium* spp.) and ears blackening (*Alternaria* and *Cladosporium*) are the most frequently in wheat crops. Yield losses reaching to 30% from yield value depend on climatic conditions and wheat cultivar (Nagy and Nagy, 2008).

Aims: The influence of climatic conditions on the foliar and ear diseases dynamics in autumn wheat.

Materials and Methods: An experiment was conducted at ARDS Turda, in the Phytopathology Laboratory, between 2015-2018, including three varieties of wheat, Ariesan, Andrada and Codru. During the growing season, in the main phenological phases of development, were made observations regarding the foliar and ear diseases.

Results: The climatic conditions of the experimentation period had influence upon development and manifestation of wheat diseases. As for the structure and percentage of the diseases, they differed from year to year and from one variety to another. Thus in all varieties the main disease present in the pathosystem was *Septoria tritici* blotch, which was reported in all varieties in all experimental years. Powdery mildew was the second disease, but with a lower intensity. Yellow rust (*Puccinia striiformis*) was reported in three of the four years studied. In the background of the foliage disease and under favourable climatic conditions, in all varieties, in the end of the vegetation period there was an attack of *fusarium head blight*, which affected the ears in percentages between 0.1-8%, depending on the variety, developmental phenophase and the climatic conditions.

Conclusion. The attack of pathogens, in the wheat culture, is greatly influenced by the temperature and rainfall regime during the vegetation period, the cultivated genotype and the source of the inoculum.

Keywords: *climatic condition, wheat, foliar and ear disease.*

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RECORDS OF *EQUISETUM* GENUS PRESERVED IN "ALEXANDRU BELDIE" HERBARIUM

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Introduction: *Equisetum* includes approximately fifteen species, being the only genus of Equisetopsida class. In addition, it contains vascular plants, being the only representative for this sub-division (Hauke, 1979). The evolution of these plants was thoroughly studied by botanists as they help in interpreting Equisetophytina fossils (Sphenopsida). "Alexandru Beldie" Herbarium was created in 1929 as is inscribed in Index Herbariorum. With approximately 40.000 vouchers, the herbarium has the BUCF international code (Dincă et al., 2018).

Aims: The purpose of the present study was to acknowledge the present state of *Equisetum*. Genus, as well as shortly describing its main species. Furthermore, a focus was placed on analysing the conservation methods as well as the periods in which these species were harvested.

Materials and Methods: The study material was comprised of 88 vouchers belonging to *Equisetum* Genus. Based on each voucher's identification label, an electronic data base was created, allowing for further investigations. At the same time, the conservation degree of each specimen was also appreciated and noted.

Results: Based on *Equisetum*'s inventory from "Al. Bedlie" Herbarium, 19 species were identified as belonging to this genus. The majority of recordings were found for *Equisetum arvense* (19 vouchers), followed by *Equisetum hyemale* (17 vouchers). Furthermore, four species were shortly described: *Equisetum pratense* Ehrh., *Equisetum limosum* L., *Equisetum hyemale* L., and *Equisetum arvense* L.

Conclusions: The *Equisetum* inventory has emphasised 19 taxons. Amongst them, *E. arvense* L. And *E. hyemale* L. have the largest percentage (30%). The vouchers were harvested between 1852-1993, with a geographical focus on our country, with the most prolific period between 1940-1949.

Key words: *Equisetum* Genus, conservation degree, vascular plant, taxon, voucher.

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THE BIOMASS QUALITY OF *SILPHIUM PERFOLIATUM* AND *HELIANTHUS TUBEROSUS* AS FEEDSTOCK FOR RENEWABLE ENERGY PRODUCTION

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Introduction: The mobilization of new perennial species that need less soil, water and energy resources and produce high biomass yield is important for the production of renewable energy and sustainability. The cup plant, *Silphium perfoliatum* and Jerusalem artichoke, *Helianthus tuberosus*, *Asteraceae* family, native to North America, are of particular interest.

Aims: The objective of this research was to evaluate some agrobiological peculiarities, the methane potential of preserved biomass and the quality of solid fuel – pellets from *Silphium perfoliatum* and *Helianthus tuberosus* plants.

Materials and Methods: The cv. “Vital” of cup plant, *Silphium perfoliatum* and cv. “Solar” of Jerusalem artichoke, *Helianthus tuberosus*, created in the National Botanical Garden (Institute), registered in the Catalogue of Plant Varieties and patented by the State Agency on Intellectual Property (AGEPI) of the Republic of Moldova, which were cultivated in the experimental plot of the NBGI Chisinau, served as research subjects. The green mass was harvested at the end of July, shredded and compressed in well-sealed containers. A rapid predictive method based on near-infrared spectroscopy (NIRS) was developed to measure ash, protein, acid detergent fiber, neutral detergent fiber and acid detergent lignin of plant materials. The biochemical biogas potential and methane potential were calculated according to the equations of Dandikas et al. 2014, based on the chemical compounds: acid detergent lignin and hemicelluloses. The dry biomass was mowed at the end of January, chopped and milled in a beater mill equipped with a sieve with diameter of openings of 6 mm, the pellets were produced using an equipment developed in the IAT “Mecagro”, Chisinau, an automatic calorimeter LAGET MS-10A with accessories was used for the determination of the calorific value.

Results: It has been determined that the silage prepared from *Silphium perfoliatum* and *Helianthus tuberosus* contained 9.9-12.6 % protein, 33.2-34.0 % cellulose, 18.1-20.0 % hemicelluloses, 5.5-6.3 % acid detergent lignin and 8.9-10.6 % ash. The specific methane production potential of *Helianthus tuberosus* silage was 284 l/kg, but *Silphium perfoliatum* biomass – 271 l/kg. *Helianthus tuberosus* stems defoliated faster than *Silphium perfoliatum* stems. The specific density of pellets reached 880-1038 kg/m³, the bulk density of pellets – 582-656 kg/m³. The *Helianthus tuberosus* pellets were characterized by high net calorific value of 17.7 MJ/kg and optimal ash content of 2.1 %, *Silphium perfoliatum* pellets – 17.2 MJ/kg and moderate ash content of 3.2 %.

Conclusion: *Silphium perfoliatum* and *Helianthus tuberosus* are promising multi-purpose feedstock for biofuel production under the conditions of the Republic of Moldova.

Keywords: energy biomass, *Helianthus tuberosus*, methane potential, quality of pellets, *Silphium perfoliatum*.

INDICATOR SPECIES FOR INTENSITY OF GRASSLAND MANAGEMENT

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Introduction: High phytodiversity systems are being abandoned, even if there exist support programs (like APIA) which subsidize extensive management in order to conserve and sustainably use these habitats. More and more research is being undertaken on the impact of the level of management intensity on the productivity and biodiversity of grasslands systems (REIF, 2008; HOFER, 2017) and especially on grasslands with a high nature value (HOFFMANN, 2017), while a current concern remains developing methods for evaluation and discovering indicators that can reveal the impact of management on grasslands (GOMEZ-SAL, 2017).

Aims: the elaboration of a list of species with indicator value for the intensity of organic fertilization.

Materials and Methods: both experiments were configured with the random blocks method in 4 repetitions, each block being 10 m². The organic fertilizer experimental variants were: V₁ - control; V₂ - 10 t/ha manure; V₃-20 t/ha manure; V₄-30 t/ha manure. The mineral fertilizer experimental variants were: V1 –control; V2 - 50N 25P₂O₅ 25K₂O; V3 - 100N 50P₂O₅ 50K₂O; V4 - 150N 75P₂O₅ 75K₂O.

Results: species with management intensity indicator value - based on the analysis of indicator species, the control's grassland type (*Festuca rubra* – *Agrostis capillaris*) had in its composition 17 species with indicator value (*Anthoxanthum odoratum*; *Cynosurus cristatus*; *Festuca rubra* etc). Most species in this group are oligotrophic or oligo-mesotrophic. The *Agrostis capillaris* - *Festuca rubra* (V2) grassland type has in its floristic composition 4 species with indicator value (*Lotus corniculatus*; *Trifolium pratense* etc.). These species are mesotrophic. In the composition of the *Agrostis capillaris* - *Trisetum flavescens* cod. *Centaurea pseudophrygia* (V3) grassland type there were 3 species with indicator value (*Centaurea pseudophrygia*; *Pimpinella major* etc.). These species also have mesotrophic characteristics. The *Agrostis capillaris* - *Trisetum flavescens* (V4) had 8 indicator value species (*Agrostis capillaris*; *Dactylis glomerata* etc.).

Recommendations: the indicator value species identified and presented here can be taken under consideration by the Ministry of Agriculture and APIA in order to elaborate a methodology for evaluation and subsidization with the aim of protecting and conserving landscape biodiversity in the Apuseni Mountains.

Keywords: *oligotrophic grasslands, organic fertilization, indicator species.*

RESPONSE OF SEVEN WINTER WHEAT GENOTYPES TO PLANT GROWTH REGULATORS AND INCREASED NITROGEN APPLICATIONS

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Introduction: The rate of nitrogen fertilization is the most important factor for plant growth and development which can increase yield and grain quality assurance. But the high rates of applied nitrogen fertilizer combined with high precipitations favor stem elongation and increase risk of cereal lodging. Plant growth regulators (PGRs) are widely used for lodging control in winter wheat grown at high nitrogen rates.

Aims: A field experiment was conducted during 2015-2016 winter wheat growing season at Agricultural Research and Development Station Turda to evaluate the effect of PGR on plant height, lodging, internodes length, grain yield and grain protein content of seven winter wheat genotypes tested at different rates of applied nitrogen fertilizer, in combination with foliar treatment with trinexapac-ethyl- based Plant Growth Regulator sprayed over the foliage.

Materials and Methods: The experimental design consists in subdivided plots in a three factorial experimental system. Before sowing the wheat, nitrogen and phosphorus fertilizers were applied. Beside the fertilization applied in autumn nitrogen fertilization was applied on crop at boot stage (BBCH 40-49) at different rates: 0 kg N ha⁻¹ (control), 50 kg N ha⁻¹, 100 kg N ha⁻¹, 150 kg N ha⁻¹. The PGR foliar treatment included trinexapac-ethyl (0,4l/ha) sprayed over the foliage at second node visible stage (BBCH 32).

Results: Results showed that high rates of applied nitrogen fertilizer increased the risk of cereal lodging. The PGR application on wheat cause shorter plants (internodes) and less lodging. PGR applications significantly reduced lodging but didn't necessarily completely eliminate it. On yield and grain protein content nitrogen fertilization had a bigger influence than the trinexapac-ethyl treatment.

Conclusion: Winter wheat height was significantly influenced by PGR treatment. Reduction in plant height as a consequence of PGR treatment is associated with the reduced elongation of internodes. PGR treatment improved the crop resistance to lodging.

Keywords: *nitrogen fertilization, PGR, winter wheat.*

VEGETATIVE AND SYMBIOTIC TRAITS OF LEGUMINOUS DUE TO APPLICATION OF MICROBIAL BIOPRODUCTS

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Introduction: Legumes are important crops for both food and forage production as well as agronomic improvement of soil properties. They have a high plasticity, a great spread worldwide, and base their majority of nitrogen consumption on their symbiosis with rhizobia and mycorrhizal fungi. Organic nitrogen left by leguminous plants gradually mineralizes and feeds post-emergence crops throughout their vegetation.

Aims: Evaluation of the growth and development of plants, respectively of the presence of mycorrhizal symbionts in the roots of peas, beans and soybeans under controlled conditions and in field trials.

Materials and Methods: A short-term experiment was set up under controlled soil and field conditions to assess legumes growth due to the application of microbial active bioproducts.

Results: The dynamics of vegetative parameters indicate a stronger overgrowth of soybean and bean plants compared to peas. Reports of aboveground and belowground development are in favour of soybean, while minimum values are observed in beans. This aspect indicates a balanced development of the bean compared to the other plants.

Conclusion: Microbial consortia work towards a stronger plant growth compared to monospecific bioproducts that are directed to a single species.

Keywords: *Legumes, agronomy, bacteria, growth*

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ROOTING EFFICIENCY RESEARCHES FOR THE *CAMPSIS* *RADICANS* SPECIES USED FOR IMPROVING SLOPES

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Introduction: *Campsis radicans* (trumpet creeper) is native to the southeastern part of the United State, being a perennial woody vine with showy red-orange flowers that are attractive to hummingbirds (Streiner, 2006). Trumpet creeper is also effective in holding eroding soil on steep slopes (Wasowski Sally and Wasowski, 2003).

Aims: The main objective of the study is determination the *Campsis radicans* growing, the species being used for the eroded slopes.

Materials and Methods: For this study were collected 80 cuttings by *Campsis radicans* and there were put in a peat and perlite substrate. The plants were placed in the greenhouse. The experiments were performed during three years (2016-2018). The determination about cutting height and annual growing was made. In 2018 it was used a treatment with a rooting hormone named Radistim.

Results: In 2016 an average growth of 2.7 cm was recorded and the percentage of rooting was 23.75%. In 2017 an average growth of 6.8 cm was recorded and the percentage of the rooting is 28.75%. In 2018 the recorded average growth was 11cm, with a percentage of rooting of 60%.

Conclusion: The highest number of the cutting rooted was done at cutting introduced in Radistim with a percentage of 60%.

Keywords: cutting, land degradation, slope

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ASSESSMENT OF BIOMASS PRODUCTION ON PASTORAL MEADOWS IN THE GUTAI MOUNTAINS

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Introduction: The meadows in the Gutai Mountains contain species of plants that are important for fodder, being an integrated part of the pastoral system in the region. However, it is essential to establish a system of the resource assessment, because, in recent years, there have been pressures due to the climate change which affects the species composition, their diversity, and biomass production (Pacurar *et al.*, 2014).

Aims: This study aims to evaluate the botanical composition and the biomass production of the mountain meadow, as it has been exploited three months a year.

Materials and Methods: The studied zone is being exploited by sheep and goat breeders. The measurements were performed during three years, in summer time. Plant biomass was determined by the gravimetric method, after repeated mowings of 1 sqm lawn, several times.

Results: The floral composition has shown that the pasture is characterized by an average level of pastoral flora diversity; those herb communities mainly belong to *Viola declinatae-Nardetum*. The determination of green mass production was established for an average of 11.6 t/ha and refusals represented 6.15 t/ha. By empirical calculations we established the consumable production of 5.54 t/ha. These values of biomass production can be explained by the continuous exploitation of the pastoral resources, which affects the biodiversity.

Conclusion: Our results show a drop in the consumable biomass due to the grazing animals in the area, thus the local animal breeders should adopt an appropriate plan to allow the regeneration of pastoral meadows in the Gutai Mountains.

Keywords: *biomass production, meadows, pastoral.*

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SESSION 2: ENVIRONMENTAL PROTECTION

INFLUENCE OF ORGANIC FERTILIZATION ON NUTRITIONAL CHARACTERISTICS AND ANTIOXIDANT ACTIVITY OF MELON FRUITS

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Introduction: In recent years organic fertilization has been used to increase crop productivity and yields. Its application is usually associated with improved soil fertility and soil health. Fruits are basic part of healthy diet and good source of vitamins, minerals, micro nutrients and natural antioxidants. As they containing many different antioxidant components may provide protection against free radicals and are associated with health-promoting properties and decrease of oxidative stress.

Aims: The aim of the current study was to investigate the influence of organic fertilization on nutritional characteristics and antioxidant activity of three melon varieties fruits (*Cucumis melo* L.) - Hybrid 16, Dessert 5 and Galia.

Materials and Methods: The trials were carried out during the period April-August 2015 under greenhouse conditions in the infested with root-knot nematodes soil. The melon variety Galia have been grown with mineral fertilization, while the other two melon varieties with organic fertilizers - liquid “Humus Active” were applied during vegetation and Neem cake twice - before planting and during flowering. The dry matter and ash, carbohydrate, protein and lipid content, titratable acidity (TA), pH, the total phenols and total flavonoids, carotenoids and the antioxidant activity were determined and compared.

Results: The sugars and ash content also strongly varied among studied samples. Hybrid 16 and Dessert 5 melon varieties could be considered as high the richest source of sucrose, glucose (G) and fructose (F) as F/G ratio was 0.47. The highest carotenoids, total phenols and total flavonoids content were found in melon Dessert 5 - 6.3 mg/100 g fresh weight (fw), 540 mg GAE/100 g fw and 73 mg QE/100 g fw, respectively. This variety possessed the highest antioxidant activity evaluated by DPPH assay – 20 mM TE/100 g fw. Thus, the results revealed that quality and nutritional value of melon fruits could be improved by applying of organic fertilization for production of foods for human healthy nutrition.

Conclusion: The study demonstrated the influence of organic fertilization on the physico-biochemical attributes with emphasis on the nutritional potentiality of different varieties of melon. The results indicated that studied fruits are a rich source of carotenoids, sugars and total phenols, especially Dessert 5. These results also support the concept of fertilization of melon fruits that strongly inflated the accumulation of biologically active substances in melon fruits and improved their nutritional properties.

Keywords: *antioxidant activity, melon varieties, organic fertilization.*

CULTURAL ECOSYSTEM SERVICES - CULTURAL AND ECONOMIC PERCEPTION OF STAKEHOLDERS – CASE OF BULGARIA

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Introduction: Ecosystem Services - briefly presenting all possible human benefits, identified in several major groups. Cultural services as a part of them represent intangible benefits of ecosystems related to their aesthetic and recreational value, their spiritual characteristics, their educational value, and the creation of an environment for the development of the spirit. Relationship between culture and nature is very important for sustainable agricultural practices and rural landscapes maintenance, cultural ecosystem services (CES) are perceived strongly by local communities because they are identified with place of living and cultivation of land.

This investigation is in the frame of project STACCATO.

Aims: The aim was to obtain data on CES perceived by farmers and local residents, based on a raking from 1 to 10 in the Questionnaire To assessment cultural ecosystem services and land-use management changes (LUMC) in selected regions in Bulgaria.

Materials and Methods: Case study regions for the assessment of cultural ecosystem services were selected and core issues of interest identified. A Questionnaire was developed for the evaluation of stakeholders' acceptance of cultural ecosystem services, and for the documentation of site characteristics (land management system) as well as social and economic structures of land use (e.g. ownership patterns, export orientation, demographic change). The survey was conducted from April to December 2016 in 11 different villages, in two different provinces: South-Central and South-East Bulgaria

Results: Different Structure generating systems can be divided in agricultural landscapes: agricultural heritage systems, mosaic elements and semi-natural landscapes, depending on local environmental conditions for example or traditions related to farming activities of a given place (Fischer and Eastwood, 2016; Hanaček and Rodríguez-Labajos, 2018). All four categories of ES provided by agroecosystems were found to be perceived by all three stakeholders' groups at the regional level - Ecologists and NGOs, Authorities, Experts and Technicians, Farmers. Cultural services are dominantly perceived by authorities, technicians and agricultural experts with 56% and farmers with 51%. Ecologist and NGO's perceived CES with 31%, in lower degree when compared to other user groups.

Conclusion: The results shows that birthplace, sense of belonging, connection with nature, transmission of knowledge from generation to generation are the most important cultural ecosystem services on investigated villages in Bulgaria

Keywords: *Bulgaria, Cultural Agroecosystem Services, stakeholders.*

STUDY ON FORESTRY SECTOR. ANALYSIS OF CURRENT NATIONAL STRATEGIES

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Introduction: The functions and the impact of the forests on Romania's sustainable development also take into account their role of protection (correction of torrents in the forest fund, establishment of forest protection curtains, a forestation of degraded lands and soil stabilization etc.), the role of forests in mitigating climate change, And cultural role, the role of producing energy resources - biomass, etc.

Aim: Following the United Nations Environment and Development Conference in Rio de Janeiro (1992), international attention has been paid to the National Forest Programs (NFPs), which are considered an effective tool for solving major forest problems both in developing countries and from developed countries around the world.

Material and Methods: Many of the subsequent documents of the Inter-governmental Forestry Board (IPF) and the Intergovernmental Forum on Forests (IFF) refer to the development and implementation of national forest programs.

Results: The National Forestry Strategy 2018-2027 complies with the principles of sustainable development and has the role of providing landmarks and predictability to the forest for the next 10 years. Its elaboration does not take place in isolation but as a result of an open and participatory process in the context of national, European and international realities.

Conclusion: Treaties signed between EU countries do not specifically mention forests, so the EU does not have a common forestry policy. Therefore, forestry policy remains a national competence in particular. However, many European actions have an impact on forests in the EU and third countries.

Key words: *forest fund, forest programs, action plans, regulations.*

THE DIFFERENCES BETWEEN HALOPHYTE SPECIES GROWN IN DIFFERENT SOILS USING IMAGING SOFTWARE TOOLS

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Introduction: Today, the entire world is facing with the response of the nature to anthropic factors, also called climate change. Thereby, the impact of climate change is manifested globally, in all areas and sectors, including agriculture. This, as the main food supplier, is strictly dependent on the quality of the soil resources, which is in a continuous depreciation.

Aims: The aim of this paper is to present some biometric data of leaves and roots of *Amaranthus* sp., *Limonium* sp., *Portulaca* sp., *Festuca* sp. grown in greenhouse conditions, on different types of soil, with pH and conductivity known in order to establish plant adaptability for soil remediation.

Materials and Methods: The seeds were sowed in January in pots, and after five months leaves and roots of the plant species were analysed. *Amaranthus* sp., *Limonium* sp., *Portulaca* sp., *Festuca* sp. were sowed in following soils: saoil from Dâmbovița county (S1), soil from Ialomița county (S3), and soil from Lacul Sarat (S2), Brăila county.

For morphological analysis of leaves and roots two equipments were used. WinFOLIA is a computer image analysis system that accurately do morphological measurements on broad leaves. It comprises hardware for image acquisition (scanner or digital camera and accessories) and a computer program, WinFolia, specifically designed for leaf area, morphology and disease analysis. Different configurations are offered in function of measurements, speed, accuracy and portability.

WinRhizo is an image analysis system specifically designed for root measurement in different forms. It can do morphology, topology, architecture and color analyses. It is made of a computer program and image acquisition components.

Results: According to the analyses carried out, it was found that on the soil S1 *Portulaca* species developed better than on the soil S3. As for the *Festuca* species, both the roots and the leaves were larger on soil S3 than on soil S1. In the same way as *Festuca*, the *Amaranthus* species was highlighted, on S3 both the roots and the aerial part were more developed. There were no significant differences in the case of *Limonium* sp.

The results were related to those obtained from scanning the leaves and roots of plants grown on peat and pearl substrate.

Conclusion: The substrate influenced the growth and development of the halophytes plants. Between species, *Limonium* sp. and *Portulaca* sp. showed good adaptability on salinity. None of the plant species developed on soil S2.

Keywords: *climate changes, conductivity, pH, salinity.*

ENHANCING ENVIRONMENTAL TEACHING EFFICIENCY IN HIGHER EDUCATION INSTITUTIONS

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Introduction. The higher education institutions specialized in environmental engineering issues, should promote suitable study conditions for students, in order to successfully complete the studies in a suitable period of time, without obstacles related to the socio-economic context.

Aims. The aim of this research is to emphasize solutions for achieving performance in higher education in the field of environmental engineering.

Materials and Methods. The study of the receptivity trait included in a SERVQUAL study was implemented in order to appreciate the quality assurance in the Environmental Engineering Department from the University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca from the Ist year students' point of view, analyzed from this perspective. The questionnaire methodology was applied, together with factorial analysis.

Results. The size of the receptivity, according to the SERVQUAL methodology, has as main components, the availability of the university to provide the didactic service and professionalism of the university manifested in offering the didactic service. The factorial analysis applied to the study of the expectations of the students, generated, according to the expectations four main components, of which, only two factors are important. It is about promoting by teachers a sustained and efficient learning style with the opportunity to occupy a job corresponding to its preparation and adapting the information taught to the level of understanding of the students regarding the acquisition of knowledge.

Conclusion. The analysis of the expectations-perceptions matrix regarding the receptivity component of the learning process, shows that in the first year of studies there are no high expectations for any attribute. For providing support, counseling and help to students and expectations are low, but also the perception only satisfactory.

Keywords: *factorial analysis, matrix, questionnaire, receptivity.*

THE INFLUENCE OF NANOPARTICLES BASED ON Cu AND Ti ON BIOACTIVE COMPOUNDS FROM WHEAT

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Introduction: The toxic effects of some chemical like heavy metals have been deeply investigated in the last years. The plants response to stressors depends on many factors (sensitivity of plant species, stress intensity, time of their action, temperature, light intensity or many other environmental factors).

Aims: The purpose of the research was to grow wheat in the presence of nanoparticles based on copper and titanium and to determine their influence on plants.

Materials and Methods: The nanoparticles based on copper and titanium were prepared in laboratory by chemical procedure and green chemistry (using blackthorn extract). Predetermined quantities of these nanoparticles were mixed with the soil growth plants. 50 seeds of wheat have been sown in each pot. Pots thus prepared were placed into a growth chamber at controlled conditions for humidity and temperature. Plants were harvested at various stages of maturity. All the experiments were made in triplicate and the averages and errors were calculated. On the harvested plants we determined the bioactive compounds and the content in the inorganic elements using UV-VIS spectroscopy and neutron activation analysis.

Results: The results obtained show that TiO₂ nanoparticles have the highest influence on bioactive compounds from wheat, follow by nanoparticles based on copper obtained with blackthorn extract. The smallest influence on wheat growth was observed for CuO nanoparticles prepare by chemical procedure. The results were compared with those obtained for control plants and it was observed that the quantity of chlorophylls decreased in treated plants and the antioxidant capacity increased in these.

Conclusion: In the present research work, we demonstrated that the nanoparticles of metal oxides influence the plants development and composition.

Keywords: *nanoparticles, neutron activation analysis, plants.*

Acknowledgments: This work was carried out in the framework of Romanian-JINR cooperation (Order 395-30/27.05.2019; 396-55/27.05.2019 and Order 397-57/27.05.2019) and we thanks also to Ministry of Research and Innovation, CNCS – UEFISCDI, project number PN-III-P1-1.1-PD-2016-0484, within PNCDI III.

OPTIMIZATION OF BIOACTIVE COMPOUNDS EXTRACTION FROM GARLIC FOR IMPROVEMENT OF ANTIOXIDANT AND ANTIFUNGAL PROPERTIES

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Introduction: Garlic (*Allium sativum* L.) is one of the most important species of the *Allium* genus, known for centuries as important food flavoring agent with recognized medicinal properties. Several studies revealed that garlic, one of the ancient plants possessing many therapeutic properties, has antimicrobial activity against bacteria and fungi (Barreto Pinilla et al., 2019).

Aims: The purpose of the research was to obtain a garlic extract rich in bioactive compounds with antioxidant and antifungal properties.

Materials and Methods: 1 g of garlic bulbs, grated, was sonicated with different mixture between ethanol - water. In order to optimize the extraction method of bioactive compounds by ultrasound extraction, the Box-Behnken experimental design obtained using the Minitab 17 program was used. The variables optimized were the extraction time (30-60 min), the temperature (40-60°C) and the ethanol concentration (60-100%). The obtained extracts were filtered and stored at 4°C until analysis. The antioxidant activity of these extracts and antifungal properties were determined.

Results: The garlic extract with the highest antioxidant activity was obtained at 50°C by ultrasound assisted extraction for 30 minutes using ethanol - water extraction solvent in a ratio of 60 : 40 (v/v). This extract was tested on 10 strains of *Candida albicans* isolated from patients and on a strain of *C. albicans* ATCC 10231. The Minimum Inhibitory Concentration was 1.5625% for 7 *Candida* strains, including ATCC strain, and 0.78125% for the other 4 of the 11 tested *Candida* strains. Also, the Minimum Fungicidal Concentration was determined as being 3.125% for 7 *Candida* strains and 6.25% for the other 4 of the 11 tested *Candida* strains.

Conclusion: The garlic extract obtained at 50°C by ultrasound assisted extraction for 30 minutes using ethanol - water (60 : 40, v/v) showed the highest antioxidant activity and antifungal properties.

Keywords: antifungal property, antioxidant activity, bioactive compounds, extraction, garlic.

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WOOD PASTURES TO PREVENT SQUIRREL DAMAGE

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Introduction: The Burnham Beeches nature reserve in Buckinghamshire, UK, boast a large number of *Fagus* pollards. It is one of very few places in Europe where this technique of polling beeches still exists. Since a few decades, these trees suffer severe damage caused by the grey squirrel (*Sciurus carolinensis*), an invasive species in English forests since the early 20th century. Intensive (but expensive) programs to fight this pest exist, but mostly with a focus on reducing squirrel population densities, rather than preventing gnawing damage to trees.

Aim: The Burnham Beeches forest consists of several different types of woodland and forest, with some big differences in management. This study examines if there is a relationship between the woodland management and squirrel damage. If there is proof that some parts of the area show less squirrel damage, the management as in these parts could be suggested as a measure to prevent the damage.

Materials and Methods: In Burnham Beeches, 252 *Fagus sylvatica* pollard trees were identified. For these trees the most common tree properties and location coordinates were recorded, as well as the intensity, distribution and overall amount of squirrel gnawing damage. After intensive field- and GIS work, statistical factor analysis was conducted on the data.

Results: Results show a distinct correlation between the location of the pollards and the squirrel damage. Trees near busy spots in the forest (e.g. the car park) show less damage, but less damage is also noticed in those woodland areas where the beech trees are located further apart. The old cultural landscape called *wood pasture*, a combination of (open) shrub land and woodland with grazing, showed least damage.

Conclusion: Of course still other factors (such as tree species preference) need to be investigated on their effect on the squirrel damage, but from this study, managing a natural forest reserve as a wood pasture, may not only conserve some English cultural heritage, it might also be an interesting instrument in the prevention of damage caused by the invasive grey squirrel.

Keywords: *beech pollard, gnawing damage, grey squirrel, wood pasture*

STUDY CONCERNING THE NUTRITIONAL VALUE OF ALFALFA IN SPECIFIC CLIMATIC CONDITIONS OF ALFALFA PRODUCTION

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Introduction: The nutritional value of alfalfa is one of the most valuable source for cattle feeding, even in cold seasons, when it may also be used as silage. For this reason the nutritionists' preoccupations towards improved preparation technologies of silage destined to ruminants, and to cattle, in particular, is an important option. Alfalfa is one of the most valuable nutritional source for cattle stocks, and alfalfa silage, also, if appropriate technology of preparation is adopted.

Aims. The aim of our study is to emphasize the crude chemical composition of alfalfa, used as cattle fodder, obtained in specific climatic conditions.

Materials and Methods: Our experiment was carried on two private farms located in Cluj and Alba Counties, in the year 2018. Silage was analysed taking into consideration the quantification of the main traits, in the Laboratory of forage quality analysis of the Faculty of Agriculture, from the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca. Climatic conditions were also recorded.

Results: Our study led to results that emphasize that alfalfa crude chemical composition, represented by crude protein, crude fat, crude cellulose and ash show high nutritional value. The climatic conditions recorded within our experiment, meaning environmental temperature, relative humidity, precipitations regimen and wind velocity framed in normal limits in studied season.

Conclusion: The conclusions of this study show that alfalfa crude chemical composition emphasize its important nutritional potential for livestock, in specific climatic conditions of Transylvania, Romania.

Keywords: *ash, fiber, fat, protein, quality.*

FROM WASTE TO VALUE IN A CIRCULAR ECONOMY. COMPOSTING AS A CHOICE IN FOR BIOWASTE VALORIZATION

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Introduction: Biowaste represents between 20%-60% of the solid municipal waste in EU. At the same time, only 25% of the biowaste in EU is effectively recycled into high-quality compost and digestate (Siebert, 2016), even if overall the share of recycled and composted waste together has increased from 17% to 46% at EU level between 1995 and 2017 (Eurostat, 2019). Most of household biowaste is food waste and approximately 65% of food waste is considered unavoidable (e.g., bones, potato peel, eggshell) (Schott and Andersson, 2015).

Aims: The aim of the project is to contribute to circular economy through households' involvement in biowaste composting. The general objective of the research is to investigate the determinants of household composting choice. Thus, the study will also highlight motives and barriers to biowaste composting in order to find solutions for the effective stimulation of household pro-composting behavior.

Materials and Methods: Household member beliefs, concerns and behaviours are investigated through a survey using a structured questionnaire.

Results: The transition to a circular economy requires the change of traditional production and consumption patterns and of people's values and understandings of key concepts such as waste, resources, and responsibility as citizens, consumers, and business actors. Therefore, it is necessary to increasingly integrate social and economic sciences research in the solutions required to build the circular economy. The main barriers against composting revealed by the study are path-dependency, lack of perceived benefits and difficulty in sorting waste categories.

Conclusion: The study results can enhance the efficiency of biowaste management efforts, by adding the household perspective. This component is indispensable in any coherent waste management strategy and it is often marginalized in projects that focus with priority on technical aspects.

Keywords: *Biowaste, composting, household members attitude.*

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THE INVENTORY OF LARGE CARNIVORES AND CONFLICT AVOIDANCE MEASURES FROM NATURA 2000 SOMEȘUL RECE

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Introduction: Someșul Rece, as a protected area, occupies an area of 8,529 ha (85.29 km²) and is part of the Natura 2000 network of protected areas, which is the main tool of the European Union for preserving the natural state of different habitats. Field studies have led to the identification of the following species of community interest: *Ursus arctos*, *Canis lupus*, *Lynx lynx* and *Felis silvestris*.

Aims: The main purpose is to inventory and evaluate the conservation status of species of community interest.

Materials and Methods: For the inventory of mammals we used the classic methods of identification, namely the method of cameras, direct observations, the method of questionnaires and transects. The main conservation measures for mammals are represented by:

- avoid habitat fragmentation by building roads or other barriers;
- rational management of the trophic base represented by wild herbivores in the case of large carnivores;
- elimination / reduction of poaching and control of hunting activities, etc.

Results: Following the transects carried out in the site, the satisfactory presence of *C. lupus*, *L. lynx* specimens, the frequent presence of *Felis silvestris* specimens was identified. Other mammalian species present in the site were the bear, the boar, the deer and the otter.

Conclusion: As far as large carnivores are concerned, the Someșul Rece site is too small to draw a conclusion on their conservation status, but the results of the inventory lead to the conclusion that the number of bear, wolf, rays shows a satisfactory presence in site.

Keywords: *carnivores, conservation measures, inventory, Natura 2000 site.*

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MODELLING THE DYNAMICS OF SEMI-VOLATILE ORGANIC COMPOUNDS FOR ENVIRONMENTAL RISK ASSESSMENT

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Introduction: Environmental pollution occurs mainly due to wastewater discharges and diffuse emission sources. Chlorobenzenes are ubiquitous chemical contaminants due to their widespread use. Hexachlorobutadiene (HCBd), is considered to be a persistent chemical, meanwhile Hexachloroethane (HCE) is listed as potentially carcinogenic (Fuerhacker, 2009). Environmental models are used to predict the chemical behavior in various environmental compartments (ECs).

Aims: This work focuses on a fugacity model (FM) useful to assess the bio-concentration factors that relates the pollutants concentration from ECs.

Materials and Methods: The analytical investigation of four semi-volatile organic compounds from Olt River (HCE, HCBd, 1,2,3-Trichlorobenzene (1,2,3-TCB) and 1,2,4-Trichlorobenzene (1,2,4-TCB)) was performed using a Gas Chromatograph coupled with a Mass Spectrometer of 240-MS 450 GC Varian. These pollutants were considered as input data to assess their transfer between ECs. Computational work was carried out with QSAR Toolbox v4.3 using a Level III FM, a direct adaptation of Mackay's model (Mackay et al., 1996), which provides a database of environmental properties.

Results: In water, concentrations of HCE, HCBd, 1,2,3-TCB and 1,2,4-TCB had values below the limit of quantification of the measurement method, while values in the sediment were found not exceeding the maximum admissible values (Directive 2008/1/EC). The Level III FM predicted the partitioning of pollutants among various ECs under steady state conditions.

Conclusion: In this research work, we were able to assess the environmental transfer of considered pollutants, gaining conclusive indications for environmental risk assessment.

Keywords: *fugacity, pollutants, QSAR.*

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THE CORRELATION BETWEEN WINDTHROWS AND PROGNOSIS OF THE IPIDEA ATTACK INSIDE AND OUTSIDE OF PROTECTED AREAS FROM MARAMURES COUNTY

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Introduction: According to recent researches, climate changes illustrate one of the greatest challenges and the biggest social issue that humanity has ever had.

Aim: The aim of this paper is to monitorize the attack of *Ips typographus* and to create a correlation with the windthrow that took place inside and outside of protected areas from Maramures county.

Material and Methods: We intend to make a forecast, and also to study the imbalance created in the protected areas and its impact on the habitats and priority species.

Results: The windthrows are also a consequence of climate changes. This phenomenon causes mechanical damage that affects trees, being the result of wind action. As a result of this phenomenon the spreading of pests is favoured, leading to a decrease of economical point of view and the productivity of the trees. The European spruce bark beetle (*Ips typographus*) is one of the most dangerous pests, causing great damage to softwoods.

Conclusion: The area where the study is conducted is represented by the Forests of Maramureș County. In order to achieve the proposed objectives, we have merged the field visits to the places affected by the windthrow with a thorough documentation at the Maramures Forestry Department.

Key words: *Ips typographus*, Maramures county, protected areas, windthro.

SESSION 3: FOOD SCIENCE AND TECHNOLOGY

DNA EXTRACTION FROM POLLEN IN HONEY FOR MOLECULAR ANALYSIS

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Introduction: The study of pollen (palynology) finds important application in the analysis of honey. This application is called melissopalynology and it is based on microscopic analysis, aiming at identifying the taxonomical origin of pollen. Molecular analysis can also be performed for complementing the information provided by the previous method or when other type of information is needed, *e.g.* detecting the presence of GM pollen. The major drawback in performing molecular analysis is the low efficiency of DNA extraction.

Aims: The aim of this study was to test and optimize a protocol for the extraction of the DNA from pollen in honey.

Materials and Methods: Two already published CTAB-based methods were selected and tested for DNA extraction from pollen in different types of Romanian honey samples. Their performance was evaluated spectrophotometrically, by agarose gel electrophoresis and by PCR. DNA extraction from fresh pollen, obtained directly from flower anthers, was used as reference. A preliminary microscopic analysis of honey was also performed, in order to assess the presence and quantity of the pollen.

Results: The modifications made to the method published by Pop *et al.* (2003) facilitated the recovery of sufficient DNA, both from pollen in honey and from fresh pollen. PCR analysis confirmed the presence of amplifiable plant DNA.

Conclusion: The variant of the DNA extraction method published by Pop *et al.* (2003), that we propose here, can be employed successfully for obtaining amplifiable DNA needed for molecular analysis in melissopalynological certification, testing for GM pollen and in monitoring the risk of allergies associated with pollen.

Keywords: CTAB, DNA extraction, honey, molecular analysis, palynology

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INFLUENCE OF ORGANIC FERTILIZATION ON NUTRITIONAL CHARACTERISTICS AND ANTIOXIDANT ACTIVITY OF MELON FRUITS

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Introduction: In recent years organic fertilization has been used to increase crop productivity and yields. Its application is usually associated with improved soil fertility and soil health. Fruits are basic part of healthy diet and good source of vitamins, minerals, micro nutrients and natural antioxidants. As they containing many different antioxidant components may provide protection against free radicals and are associated with health-promoting properties and decrease of oxidative stress

Aims: The aim of the current study was to investigate the influence of organic fertilization on nutritional characteristics and antioxidant activity of three melon varieties fruits (*Cucumis melo* L.) - Hybrid 16, Dessert 5 and Galia.

Materials and Methods: The trials were carried out during the period April-August 2015 under greenhouse conditions in the infested with root-knot nematodes soil. The melon variety Galia have been grown with mineral fertilization, while the other two melon varieties with organic fertilizers - liquid “Humus Active” were applied during vegetation and Neem cake twice - before planting and during flowering. The dry matter and ash, carbohydrate, protein and lipid content, titratable acidity (TA), pH, the total phenols and total flavonoids, carotenoids and the antioxidant activity were determined and compared

Results: The highest carotenoids, total phenols and total flavonoids content were found in melon Dessert 5 - 6.3 mg/100 g fresh weight (fw), 540 mg GAE/100 g fw and 73 mg QE/100 g fw, respectively. This variety possessed the highest antioxidant activity evaluated by DPPH assay – 20 mM TE/100 g fw. Thus, the results revealed that quality and nutritional value of melon fruits could be improved by applying of organic fertilization for production of foods for human healthy nutrition.

Conclusion: The results indicated that studied fruits are a rich source of carotenoids, sugars and total phenols, especially Dessert 5.

Keywords: *antioxidant activity, melon varieties, organic fertilization*

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EARTHWORMS *EISENIA FETIDA* (SAVIGNY, 1826) AS SOLUTION FOR VALUATE THE CHERRY FRUITS WASTES: EARTHWORM CASTS ANALYSIS

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Introduction: The management of food wastes using earthworms represents a successful option for many types of food rests (fruits, vegetables, meat, eggs etc.) (Jyoti and Seema, 2014). The earthworm species *Eisenia fetida* is a widely used species in the process of converting food wastes into valuable products, through the process of vermicomposting (Asadollahfardi *et al.* 2012; Bhat *et al.* 2015).

Aims: The main objectives of this study were to show that wastes like decomposed fruits of *Prunus avium* L. (cherries) can be introduced in the diet of earthworm *Eisenia fetida* (Savigny 1826) (red wiggler worm), resulting after the digestive process valuable earthworm casts with role in improving the quality of soil.

Materials and Methods: The experiment has been carried out as microcosm experiment. The earthworms *Eisenia fetida* were fed with decomposed fruits of cherry (chopped fruits of cherry kept for two days at room temperature). Earthworm casts were collected at the surface of the experimental pots and analyzed for pH and contents in total organic carbon, N, P, K, and Ca.

Results: The achieved results showed that decomposed fruits of cherries can be digested by earthworms *Eisenia fetida* and converted in valuable casts. No earthworm mortality was recorded at the end of experiment. Several statistical correlations ($p < 0.01$, $p < 0.05$) between certain chemical parameters were found.

Conclusion: In conclusion, the earthworm *Eisenia fetida* represent a solution to manage the wastes of cherries resulted from the human food activities.

Keywords: casts, cherry, *Eisenia fetida*, fruits, wastes

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SHIFTING TO BIOECONOMY BY DEVELOPING POSTHARVEST PROTECTIVE BIOPRODUCTS

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Introduction: Substitution of unsustainable materials is the main goal of bioeconomy research. The food industry challenges are to provide nutritional food while implementing sustainable production processes.

Aims: The importance of fruits and vegetables in nutrition, health and economy is well established. They are the best carriers of vitamins, essential minerals, dietary fiber, phenolic antioxidants, glucosinolates and other bioactive substances.

Methods: In addition to these elements, they also provide carbohydrates, proteins and calories in fairly large quantities. Fruits and vegetables therefore play an important role in the daily diet, and it is advisable to be consumed fresh.

Results: However, fruits and vegetables are extremely perishable goods. Currently, up to 23 percent of the most perishable are lost during their agri-food chain journey as they deteriorate.

Conclusion: This work describes an overview of various measures towards minimisation of losses during the harvest, handling, storage, packaging and processing of fresh fruits and vegetables into products suitable for better conservation.

Keywords: *bioresources, fresh food, vegetables storage*

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THE ASSESSMENT OF PHYSICAL-CHEMICAL PARAMETERS FOR THE PRODUCTION OF TORTILLA CHIPS WITH CORN FLOUR, CHICKPEAS FLOUR, LENTIL FLOUR AND GREEN PEAS FLOUR

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Introduction: Changing consumer demands have directed food industry into development of alternative food products in terms of nutrition, authenticity, innovation and functionality (Büşra, 2018). Tortilla chips are made from corn flour that gives the product a unique flavor and smell. Traditional recipes are improved by developing new recipes with the addition of vegetables with different nutrient intakes.

Aims: The aim of present study was to develop tortilla chips with corn flour (TCC), chickpeas flour (TCCH), lentil flour (TCL) and green peas flour (TCGP) was used to obtain products with nutrients intake.

Materials and Methods: Tortilla chips samples were made from mixtures corn flour and chickpeas flour (50:50), corn flour and lentil flour (50:50), corn flour and green peas flour (50:50).

Physical-chemical determinations analyzed was: moisture content (SR ISO 712:2010), fat content (SR 8613-5:2009), dietary fiber content (AOAC 991:43:1994) and protein content (ISO 1871:2002).

Results: The highest level of moisture was obtained for samples TCCH and TCGP, where the values were the same, 2,0 g/100 g. Fat content was between 15,2 g/100 g for sample TCGP and 21,6 g/100g for sample TCC. For analyzed samples of tortilla chips, the dietary fiber results were between 1.5g/ 100g for sample TCC and 9,7 g/100g for sample TCGP. The protein content was between 4.3 g/100 g for sample TCC to 14.7 g/100 g for sample TCL.

Conclusion: Tortilla chips with corn and chickpeas (50:50), tortilla chips corn and lentil (50:50) and tortilla chips corn and green peas (50:50) are high in dietary fiber because their content is more than 6 g/100g, according EU 1924/2006.

Keyword: *chickpeas, corn, green peas, lentil, tortilla chips*

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BIOTECHNOLOGICAL ROUTE OF INDUSTRIALLY-DERIVED CEREAL WASTE FOR FEEDING 10 BILLION PEOPLE BY 2020

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Introduction: Considering the cereal processing industry, the wastage rate is at 30% (286 million tonnes) (FAO, 2019) and is mainly represented by bran tissues. The major phenolic compounds are concentrated in bran tissues and belong to phenolic acids and flavonoids sub-classes, but less explored.

Aims: The purpose of the research was to evaluate the potential of solid-state yeast fermentation (SSYF) to improve the phenolic acid content and composition, and antioxidant activity of commercial wheat bran (WB) and oat bran (OB) in order to reduce the waste disposal problem and food hunger by offering a sustainable and cost-effective solution.

Materials and Methods: The extracts were compared for their total phenolic content (TPC using the Folin-Ciocalteu method), phenolics composition (HPLC-DAD-ESI-MS), and *in vitro* antioxidant activity (DPPH) in order to validate the potential of the bioprocess in feeding the increasing population. The viability of *Saccharomyces cerevisiae* cells was assessed by plate counting.

Results: The two cereal brands were considered good substrates for the growth of yeast. Fermented WB and OB displayed enhanced TPC, phenolic composition and DPPH scavenging activity that the control. Yeast fermentation induced the structural breakdown of cell walls, therefore leading to the liberation of various antioxidant compounds. This mechanism can also involve exposure of microorganism to oxidative stress during fermentation; therefore, the cells may evolve protective mechanisms involving enzymatic antioxidation, which may contribute to the antioxidative effect of fermentation.

Conclusion: The study proposed a sustainable approach for feeding the increasing world population (10 billion people by 2050) by promoting recirculation of resources in the context of a circular economy.

Keywords: enzymes, low-costs, *Saccharomyces cerevisiae*, sustainability

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NEW PERSPECTIVE ON BIOACTIVE COMPOUNDS OF VINE AND WINE RESIDUES VALORISATION

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Introduction: Grape (*Vitis vinifera* ssp.) is a key growing system characterized by underutilised woody biomass by-products that can be valorised by reducing the carbon footprint of its own high quality products (grapes and wine). Grape pomace (GP) is a waste product from wine making process. The global amount of GP is approximately 20% of harvested grape. Its diverse composition in bioactive compounds, particularly the polyphenols, contributes to the many health benefits reported so far in the literature.

Aims: In this context our study aims to present possibilities that will enhance vineyard by-products valorisation.

Materials and Methods: The most relevant publications were searched using the following databases: PubMed, Science Direct, Web of Science and Scopus.

Results: The grape seed extract (GSE), might have besides its antioxidant action, a prooxidant activity as well, and might be mediated by the prooxidant quinones/oxidation products of the polyphenols (Chedea *et al.* 2010). GSE exhibited statistically significant cytotoxic activity against two human tumor-derived cell lines and generally, higher concentration of extracts and longer incubation time increased cytotoxicity (Ignea *et al.* 2013). *In vivo* the presence of polyphenols from GP in duodenum and colon highlighted the absorption of the unmetabolized procyanidin trimers (Chedea *et al.* 2018).

Conclusion: Within this work the beneficial actions of polyphenols from grape residues was demonstrated, with special focus on the *in vivo* and *in vitro* modulation of the antioxidant/prooxidant balance.

Keywords: absorption, antioxidant/prooxidant, grape pomace, grape seeds, polyphenols

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SEROLOGICAL AND MOLECULAR BIOLOGY TECHNIQUES FOR DETERMINING THE ORIGIN OF MEAT AND TRACEABILITY OF FOOD OF ANIMAL ORIGIN

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Introduction: Correct labelling of food products is essential for consumers' health. In the quality of the meat products sector, there is a need to provide modern biotechnological processes that provide clear interim analysis steps based on modern laboratory methodologies that, in addition to pursuing the physicochemical and organoleptic characteristics, ensure the authentication of the types of meat used.

Aims: This study was intended to perform quick identification of meat species with the real-time molecular biology technique, following a very simple method of DNA extraction and enhancement in Real-Time PCR.

Materials and Methods: The PCR technique consisted of amplifying a fragment of a DNA template using synthetic primers designated on a complimentary basis. The number of copies of the sequence chosen for amplification was doubled at each replication. In order to validate the method, several performance parameters have been validated in-house. The use of molecular markers is a novelty in the management of genetic resources, with implications for the effect of selection and shortening the interval between generations in animals of economic interest.

Results: PCR technique based on the identification of beef, chicken, and pig meat species is achieved by analyzing specific species markers by DNA amplification. The obtained amplicons were analyzed to confirm the specificity of the amplified product. These markers were then tested for cross-amplification by checking them with beef, pork, and chicken.

Conclusion: The DNA markers developed in this study can help identify fresh, cooked and heat-treated chicken, beef and pig meat. The identification process is simple, economically-attractive and fast compared to other methods.

Keywords: *food quality, meat analysis, molecular biology, species identification*

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VALORIFICATION OF MATCHA GREEN TEA POWDER IN PASTRY PRODUCTS

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Introduction: Matcha green tea powder (MGTP) is made by grounding and processing the green tea leaves. MGTP is a very rich source in polyphenols due to the high content in catechins. Also it has a high content in theanine, a non-protein amino acid involved in improving concentration or enhancing cognitive functions (Phongnarisorn, 2018).

Aims: The aim of the present paper was to replace the wheat flour with matcha green tea powder in different proportion (3%, 6%, 9%) in order to improve the nutritional properties of croissant.

Materials and Methods: The raw materials used in these experiments have been purchased from markets of specialized stores from Romania. Total phenols (TP) content was analysed by Folin Ciocalteu method and the antioxidant activity was determined by DPPH (2,2-diphenyl-1-picrylhydrazyl) method. Physicochemical analyses (moisture, ash, protein, and lipid) were made according to AACC methods and sensory analysis was made by using hedonic test. The panellists analysed the products using nine point hedonic scale with the following sensory attributes: texture, taste, odour, overall acceptability and appearance.

Results: The MGTP is a very rich source in TP (967.85 mg GAE/100g), with a radical scavenging activity (RSA) of 75.67%, in protein (30.6%) and ash (1.98%). Hedonic score indicate that the most appreciated final product was the variant with 3% MGTP, having a TP content of 52.08 % mg GAE/100g, RSA of 10.7%, 12.06% protein content and ash 0.58%.

Conclusion: MGTP could represent a new alternative used in bakery for enriched the nutritional content of the final baked products. Replacing wheat flour with 3% MGTP did not change significantly the consumer overall acceptability of the final product.

Keywords: *antioxidant activity, matcha powder, total phenols.*

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USE OF LUPINE FLOUR TO IMPROVE THE FUNCTIONAL PROPERTIES OF GLUTEN-FREE SPONGE CAKES

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Introduction: Lupine (*Lupinus spp.*) is a genus of flowering plants and belongs to the family *Fabaceae*, genus *Lupinus*. Lupine seeds are grain legumes with a chemical composition rich in proteins, lipids, minerals, dietary fibre and vitamins. Thanks to its chemical composition rich in proteins (37.9%), lupine flour could be used as a protein supplement for bakery products (Kohajdová, 2011).

Aims: This present study aimed to produce a new assortment of gluten-free sponge cake enriched in valuable nutrients, by using lupine flour.

Materials and Methods: In order to optimize the technological recipe, three different percentages of lupine flour were used: 10%, 15%, 20%. The final products content were analysed from the sensorial and physicochemical point of view. Sensorial analysis was made by using hedonic test and physicochemical analysis (moisture, protein, ash, fat, total sugars and alkalinity) were made according to AACC methods. During hedonic test, the panellists analysed the products taking into account the texture, taste, odour, overall acceptability and appearance.

Results: The use of lupine flour in the manufacture of gluten-free sponge cakes determined a higher content of protein and minerals amount, due to its rich chemical composition in these compounds. Hedonic scores indicated the 20% lupine flour variant as the most appreciated gluten-free sponge cake. Addition of lupine flour could lead to gluten-free products with improved sensorial characteristics than the commercial variants.

Conclusion: Leguminous seeds present a promising alternative matrix as a protein source for food products. Lupine flour addition up to 20% could be successfully used in the confectionary of gluten-free sponge cake.

Keywords: *gluten-free, lupine flour, minerals, protein.*

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Acknowledgment: This work was supported by Research and Consultancy Contract UASVM Cluj-Napoca, No. 25020/17.11.2017

ROMANIAN'S ATTITUDE REGARDING INFORMATION SOURCES ABOUT HEALTHY FOOD PRODUCTS

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Introduction: Over time, the Romanian people have undergone various lifestyle changes adapted to food availability, sources of information and social status.

Aims: The main purpose in this study was to evaluate the most widely used sources of information as regards to a healthy diet and favorite food products, in order to establish the perception of individuals about their trust in sources of information and their efficiency.

Materials and Methods: We performed a study based on the assessment of lifestyle and food behavior, which consisted in a validated questionnaire of 26 questions, applied online, to a group of 821 adults, in Romania, in 2018.

Results: We explored the potential benefit to the Romanian population, segmented by age, gender, background, graduate level and current professional activity, in determining the main sources for nutritional information and the level of trust in these sources. According to this study, the most used sources of information by Romanians in the increasing order of frequency were: radio (14.6%), medical field (16.9%), school (21.8%), family and friends (29.5%), TV (30.8%), magazines, books, newspapers (34.6%), internet (47.5%), most interested being educated young women from urban areas.

Conclusion: Nutritionists and food stakeholders should promote healthy diet through adequate sources of information, using eLearning methods, aimed to target groups.

Keywords: *healthy diet, internet, lifestyle, nutrition, sources of information*

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USE OF PSEUDOCEREALS IN WHEAT FLOUR MATRICES TO DESIGN NEW BAKERY PRODUCTS

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Introduction: Refined wheat flour has a lower nutritional value compared to whole wheat. Bakery products from refined wheat flour are considered to be nutritionally poor, as the wheat proteins are deficient in essential amino acids such as lysine, tryptophan, and threonine. For these reasons, many studies in recent years have attempted to the enrichment of refined wheat flour with various legumes, oilseeds, non-wheat cereal flours, etc. improving bakery products in protein, lysine, minerals, vitamins, dietary fiber and bioactive compounds.

Aims The aim of this work is to provide an overview of the studies focused on the use of pseudocereals flour supplementation for the development of enriched breads from a nutritional point of view. For this purpose, wheat flour was substituting with different proportions of pseudocereals, buckwheat, amaranth and quinoa.

Materials and Methods: This review highlights the effect of pseudocereals on the physico-chemical, nutritional and organoleptic properties of bakery products according to the enrichment level, origin and way of addition. The incorporation of pseudocereals improves the nutritional profile of bakery products due to the nutritional value added and provides several health benefits. Quinoa proteins contain essential aminoacid lysine, threonine, and methionine having a balanced micronutrient composition. Amaranth has also satisfactory lysine and tryptophan contents and can be used as a fortification ingredient for refined wheat flour. Buckwheat, amaranth and quinoa grains represent a good source of minerals such as Ca, K, Mg, Na, Mn, Zn and Cu. Regarding vitamins, buckwheat seeds are rich in thiamine, riboflavin and pyridoxine and have naturals antioxidants (tocopherols, flavonoids and phenolic acids).

Results: The addition of pseudocereals, as non-gluten flours, in wheat matrices modifies dough rheology, the volume of the finite product and their texture, affecting their organoleptic characteristics and their acceptability. Nevertheless, these changes will depend on the type of pseudocereals used, addition level, flour particle size, as well as on the method of addition.

Conclusion: Use of pseudocereals in wheat flour matrices appears to be a useful strategy to obtain enhanced value of baked goods or to design innovative baked goods. The quality profile of new baked products in terms of nutritionally added value, palatability, opportuneness and facile handling during processing advocated the pseudocereals as suitable to make highly nutritious and innovative baked goods.

Keywords: *amaranth; bakery products; buckwheat; quinoa*

IMPACT OF THREE HONEY ASSORTMENTS ADDITION TO BEER CHEMICAL CHARACTERISTICS

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Introduction: Beer is the most worldwide consumed alcoholic beverage and a valuable source of bioactive compounds. Honey, an apiculture product recognized for its antimicrobial, antioxidant properties and as an important source of vitamins, phytohormones, aromatic compounds, organic acids, also contributes to the stability of the beverage flavor.

Aims: The purpose of this paper was to study the influence of honey addition on beer chemical characteristics.

Materials and Methods: Three product variants were developed with the partial substitution of malt wort extract with linden, acacia and multifloral honey, respectively, in comparison to a blank sample composed of wort where the fermentable substrate was provided only by the malt. The following determinations were carried out: monitoring of primary and secondary fermentation (pH, alcohol content, total extract, total acidity) and the quality of final beers.

Results: All original wort extracts had the same concentration. The highest alcohol content after the primary fermentation was recorded for the beer with linden honey addition. The ratio was the same also after the second fermentation. Some of the acacia honey compounds could act as inhibitors for the fermentation yeast cells.

Conclusion: The using of honey in brewing technology offer benefits to both the consumer (considering the functional properties of honey) and for the industrials with honey as a convenient source of fermentable sugars.

Keywords: *beer, quality characteristics, honey*

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EFFECT OF SELECTED YEAST ADDITION ON THE FERMENTED BEVERAGE QUALITY

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Introduction: Romania has an old tradition in the cultivation of fruits and the production of natural distillates. However, with the advancement of technology, spontaneous fermentation was not enough, and yeast strains development, also called selected yeasts or starter cultures, for the food industry have become more and more advantageous, allowing alcoholic fermentation to be controlled.

Aims: The aim of this study was to test the impact of selected fermentation yeasts on the quality of the pear distillates. Additionally, was tested the rapid inducing ageing character to pear brandies by the addition of wood fragments.

Materials and Methods: Pear brandies were produced in a pilot scale following the traditional method. Selected fermentation yeasts were used in comparison to spontaneous microflora fermentation of pear pomace. Chemical characteristics of raw material, fermented pear pomace and final distillate were assessed. Both pear brandies – with and without the addition of selected fermentation yeast – were transferred to rapid ageing procedure where different amounts of wooden fragments were added. A rapid, efficient, eco-friendly procedure was applied to evaluate the chromatic characteristics of aged pear brandies by the spectrophotometric method previously described by Rodríguez- Solana *et al.* (2014). Sensory analysis was also applied to assess the quality of aged brandies.

Results: Alcohol content strongly contributed to a better extraction of colour compounds, fact proved by the higher colour intensity values. In comparison to previous studies, after 21 days of ageing were obtained results similar to barrel ageing procedure. According to sensory analysis, best colour scores were recorded when higher amounts of wood fragments were added.

Conclusion: The addition of wood fragments to young fruit brandies in specific amounts conducted to several chemical and sensory modifications similar to the conventional, more expensive and time consuming barrel ageing procedure.

Keywords: *rapid ageing, pear brandy, selected fermentation yeast*

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EDIBLE FLOWERS, NEW SOURCE OF ANTIOXIDANTS WITH ANTIPROLIFERATIVE AND ANTIBACTERIAL POTENTIAL

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Introduction: Various studies have been based on the hypotheses that the therapeutic potential of fruits, vegetables, and medicinal plants including flowers, is induced by their high content in phytochemicals with biological activities. The key for the health promoting benefits associated with phytochemicals is their large number of antioxidants that they contain. Including edible flowers in human diet has become a trend in the last years, although they have been part of human nutrition since ancient times. They are considered plant foods which proved their medicinal properties during time, as well the various benefits they have for human health, due to their content in bioactive compounds such as phenolic compounds. Various species of edible flowers are consumed as ingredients in different meals, salads or drinks.

Aims: Considering all these potential health benefits of plants, the aim of our study was to assess the phytochemical composition of the most common flowers in Europe: roses, tulip and peonies. Moreover, antiproliferative and antibacterial proprieties were evaluated.

Materials and Methods: Targeted and untargeted phytochemicals were analysed by LC-MS using an LC Accela 600 -LTQ Orbitrap XL mass spectrometer (Thermo Fisher Scientific, UK). Cell proliferation (Hs27 and B16F10 cell lines) was assessed using WST-1 assay. In order to verify whether exposure of both cell lines cells to our extracts leads to oxidative stress, ROS were first detected by the ROS assay kit (Abcam) and also by MDA Sigma-Aldrich MAK085 assay kit. For *in vitro* antibacterial activity the compounds were screened for their antimicrobial activity against nine reference bacterial strains.

Results: From all analysed samples, tulip was found to be more complex regarding its phytochemical composition. Moreover, all samples exhibit antiproliferative potential on melanoma cells.

Conclusion: The obtained results showed that all samples were rich in polyphenols mainly anthocyanins with positive results for *in vitro* tests.

Keywords: *flowers, LC-MS, melanoma*

CALLUNA VULGARIS HONEY – FOOD OR MEDICINE?

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Introduction: Heather, (*Calluna vulgaris* L. Hull, fam. Ericaceae) is an evergreen shrub. It can be found in most parts of Europe and Northern America from lowland up to alpine regions. Heather honeys possess a particular characteristic called thixotropy, due to the presence of a specific colloidal protein. It is a dark coloured honey, with medium to strong aroma and odour and a particular gel consistency. Studies reveal that heather honey has a high antibacterial activity, comparable to or even higher than Manuka honey or other well-known antibacterial types of honey.

Aims: The aim of this study was to determine the antibacterial effects of heather honey against three bacterial strains: *Brevibacillus laterosporus*, *Paenibacillus alvei* and *Enterococcus faecalis*.

Materials and Methods: The methodology used for the determination was multichannel spectrophotometer technique. 80% dilution of *Calluna vulgaris* honey was used in our study. Natural growth of strains was used as positive control, heather honey and broth was used as negative control. The tested heather honey was screened for its quality, chemical composition was determined also.

Results: The tested heather honey shows a significant antimicrobial effect against *Brevibacillus laterosporus*, *Enterococcus faecalis* and *Paenibacillus alvei* strains. Sugar content: fructose 39,65%, glucose 31,37%, sucrose 0,03%, turanose 1,13%, maltose 1,45, trehalose 0,52, erlose 0,08%, melezitose 0,13%, total fats: 0,19% and total proteins: 0,32%.

Conclusion: This study reveal the fact that *Calluna vulgaris* honey possess a high capacity to inhibit the tested bacterial strains. Higher amounts of bioactive compounds exhibit also high antioxidant properties. It is known that darker honeys possess high amounts of polyphenols, and consequently high antioxidant properties.

Keywords: antibacterial, *Calluna vulgaris*, honey

COMPARATIVE ANALYSIS REGARDING THE FATTY ACIDS PROFILE OF DIFFERENT SPENT GRAIN GENERATED WITHIN A BREWERY

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Introduction: Large amounts of underexploited wastes are generated constantly in all the sectors of food industry, the disposal of these by-products representing a real environmental problem for which an effective management solution must be optimized and implemented.

Aims: Considering the increasing interest in finding new sources of bioactive compounds, the brewers spent grain (BSG) generated from five different types of beer were analyzed regarding the total lipid composition and fatty acids profile.

Materials and Methods: The fresh BSG samples, supplied by a brewery located in Cluj-Napoca, were oven-dried (70 °C/24 h), finely milled and kept protected from light and humidity. The total lipids (TLs) of the samples were extracted with a high-power homogenizer using a chloroform: methanol mixture. After purifications the total lipids were weighed and fatty acid methyl esters (FAMES) were derivatized by acid catalysed transesterification using 1% sulphuric acid in methanol. The FAMES were determined by gas chromatography-mass spectrometry, using a Perkin Elmer Clarus 600 T GC-MS.

Results: The concentration of TLs found in the BSG dried samples varied from 5.09% up to 6.61%. Regarding the fatty acids, a total of 15 compounds were identified in the all analysed samples, the most abundant being linoleic, palmitic and oleic acids. The fatty acid profiles of BSG samples were qualitatively similar, the minor differences being influenced by the mashing parameters and the malt type specific to each assortment of beer.

Conclusions: The obtained results provide further information to the current knowledge regarding the brewers spent grain composition, with perspectives in the development of novel functional ingredient and food products. In conclusion, the reintegration of brewers spent grain biomass in the food chain can be considered a big step towards a sustainable circular economy.

Keywords: *brewers spent grain, cereal waste, fatty acids profile, waste management*

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EFFECT OF THYME ESSENTIAL OIL ON THE EVOLUTION OF PHYSICO-CHEMICAL AND MICROBIOLOGICAL CHARACTERISTICS OF SMOKED SAUSAGES DURING RIPENING

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Introduction: Many food products are perishable by nature and require protection from spoilage during their preparation, storage and distribution. The use of natural preservatives in foods has been widely accepted by consumers, who increasingly seek for natural and healthier products, free of synthetic additives. Therefore, essential oils (EO) can be considered a good choice of natural preservatives for meat products.

Aims: This study focused on the development of a new assortment of sausages with added thyme essential oil as controlling agent for the biological risks that may occur during sausage ripening.

Materials and Methods: Three formulations of sausages were manufactured: control samples (only meat) and two samples with 0.02% and 0.03% of added thyme essential oil respectively, and stored at 4°C/28 days. The dried thyme leaves were purchased from a specialized company and the essential oil was extracted by hydrodistillation using a Clevenger-type apparatus. The antimicrobial activity of the extracted oil was assessed by minimally inhibitory concentration method. For all sausage formulations the physico-chemical and microbiological characteristics were determined during ripening period.

Results: The present work proved that the incorporation of thyme EO can enhance the antimicrobial properties of smoked sausages during storage time, leading to the natural preservation of the product and ultimately improving the product shelf-life.

Conclusion: As an overall conclusion it can be stated, the addition of 0.03% thyme EO to the smoked sausages improves significantly its microbiological quality and stability during storage time, but without modifying the physicochemical parameters of the final product.

Keywords: *essential oil, physicochemical and microbiological properties, smoked sausage, storage time*

Acknowledgments. This work was supported by two grants of Ministry of Research and Innovation, CNCS - UEFISCDI, project number PN-III-P2-2.1-CI-2018-1355 and project number PN-III-P1-1.1-TE-2016-0973.

NUTRITIONAL IMPROVEMENT AND PHYSICOCHEMICAL EVALUATION OF LIVER PATE FORMULATIONS FORTIFIED WITH MUSHROOMS

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Introduction: Liver pate is a traditional food manufactured using liver from pig, by-products of pork and other characteristic ingredients. It is consumed all over the world, especially in European countries and is generally considered an added value product with high nutritional and sensory qualities. *Agaricus bisporus* is an edible species that is extensively cultivated throughout Europe and an appreciated nutritional source for humans' diet due to their low caloric intake and their high content in proteins, dietary fibre and phenolic compounds.

Aims: The purpose of this paper was to obtain pork-liver pate enriched with *A. bisporus* and evaluate its content in bioactive compounds and the influence that mushroom addition had on final product physico-chemical characteristics during storage.

Materials and Methods: Three formulations of liver pate were manufactured: one control samples and two with added mushroom powder (15% and 25% respectively) and stored at 4 °C/90 days. The mushrooms were purchased from retailers in Transylvania, Romania and were dried at 45 °C for 24 h and milled using a laboratory milling machine. *A. bisporus* was screened regarding its content in total polyphenols, flavonoids and antioxidant activity. The final products storage stability was monitored by following the physico-chemical and microbiological parameters and by calculating the energy value.

Results: It was found that *A. bisporus* had a significant influence on the physico-chemical and microbiological properties of the liver pate, according to the composition of the samples.

Conclusion. As conclusion *A. bisporus* currently consumed in Romania may have potential to be used as natural antioxidants if they are introduced in the diet.

Keywords: *Agaricus bisporus*, by-product, liver pate, physicochemical properties, storage time

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ADDRESSING WINE AUTHENTICITY USING BIOCHEMICAL PROPERTIES AND CHEMOMETRICS

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Introduction: Red wines contain a large number of phytochemicals with health benefits and promoting effects, which contribute to the formation of wine specific characteristics such as color, aroma, and flavor, making the difference between different assortments of wine [1]. The authenticity of grapevine varieties is a very important topic worldwide, mainly for authentic wines, being of great interest to both, the wine industry and the consumer [2].

Aims: The purpose of this research was to assess the potential of wine biochemical properties (total polyphenolic content, total flavonoids content and DPPH antiradical activity) to discriminate between different red and white Romanian wines and years of vintage.

Materials and Methods: There were studied 4 red wine varieties (Cabernet Sauvignon, Merlot, Feteasca Neagra, Babeasca Neagra), 7 white wine varieties (Chardonnay Riesling Italian, Columna, Sauvignon Blanc, Feteasca Regala, Pinot Gris and Muscat Ottonel) and one rose variety (Mamaia) produced at SCDVV Murfatlar during 9 year of production.

Results: The statistical analysis tools applied to the analytical data allowed a good discrimination of wines according to grape variety, especially in the case of red wines. Aged wines shows higher biochemical properties comparing young wines.

Conclusion: The results suggested that quantitative UV-Vis spectroscopic method coupled with PCA represents a very powerful tool capable to discriminate between different wines. The proposed methodologies allow the classification of wines according to grape variety and year of vintage, better than 75%.

Keywords: *biochemical properties, chemometrics, discrimination, wine*

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EXTRACTION AND CHARACTERIZATION OF PHYTOCHEMICALS FROM BARK OF SOFTWOOD SPECIES: COMPARISON BETWEEN DIFFERENT EXTRACTION METHODS

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Introduction: The considerable presence of phenolic extractives in softwood bark represents a potential for the superior valorization of by-product of the wood and pulp industry (Jablonsky, 2017).

Aims: This work was aimed to extract and characterize phenolic compounds (flavonoids and phenolic acids) and tannins presented in the barks of softwood species: scots pine (*Pinus sylvestris* L), black pine (*Pinus nigra* Arnold) and spruce (*Picea abies* Mill.) in order to identify potentials and limitations of softwood bark as a source of extracts with high content of bioactive compounds. The last aspect of this research was to define the green assessment profile for each extraction method.

Materials and Methods: Different extraction methods (with water at 60°C, ultrasound-assisted extraction (UAE)) and microwave-assisted extraction (MAE)) were tested. The influence of important parameters such as: solvent, extraction time and temperature on the total polyphenolic content, the total flavonoids content, the condensed tannins content, anti-radical capacity (DPPH) were evaluated. The extracts were characterized in term of phenolic compounds using UHPLC-MS.

Results: Our results demonstrated that the highest phytochemical content was obtained using MAE extraction method (150 W power extraction), using 50% ethanol, at 50 °C, during 5 min. UAE and water extraction allowed to obtain extracts with similar polyphenolic contents, the last being preferred when consider the green aspects of an extraction process. U-HPLC-MS analysis revealed that catechin and ellagic acid were the main condensed tannin units in the extracts. Phenolic acids (3,4-dihydroxybenzoic, p-hydroxybenzoic gallic and syringic acid) and monomeric flavanoids (naringin, myricetin and kaempferol-3-O-glucoside), epicatechin and epicatechin gallate were also present in the extracts.

Conclusion: This study has permitted to define the optimal extraction process for bioactive phytochemicals from softwood bark. The MAE has many advantages compared to UAE and hot water extraction method, being less time consuming and allows to obtain higher amounts of phytochemicals.

Keywords: *softwood bark, MAE, phytochemicals*

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ROMANIAN'S PERCEPTION ABOUT FOOD BEHAVIOR AT RISK IN RELATIONSHIP WITH THEIR SOCIAL AND CULTURAL PROFILE

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Introduction: Nutrition is an individual choice but conditioned by the social context, health or illness, physical activity, access to care and information, and funding system.

Aim: The main goal was to assess food behavior according to the social and cultural profile, to identify food behavior at risk, with the purpose of implementing prevention methods by including nutritional knowledge in health education campaigns.

Material and methods: We performed a study based on the assessment of lifestyle and nutrition, along with social aspects, which consisted in a questionnaire of 26 questions, applied online, to a group of 821 adults, in Romania, in 2018.

Results: The results revealed that socio-economic status is a contributing factor in food choices, people with low socio-economic status opted for low-price food, especially the elderly. Social influence has a big impact on the food intake, especially on the group under 18 compared to other age groups, who perceive meals as opportunities for relaxation and socialization in a higher percentage (62.5%). Teenagers who said their parents were authoritarian about healthy food, had have later on healthy diets, more regular breakfast and more vegetables in their menu.

Conclusion: Improving eating behavior is based on changes in the psycho-social, economic and cultural characteristics of individuals, starting with educational interventions.

Keywords: *health, food intake, food price, socio-economic status*

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EVALUATION OF NITROGEN SUBSTANCES LEVEL IN WATER USED IN ANIMAL ORIGIN FOOD PRODUCTS PROCESSING UNITS

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Introduction: Excess nitrogen from agriculture can leach into groundwater or move *via* surface runoff into waterways. (Mateo-Sagasta, Zadeh, & Turrall, 2017) Drinking water is water intended for human consumption as natural or treated water used for drinking, food preparation or other domestic purposes, and also water used in the food industry for processing, preservation or trading of products or substances intended for human consumption. (LEGE nr. 458/8.07.2002 privind calitatea apei potabile)

Aims: This paper goal was the evaluation of nitrogen substances level in sources of water supply used in animal origin food products processing/selling units, in 2014 and 2015, in Olt County, Romania.

Materials and Methods: The study was conducted using water samples from 15 localities (7 in the North and 8 in the South), taken from animal origin food products processing units in 2014 (n = 120) and in 2015 (n = 77), which were further divided into groups based on the source of water supply and region. Water samples were analysed for nitrites (SR ISO 6777/2002), nitrates (SR ISO 8466/2001), and ammonia (SR ISO 7150-1) by spectrometric methods.

Results: Mean nitrite concentrations have increased in the North in public sources of water supply in both years, with values exceeding the maximum admissible limit – MAL (0.607 mg•L⁻¹ in 2014, and 0.613 mg•L⁻¹, respectively, in 2015). The units' own water supply sources registered a mean nitrite level below MAL, independent of region or year. The mean nitrate concentrations remain below the MAL in both North and South regions during the two-year study period. The average nitrate level was higher in the South in both studied years (32.55 mg•L⁻¹ vs. 6.66 mg•L⁻¹, in 2014; 30.83 mg•L⁻¹ vs. 8.18 mg•L⁻¹, in 2015). The mean ammonia level exceeded MAL in 2014 in each of the two regions in its own power supply units (2.29 mg•L⁻¹ in North; 0.73 mg•L⁻¹ in South). In public water supply sources, the ammonia value was below MAL, regardless of region or year.

Conclusion: The level of nitrogen substances analysed in the water from animal origin food processing units was higher in 2014. In 2014, the nitrite mean level was higher in public sources of water supply, and nitrate and ammonium registered higher average values in the units' sources. In 2015, all analysed nitrogen substances mean levels were higher in public sources of water supply.

Keywords: *ammonia, animal origin products, nitrate, nitrite, water.*

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ANTINOCICEPTIVE EFFECT OF LYOPHILIZED JUICE OF THREE VARIETIES OF POMEGRANATE (*Punica granatum* L.) IN THE FORMALIN TEST

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Introduction: The infusions of pomegranate have been used in traditional medicine around the world, as an alternative treatment for different pain diseases. For the evaluation of its probable antinociceptive effect. Lyophilized juice of pomegranate was prepared from three different endemic varieties from Hidalgo, Mexico, and their antinociceptive effects were studied in Wistar rats through the formalin test.

Aims: Evaluate the antinociceptive effect of lyophilized juice of three varieties of *Punica granatum* L., in a pain test of formalin.

Materials and Methods: The antinociceptive effect of the samples (J1, J2 and J3), was evaluated through the formalin test in male Wistar rats. 30 minutes before the test, a dose of 316 mg / Kg i.g of the samples was administered, using Tween 80 (1%) as vehicle and acetylsalicylic acid (ASA) as reference drug (100 mg / Kg i.g). The test consisted in a subcutaneous injection of formalin (2%) in the dorsal surface of the right hind paw; subsequently the number of shakes of the limb were evaluated every five minutes for one hour.

Results: The temporal course curve showed that J2, achieved a greater reduction in the number of shakes produced by the formalin injection, compared to ASA and the other varieties. The index of pain inhibition (IPI) for J2 was 57.7%, for ASA it was 46.6%, for J1, 32.1% and for J3, 22.6%. We found a statistically significant overall effect ($p < 0.05$) for J1 and J2, There was also a significant effect in both phases of the test (nociceptive and inflammatory), for J2, compared to the control group.

Conclusion: The results suggest that J2 lyophilized juice of pomegranate, have antinociceptive effects in two types of pain: nociceptive and inflammatory, and J1 - J2 in the overall effect of the formalin test.

Keywords: *antinociceptive, formalin, juice, pomegranate*

MICRONUTRIENTS INGESTION IN PRESCHOOL CHILDREN AND BLOOD PRESSURE STATUS

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Introduction: Balanced nutrition implies an appropriate ingestion of macro- and micro-nutrients. Because the focus is on caloric value, there is often a deficient relationship between minerals and vitamins.

Aims: The aim of the paper is to analyse in detail the menu plan offered in preschool institutions and consumers blood pressure.

Materials and Methods: A four-month analytical study was carried out on a sample of 287 preschool subjects. The menu plan offered within the institution was analysed along with anthropometric development and arterial blood pressure. The interpretation of anthropometric data and blood pressure was based on Z score and percentiles. Detailed menu analysis was based on the exact amount of product offered to a child.

Results: The descriptive statistical data show an average systolic blood pressure (SBP) of 94.68 ± 10.94 mmHg and diastolic (DBP) of 61.6 ± 8.07 mmHg. The mean caloric intake was 1420.91 ± 125.75 calories, equivalent to 181.04 ± 4.35 mg magnesium, 582.8 ± 42.59 mg calcium, 722.99 ± 53.47 mg phosphorus, 1926.5 ± 97.38 mg potassium, 1056.15 ± 143.43 mg vitamin A, 2.12 ± 0.36 μg vitamin B12, 80.31 ± 6.25 mg vitamin C and 180.92 ± 76.22 μg vitamin K. According to inferential statistical data, SBP was increased in the association of a high calorie intake ($p=0.009$, $r=0.154$), low intake of vitamin B12 ($p=0.000$, $r=-0.216$) and increased intake of vitamin K ($p=0.001$, $r=0.188$). Phosphorus intake ($p=0.296$), magnesium ($p=0.695$) or potassium ($p=0.795$) did not significantly affect SBP status. Elevated levels of DBP were observed in association of a hypocaloric menu ($p=0.000$, $r=-0.411$), high magnesium intake ($p=0.000$, $r=0.226$), calcium ($p=0.022$, $r=0.134$), vitamin A ($p=0.000$, $r=0.264$) and a reduced intake of vitamin B12 ($p=0.000$, $r=-0.376$).

Conclusion: In the present research work, we demonstrated that for pre-schoolers, an excess caloric intake is associated with an increase in SBP and DBP, an unbalanced diet plan, deficient in vitamin B12 being correlated with high blood pressure.

Keywords: *blood pressure, preschool, vitamin*

THE ROLE OF Ag^+ , Ca^{2+} , Pb^{2+} , Al^{3+} ADIONS IN THE SERS TURN-ON EFFECT OF ANIONIC ANALYTES

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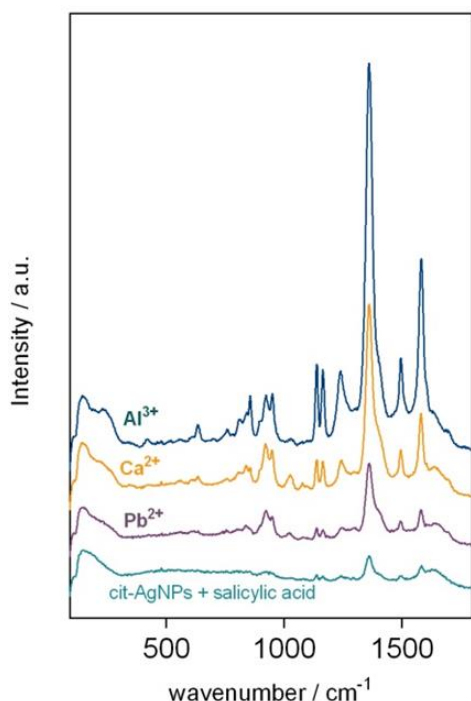
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Introduction: The control on the adsorption of molecules onto the metal surface is determinant for predictability in surface-enhanced Raman scattering (SERS) experiments. SERS spectra of anionic species are rarely reported, the main difficulty being the chemisorption of such species onto the metal nanoparticle surface. Recently, we provided experimental results regarding the SERS switch-on effect of anionic species, determined by the electronic contact between adsorbate and silver nanoparticle, mediated by cations (Ag^+ , Ca^{2+} , Mg^{2+}).

Aims: In this study, SERS spectroscopy was used to assess the chemisorption of anionic species such as citrate, uric acid, salicylic acid (please see figure) and fumaric acid in order to assess their detection.

Materials and Methods: Silver colloids were obtained by the common citrate reduction method (cit-AgNPs). SERS spectra of the organic acids at 50 μM concentration were acquired after the activation of the colloid with 50 μM Ca^{2+} , Pb^{2+} , Al^{3+} . A 532 nm laser line was used.



Results: We suppose that a SERS switch-on effect occurs due to by the cation bridging effect of Ca^{2+} , Pb^{2+} or Al^{3+} , between anionic species and silver surface. Thus, this effect in our opinion facilitates a metal-adsorbate charge transfer. By simply adding the cation nitrate or sulphate salts to cit-AgNPs, the SERS spectrum of citrate capping agent is turned-on. The addition of anionic analytes (uric acid, salicylic acid, fumaric acid) results in high intensity SERS spectra of these analytes as they replace the citrate chemisorbed anions from the silver surface, due to their higher affinity for the silver surface. Thus, the chemisorption of anionic species occurs competitively in order of their affinity towards the surface.

Conclusion: Our experimental results support the electronic theory of SERS, highlighting the necessity of an electronic contact between adsorbate and silver metal nanoparticle (mediated by cations for anionic species) in order to switch-on the SERS effect.

Keywords: cation bridging, charge transfer, SERS

IN VITRO ANTIOXIDANT ACTIVITY OF ETHANOLIC EXTRACT OF FLOWERS FROM *ERYTHRINA AMERICANA*

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Introduction. The flowers of *Erythrina americana* are a very valuable food in different regions of Mexico. In addition, the aerial parts of the tree (leaves, bark and fruit) are used empirically in traditional medicine to treat some diseases such as cardiovascular disease, cancer and diabetes, related to oxidative stress.

Aims. Evaluate the antioxidant capacity of the ethanolic extract of the flowers of *E. americana*.

Materials and Methods: *In vitro* antioxidant activity of the crude extract was evaluated through 2,2-diphenyl-1-picrylhydrazyl (DPPH), 2,2'-azino-bis-(3-ethylbenzothiazoline-6-sulphonic acid (ABTS) and the ferric reducing ability of plasma (FRAP) assays by triplicate. A sample of 100 μ L (2mg/mL ethanol extract) was mixed with 500 μ L DPPH reactant. After a 60 min, the absorbance was recorded at 520 nm and the results were calculated from the Trolox standard curve and expressed as Trolox equivalents. Also 20 μ L the sample was mixed with 980 μ L of ABTS⁺ solution, and absorbance was recorded at 754 nm after 7 min. The results were calculated from the ascorbic acid standard curve and expressed as ascorbic acid equivalents. Finally 900 μ L of prepared FRAP reagent was mixed with 100 μ L of sample; the absorbance at 593 nm was recorded after a 10 min incubation at 37 °C. FRAP values are expressed as \square M of Fe⁺² equivalents/g.

Results. The results showed a radical scavenging ability in the DPPH and ABTS assay with 173 μ mol ET/L and 23.28 μ mol EAc/L respectively. It also showed a reduction capacity of Fe⁺³ ions of 6.70 μ M Fe⁺²/L.

Conclusion. The ethanol extract from flowers of *E. americana* shows a moderate antioxidant capacity, which suggests that this food can have a beneficial role in human health.

Keywords: *antioxidant, DPPH, Erythrina, FRAP*

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SELECTIVE ADSORPTION OF ANALYTES TO SILVER NANOPARTICLES AND SERS TURN-ON EFFECT

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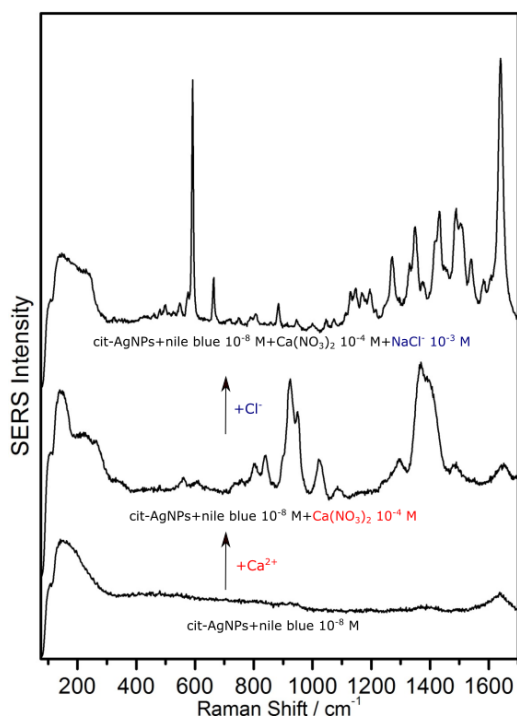
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Introduction: Our recent results support the electronic theory of surface-enhanced Raman scattering (SERS), highlighting the necessity of an electronic contact between adsorbate and silver metal nanoparticle in order to switch-on the specific and selective SERS effect. Cationic adions such as promote the specific chemisorption of anionic molecules, whereas anionic adions turn-on the SERS spectra of cationic molecules.

Aims: In this study, we demonstrated that the The electronic coupling of anionic analytes to the silver surface occurs at SERS-active sites on the AgNP surface formed by chemisorbed Ca^{2+} ions and the chemisorption of cationic analytes is mediated by Cl^- .

Materials and Methods: Silver colloids were obtained by the common citrate reduction method (cit-AgNPs). For SERS measurements, the cit-AgNPs were activated with 10^{-4} M Ca^{2+} and 10^{-3} M Cl^- and irradiated with 532 nm laser line.



Results: The selective SERS switch-on effect of anionic species such as citrate³⁻ and Cl^- from their mixture occurs in a competitive manner, as determined by the affinity of these species to the metal surface, leading thus to a selective SERS detection of these species from their mixture. The bottom spectrum in the figure shows a blank SERS spectrum, even if Nile blue was added to the cit-AgNPs. After the addition of Ca^{2+} to this solution, the SERS spectrum of the citrate is turned-on. Next, the added Cl^- ions, due to a higher affinity to the silver surface, replace the citrate anions, and the SERS spectrum of citrate disappears. However, the Cl^- ions form SERS active sites on the metal surface for the cationic dye. Cl^- ions promote the chemisorption of the cationic dye and thus, the SERS spectrum of Nile blue is turned-on after the addition of Cl^- to the silver colloid.

Conclusion: The experiments presented in this study highlight the SERS-activating role played by ions such as Ca^{2+} , Mg^{2+} , Al^{3+} , Pb^{2+} for anionic species SERS detection and Cl^- , Br^- or I^- for cationic analytes SERS detection.

Keywords: *adatoms, cation bridging, SERS*

ANALYSIS OF GRAPE-BASED SPIRITS MACERATED WITH AROMATIC PLANTS

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Introduction: Distilled beverages are produced in many countries across the globe. Grapes are the raw material for producing grape-based spirits. They are distilled beverages with characteristic aroma, flavor, and volatile composition, which are influenced by the grape quality, distillation, and maturation process. Poor quality grapes give distilled spirits a lighter flavor, and to improve some sensory qualities, plants with strong characteristic flavor can be added.

Aims: The aim of the study was to evaluate the chemical composition of grape-based spirits ("tuica"), macerated with four types of aromatic plants: mint, sage, thyme, and basil.

Materials and Methods: Grape based spirits were obtained in copper distillation installation. The distillation was repeated twice, and the final alcoholic concentration of the grape-based spirits was 52% v/v, and the pH 4.33. In order to obtain grape-based spirits macerated with aromatic plants, mint, sage, thyme, and basil were used. Prior to GC-MS analysis samples were subjected to a L-L separation. Samples obtained were analyzed through GC-MS and HPLC.

Results: The presence of volatile compounds was noticed in all samples. For samples macerated with aromatic plants were noticed, D-carvone and D-limonene for mint; alpha pinene, camphene, and sabinene for sage; gamma terpinene, *p*-cymene, alpha thujene, and thymol for thyme; eucalyptol, and linalool for basil. HPLC analysis revealed the presence of riboflavin, pyrocatechol, caffeic acid, rosmarinic acid, and *p*-coumaric acid.

Conclusion: In the present research work, we determined the presence of 11 terpenes and 5 phenolic acids in grape base spirits macerated with aromatic plants.

Keywords: *aromatic plants, grape-based spirits.*

REVIEW: METHODS USED IN PALYNOLOGY

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Introduction: Palynology is the science that deals with the study of pollen. The results of palynological research have applicability in many scientific fields, but the most important are taxonomy, plant evolution, medicine and the analysis of honey - melissopalynology. The last type of analysis provides data regarding the botanical origin of pollen, which is useful in establishing the provenance of honey and its correct labeling.

Aims: This paper details the characteristics and testing of several methods for obtaining microscope specimens from fresh pollen and from honey sediments.

Materials and Methods: Microscopic examination constitutes the essential part of the melissopalynological analysis, assessing both overall aspects (polarity, shape, color, apertures) as well as details (morphology of the exine and its ornamentations) of pollen grains. Several methods for the preparation of microscopic specimens were selected from different references and assessed with regard to preparation time, costs, dangerous substances used and results.

Results: All methods were employed successfully for both fresh and honey-derived pollen, but the non-acetolysis method published by Louveaux *et al.* (1978) offers several advantages in terms of ease-of-use, safety and efficiency.

Conclusion: The results of our comparative analysis emphasizes that some methods are recommended for the creation of reference libraries, while others are well suited for being used in routine analysis of honey.

Keywords: honey labeling, microscope analysis, melissopalynology, palynology, pollen

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COMPARATIVE EFFECT OF ONE SINGLE DOSE OF L-CARNITINE IN HIGH INTENSITY PHYSICAL EFFORT: PERFORMANCE AND RECOVERY ANALYSIS

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Introduction: Long term L-Carnitine ingestion is well studied through previous papers which analysed its effect over individual athletic performance. Yet, single dose have been much less studied despite the lately use to obtain a similar effect.

Aims: Our hypothesis is that L-Carnitine single dose ingestion can influence long-chain fatty acid oxidation, whereas mitochondria acyl groups` transfer during physical effort, will enhance performance by lowering lactate accumulation. Our objective was to test the current hypothesis by monitoring individual physical performance after one single L-Carnitine oral dose, over short high intensity physical test.

Materials and Methods: The study group consisted of fourteen football players. Seven of them were located to L-Carnitine ingestion (G₁) and seven to placebo (G₂). Both groups conducted two Squat Jump Test (30 seconds). The initial test was performed to understand the physical test protocol and it was conducted within 5 days before the physical performance test. The second test took place after one single oral dose of 4.5 g L-Carnitine in G₁ and an equivalent of no flavour, maltodextrin product in G₂.

Results: Maximum lactate concentration was higher in G₁ unlike G₂ (12.15 vs 11.47 mmol/l). Differences (p=0.01) were monitored over target center, whereas power ratio was higher in G₁ (23.21 W/Killo) as against G₂ (18.83 W/Killo). Individual performance report described a +2.36% difference in G₂ as against G₁. Following lactate accumulation, post effort lactate recovery was improved in G₁ unlike G₂ (37.37% vs 25.05%) in the first 20 minutes period (p=0.023). Over the 40 minutes passive recovery time, lactate concentration dropped with 63.38% in G₂ and with 62.67% in G₁.

Conclusion: An increased lactate accumulation was monitored in G₁ unlike G₂. Overall performance was higher in G₁, possible due to an increased lactate tolerance. Lactate recovery was lower in the first part of the exercise recovery period while an improved lactate recovery was measured in the second part.

Keywords: *athletic performance, football, L-Carnitine*

CONSUMERS' REQUIREMENTS FOR FUNCTIONAL FOODS

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Introduction: Although there is still no legal definition, functional foods are considered by the scientific community as providing additional benefits beyond the general benefits of nutrient intake and satisfaction of hunger (Lenssen *et al.* 2018). The bioactive compounds present in these products should provide a scientifically proven health benefit for the prevention, management or treatment of chronic disease.

Aims: The aim of the present study was to investigate the consumers' awareness, knowledge and interest for functional food consumption and the specific requirements that these products have to meet.

Materials and Methods: The study was conducted on a 102 respondents that answered a 16-questionnaire distributed online. The participants were adults from rural and urban area, with different levels of education.

Results: The data collected from the respondents showed that women are more aware and interested in functional foods than the male respondents. Only 15% of the participants to the questionnaire said that they do not know the meaning of the term "functional foods". Nevertheless, the over 60% of the respondents considered that the availability and variety of functional foods from the Romanian market should be increased, the supermarkets being the preferred purchased location for these kind of products. According to the gathered results, from consumers' point of view, a functional food should be tasty, accessible (including price), enhanced nutritional properties with health benefits.

Conclusion: This study has shown that the knowledge and interest of consumers' for the functional foods is influenced by factors such as gender, age, education or income level. The prices together with the sensorial and health benefits were among the decisive factors that consumers' considered when buying a functional food. On a larger scale, this type of study may even suggest the educational strategies that can be implement for a better knowledge of functional food terminology.

Keywords: *bioactive compounds, functional food, health properties*

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INVESTIGATION OF THE INFLUENCE OF CALCIUM SALTS AND GELLING TIME ON THE STRUCTURAL MECHANICAL PROPERTIES OF FRUIT JAM

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Introduction: Alginate beads attract attention as a carrier or matrices for encapsulation of bioactive substances in food, cosmetics and pharmacy. However, the stability of beads depends on different factors as calcium ion and sodium alginate concentration, gelling time and others. Increasing the concentration of alginate increases the diameter of the alginate beads, but when increasing the concentration of $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$, the diameter of the alginate beads decreases. The addition of high-esterified pectin or inulin to not heat-treated pear fruit jam reduces or slightly improves in the structural and mechanical parameters.

Aims: The aim of the present study is to investigate the influence of different types of calcium salts on the structural and mechanical parameters - the rupture force and deformation force at different gelling times of the pear fruit jam by a texture analyzer.

Materials and Methods: Fruit jam was prepared with pear fruits, low molecular inulin, amidated pectin, sodium alginate. Different salts were used as a source of calcium ions (CaCl_2 , calcium lactate pentahydrate, calcium citrate) for jam preparation. To evaluate the structural and mechanical properties of jam the rupture and deformation forces were measured by texture analyzer (TA.XT. plus Stable Micro Systems, England) in uniaxial deformation mode at 60% stress with a constant deformation velocity of 2 mm/s by an aluminum cylindrical plunger of diameter 5 mm in eleven replicates.

Results: Any change in the value of rupture force was observed when increasing the gelling time from 24 hours to 48 hours for the fruit jam prepared with 3.5% CaCl_2 . By increasing the gelling time from 24 hours to 48 hours, the deformation forces of fruit jams with 7% calcium lactate were reduced and in those with 7% CaCl_2 the rupture forces increases. In fruit jams, with an increase in calcium lactate concentration for 24 hours or 48 hours, the rupture forces increased and the deformation changes negligibly.

Conclusion: The current study demonstrated practical application different calcium salts for preparation of stable pear jam rich of dietary fibers and prebiotics.

Keywords: *calcium salts, gel formation time, inulin, pear jam*

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INVESTIGATION OF THE INFLUENCE OF STARCH AND AMIDATED PECTIN ON RHEOLOGICAL PARAMETERS OF IOTA-CARRAGEENAN JELLIES

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Introduction: Carrageenans are natural linear sulphated polysaccharides that are extracted from the cell wall and intracellular space of red seaweed from the Gigartinales, Solieriaceae and Phyllophoraceae families. The isomers of carrageenan are known as κ (Kappa), λ (Lambda) and ι (Iota). They vary according to the number and position of the sulfate groups in the monomer composition and the 3,6-anhydro-D-galactose content. Calcium ions refund gelling of iota-carrageenan and kappa-carrageenan potassium ions. The iota-carrageenan forms soft and elastic jellies resistant to the freeze-thaw cycle.

Aims: The aim of the present study is by a texture analyzer to investigate the influence of potato starch and low-esterified amidated pectin upon the structural and mechanical properties of iota-carrageenan jellies.

Materials and Methods: Sodium alginate VIVAPUR Alginate FD120 is used. Sources of calcium ions are calcium dichloride, calcium lactate penta hydrate and calcium citrate with analytical purity of the company Phyllab Ltd. Low-esterified amidated citrus pectin (Aglupectin LA-S10) is characterized by a degree of esterification of 34% and an amidation degree of 17%. The fruit jam has added inulin Frutafit HD. The structural and mechanical tests on the rupture force and deformation of the fruit jam are carried out with a Stable Microsystem texture analyser.

Results: From the results presented on Fig.1, it is seen that when adding starch (P02) and amidated pectin (P03), the rupture force is minimally reduced, and the rupture deformation is decreased by 50.95% (P02) and 54.79% (P03) relative to P01. From the obtained data (Fig.2), it can be seen that the deformations of P05 and P06 are respectively with 46.80% and 53.32% lower than the deformation of P04. From the data obtained (Fig.3), it can be seen that the deformation of P08 and P09 is 52.75% and 42.49% smaller than the deformation of P07.

Conclusion: Potato starch and low esterified amidated pectin, at certain concentrations, do not exhibit a synergistic effect with iota-carrageenan. The addition of low esterified amidated pectin or potato starch to the iota-carrageenan gel results in a significant reduction of rupture deformation and minimal reduction of the rupture force. With increasing concentration of iota-carrageenan from 1.0% to 1.3% the reducing ability of potato starch on the deformation decreases, and low esterification amidated pectin is increased.

Keywords: *iota- carrageenan, jellies, pectin, starch*

USE OF RED GRAPES SKIN POWDER TO IMPROVE THE FUNCTIONAL PROPERTIES OF GLUTEN-FREE COOKIES

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Introduction: Grape skin, the major component of grape pomace is a valuable source of nutrients with great potential to be used as a functional ingredient in different food products. Grape skin contain polysaccharides, cellulose and hemicelluloses, acidic pectin substances, proteins, fats, minerals, sugars, phenolic compounds , organic acids and flavours (Mendes, 2013).

Aims: This study aims to exploit the potential of grape skins to develop new type of gluten-free cookies with improved functionality.

Materials and Methods: The raw materials used in these experiments have been purchased from markets of specialized stores from Romania. The grapes skin powder (GSP) was blended with rice flour at different levels: 2%, 4% and 6%, for gluten-free cookies preparation. The finished products were evaluated for total phenolic content (TPC) by Folin–Ciocalteu method and the radical scavenging activity (RSA) was determined by using the radical DPPH (2,2-diphenyl-1-picrylhydrazyl) scavenging capacity assay. Physicochemical analyses (moisture, lipids, ash, crude fiber, protein) were determined according to AACC methods and the sensory analysis was made by using hedonic test.

Results: The grapes skin powder addition has a positive influence on TPC and RSA of cookies. Also, it was recorded, that the addition 6% of grape skin powder increased ash and fibre content of cookies. The sensory evaluation indicated that the gluten-free cookies fortified with 4% grapes skin powder had the highest acceptability score.

Conclusion: This study demonstrated that grapes skin powder is a viable functional ingredient in bakery goods to increase nutritional value.

Keywords: *antioxidant activity, grapes skin, physicochemical properties, polyphenols, sensory evaluation*

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INCORPORATION OF MUNGBEAN FLOUR INTO GLUTEN-FREE PRETZEL WITH IMPROVED NUTRITIONAL AND SENSORY QUALITIES

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Introduction: Often, based on pure starches, commercial gluten-free products are characterized by with low mineral and vitamin content, by dry and sandy mouth-feel offering low organoleptic characteristics. Thus, new gluten-free products with better organoleptic and nutritive characteristics should be proposed. Mungbean (*Vigna radiata* L.) is an excellent source of high quality protein and is rich in essential fatty acids, antioxidants and minerals.

Aims: The main goal of this study was to determine the effect of partial replacement of rice flour with mungbeans flour in different ratios, resulting gluten-free pretzel with improved nutritional and sensorial characteristics.

Materials and Methods: Mungbean flours (MBF) were prepared by roasting the mungbean using a roaster oven at 160 °C for 15 min followed by cooling and grinding. MBF at 10%, 20% and 30% supplementation levels was incorporated into rice flour and corn starch to produce composite flour. The chemical characteristics of final products were carried out according to AACC methods: moisture (44-15.02), lipids (30-25.01), ash (08-01.01), crude fiber (32-07.01) and protein were measured using the Kjeldahl method (46-11.02), nitrogen to protein conversion factor was 5.7. A 9 points hedonic test was used for asses the pretzel sensorial attributes.

Results: The supplementation of MBF in rice flour significantly improved the nutrient profile of the gluten-free pretzel and the sensory attributes. The resulting gluten-free pretzels were superior in nutritional quality and provide more health benefits than commercial variants of gluten-free pretzels.

Conclusion: The addition of up to 30% MBF flour significantly improved the chemical composition (protein, fiber and ash) of pretzel and provided acceptable sensory attributes.

Keywords: *gluten-free pretzel, nutrition food, Vigna radiata* L.

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HEAVY METALS IN MEDICINAL HERBAL TEAS

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Introduction: Herbal teas, also called pro-health teas are becoming more and more popular, because it is supposed that they may reduce the heart disease and stroke risks, help to regulate the blood sugar level, prevent increasing blood pressure, strengthen the immune system and facilitate weight loss and correct body weight maintenance (Sarma *et al.* 2012). Unfortunately, they may also contain hazardous and toxic substances, such as heavy metals (Muntean *et al.* 2013). It may results from the fact that condition of the environment in which the herbs are grown has an important impact on the composition and quality of the consumed products. Thus, these products have to be regularly controlled.

Aims: The aim of the study was the determinations of heavy metals (Cd, Co, Cr, Cu, Ni, Pb and Zn) in 9 herbal teas available in Romanian markets. The tests were conducted with ICP-OES method (Avio 200, Perkin Elmer).

Materials and Methods: Around 1 g of homogenized samples of the herbal teas were dried and mineralized by using HNO₃ and HCl. ICP-OES spectrometric analysis was accomplished using an Avio 200 instrument (Perkin Elmer), using the following wavelengths for the selected metals: Cd – 226,502 nm; Co- 228,616 nm; Cr – 267,716 nm; Cu – 238,524 nm; Ni – 231,393 nm; Pb – 220, 353 nm; Zn – 206,200 nm.

Results: The obtained results demonstrated that the analysed herbal teas have accumulated determined heavy metals in the range of: Cd (< LOD – 0,40 mg/kg); Co (< LOD – 0,10 mg.kg); Cr (< LOD – 0,65 mg.kg); Cu (< LOD – 2,39 mg/kg); Ni (0.95 – 4.58 mg/kg); Pb (< LOD – 0.15 mg/kg) and Zn (11.52 – 80.84 mg/kg).

Conclusion: Herbal teas are generally believed to be healthy for our organism. Nonetheless, the contents of heavy metals may have significant importance, particularly when they are consumed in the long-term period. The obtained results are similar to those obtained previously using the MP-AES technique (Michalski *at el.*, 2017). Due to the small number of samples, the presented results do not allow to draw more general conclusions.

Keywords: *food safety, heavy metals, herbal teas*

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ANTIBACTERIAL ACTIVITY OF ISO- α AND β ACIDS AGAINST *BACILLUS SUBTILIS*

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Introduction: Hops have been used in the brewing industry for centuries. There are various studies pointing out the antibacterial effect of hop bitter acids against Gram-positive bacteria (Cleemput *et al.* 2009). Depending on the bacterial growth conditions, these bioactive compounds may exhibit either bacteriostatic or bactericidal activity (Muthayan *et al.* 2011).

Aims: The aim of the present work was to assess the antibacterial activity of hop extracts, iso- α and β acids, against *Bacillus subtilis* S499 bacteria, during a short incubation time, at pH 5.8 - 6.

Materials and Methods: The microbial strain used in the experiment, was *Bacillus subtilis* S499, belonging to the Collection of Gembloux Agro Bio Tech University, Belgium. To evaluate the antibacterial activity of hops, iso- α hop extract (30%) and β hop extract (10%), were used. The analyses were carried out on a Genesys 20 Thermo Spectronic, Unicomp spectrophotometer using the optical density method.

Results: The obtained results showed the inhibitory effects of hops extract against *Bacillus subtilis* S499. The bacteria was inhibited by different concentrations of iso- α and β hop extracts, in liquid selective medium, at pH 5.8-6, during 4h and 30min. incubation at 30°C/100rpm. The minimal inhibitory concentration of iso- α acids against *Bacillus subtilis* S499, was 5mg/l and 0,05mg/l of β acids. The medium inhibitory concentration of iso- α -acids was 15 mg/l (50% inhibition), while the for the β -acids it was 0,45 mg/l.

Conclusion: In the present research work we demonstrated that iso- α and β hop extracts showed potent bacteriostatic effect against *Bacillus subtilis* S499, the minimal inhibitory concentration of β acids being 100 fold lower than of iso- α extract, which highlighted that this bacteria was more sensitive to the β acids hop extract.

Keywords: antibacterial activity, *Bacillus Subtilis* S499, hops.

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1,3-PROPANEDIOL BIOSYNTHESIS BY *KLEBSIELLA PNEUMONIAE* DSMZ 2026 FROM CRUDE GLYCEROL

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Introduction: 1,3-Propanediol (PDO) is a valuable chemical compound used in multiple domains such as medicine, pharmacy, biodegradable plastics industry, and in the food sector. *Klebsiella pneumoniae* is a natural producer of PDO directly from glycerol, as the main nutrient source. From the biotechnological point of view, *K. pneumoniae* is a veritable microbial factory by recording impressive yields of PDO at the laboratory scale.

Aims: The aim of this study was to investigate the metabolism and the adaptability of the *K. pneumoniae* DSMZ 2026 in unpurified crude glycerol, and its potential to synthesize PDO.

Materials and Methods: At the laboratory level, *K. pneumoniae* was activated in Columbia medium. For the production of PDO, a batch fermentation containing mineral broth was initiated in a 5 L bioreactor (model Eppendorf, BioFlo 320, one unit) filled with 2L of cultivation media. The productivity of PDO and the growth of the bacterial cells was monitored for 24h.

Results: After 24h of batch cultivation, impressive amounts of PDO were obtained, and the growth of the cells achieved its maximum potential when 20h of cultivation was achieved.

Conclusion: Crude glycerol is a feasible growing substrate for *K. pneumoniae* DSMZ 2026, and a proper source of carbon for the biosynthesis of PDO.

Keywords: *bioreactor, batch fermentation, Klebsiella pneumoniae, 1,3-propanediol*

Acknowledgment: This work was funded by two grants from the Ministry of Research and Innovation, as follows: MCI-UEFISCDI, project number 37-PFE-2018-2020 “Creșterea performanței instituționale prin mecanisme de consolidare și dezvoltare a direcțiilor de cercetare din cadrul USAMVCN”, and the project POC/ID P_37_637, 2016-2020, “Dezvoltarea și modelarea bioprocесelor pentru obținerea de 1,3-propandiol (PD) și acid citric din glicerol brut, cu aplicații în industria alimentară”.

AROMATIC PLANTS - BIO-SOURCES OF ESSENTIAL OILS AND PHENOLIC COMPOUNDS

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Introduction: Aromatic plants have made their way in our lives, providing a diverse source of biologically active principles for food and medicinal purposes. Their volatile oils and polyphenolic content give rise to unaccounted properties like aroma and flavor enhancers, perfumes, cosmetics, and diverse anticarcinogenic, antifungal, antimicrobial, and antioxidant properties.

Aims: This study aimed to extract and determine the chemical composition of three essential oils and further use the post-distillation waste biomass to obtain hydroalcoholic extracts rich in phenolic compounds with multiple applications in the food industry, cosmetics, and alternative medicine.

Materials and Methods: Aerial plant parts were subjected to steam distillation using a 5L copper alembic, and the post-distillation waste biomass was subjected to a 60% hydroalcoholic Soxhlet extraction.

Results: The chemical composition of the essential oils was determined by GC-MS, and the hydroalcoholic extracts were analyzed for total phenolic content and antioxidant activity, and by UHPLC. All extracts have had high antioxidant activity that ranged between 38.48 mg GAE/L and 41.51 mg GAE/L and a remarkable inhibition from 78 to 82%. The total phenolic content was determined by the Folin-Ciocalteu method and varied from 3397 mg GAE/L to 6460 mg GAE/L. UHPLC analysis identified major compounds like gallic, *p*-coumaric, caffeic, and vanillic acids alongside rutin, quercetin, and pyrogallol.

Conclusion: In the present research work, we determined the chemical composition of several essential oils and plant phenolics recovered from waste products (thyme, oregano, and summer savory). Extracts obtained from essential oil waste biomass, with low-cost raw material prices, could be used in food products, pharmaceuticals, for a more sustainable approach on the whole plant.

Keywords: *essential oils, Lamiaceae, polyphenols, waste biomass*

POLYCYCLIC AROMATIC HYDROCARBONS AND HEAVY METALS IN MAIZE KERNELS

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Introduction: The effects of environmental contamination with heavy metals and with polycyclic aromatic hydrocarbons (PAH) on human health has lead in recent years to an increase of the consumers' interest on the quality of food products, being well known that they are hazardous outside a certain range of concentrations.

Aims: The major objective of the present research was to establish the degree of contamination with heavy metals and PAHs for maize kernels and to explore a possible correlation between this contamination and the soil contamination. Experimental maize cultures were established in three different locations: one with historical pollution (Șeica Mare), a second located in an urban area (Cluj Napoca) while the third one is a reference, non-polluted site (Jucu).

Materials and Methods: Maize kernels samples (Turda 200 variety) were grinded and subjected to microwave-assisted digestion, after which lead, cadmium, copper and zinc were determined using a double beam spectrophotometer Shimadzu AA-630. For PAHs analysis, samples were processed using ultrasonic assisted extraction with hexane, this being followed by filtration and concentration to dryness in a rotary evaporator; the obtained residues were redissolved in acetonitrile. High performance liquid chromatography analysis was achieved using an Agilent 1100 system consisting in a solvent degasser, a quaternary pumping system, an autosampler, a column oven, a diode-array detector and a fluorescence detector, separations being accomplished with an Envirosep PP column.

Results: Heavy metals' concentrations were in the following ranges: 0.01 - 0.06 μg/kg lead (with maximum values recorded for samples from Șeica Mare), 0.02 - 0.05 μg/kg cadmium (it was present only in samples from Șeica Mare), 9.15 mg/ kg - 24.68 mg/ kg zinc (minimum for Cluj Napoca, maximum for Jucu, while copper concentrations were between 0.73 mg/kg (Jucu) and 1.49 mg/ kg (Șeica Mare). The recorded concentrations for total PAH's ranged from 3.06 μg/ kg (Șeica Mare), to 9.28 μg/ kg (Cluj-Napoca); the maximum average individual PAH's content were those for low molecular weight compounds, especially for naphthalene (4.19 μg/ kg) and fluorene (1.17 μg/ kg).

Conclusion: The obtained results revealed a low contamination of maize kernels with heavy metals and PAHs, the main contributors being soil pollution and traffic. All values were under the maximum allowed limits established by The European Commission Regulation nr.1881/2006.

Keywords: *cadmium, lead, heavy metals, maize, PAH*

CHARACTERIZATION OF LAVENDER FLOWERS, THEREOF USES AS MACERATE AND DECOCT IN A JELLY PRODUCT

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Introduction: The lavenders (*Lavandula officinalis L.*) are a genus of about 25 - 30 species of flowering plants in the mint family, *Lamiaceae*, native to the Mediterranean region south to tropical Africa and to the many regions of Asia. Lavender is cultivated primarily for its aromatic inflorescences from which the oils are isolated, though its fresh and dried flowers are also marketed (Saadatian, 2013).

Aims: The study aims to incorporate the active principles of lavender flowers (macerate and decoct) into a jelly like matrix.

Materials and Methods: Physico-chemical determinations were performed by standard methods, including total phenolic content, antioxidant capacity, as well as MTT cytotoxic assay of studied material (lavender flowers, thereof macerate and decoct).

Results: The highest value of antioxidant activity was recorded for lavender flower decoct (80.09%), surpassing the value of the macerate (77.83%). As expected, the largest polyphenols content was found in the lavender flowers (200.18 mgGAE/ 100g), followed by the products obtained by decoction and maceration, the lowest amount being recorded for the jellies. No cytotoxic effects were found, the lavender flowers macerate recorded cell viability values higher than the decoct.

Conclusion: The lavender flowers, thereof macerate and decoct showed high antioxidant capacity and total polyphenol content, being recommended as an innovative food ingredient in jelly production. The lavender flowers macerate and decoct proved no cytotoxic effects, the results indicating a healing effect. The obtained jellies present a very intense lavender aroma, as well as satisfactory bioactive content.

Keywords: *decoction, jelly, lavender, maceration*

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SYNERGISTIC ORGANOGELS WITH APPLICABILITY IN CHOCOLATE SPREADABLE PRODUCTS

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Introduction: Saturated fats are responsible for the sensorial and textural properties (plasticity, spreadability, hardness) of many foods, including chocolate. Oleogels are new lipid system that show a solid structure, while the oil inside remain mainly a liquid entrapped by using different strategies (crystallization, self-assemble molecules, templated emulsions, etc.)

Aims: The purpose of this work was to obtain oleogels from highly unsaturated oils for the development of chocolate spreadable products.

Materials and Methods: Different oleogels samples were prepared from sunflower or flax seed oils and 5% lipid structurants, including sunflower wax (SW), beeswax (BE) and lecithin. The chocolate spread samples were obtained in a laboratory ball mill. The texture profile analysis of oleogels and chocolate spreads was performed by CT3 Brookfield Texture Analyzer.

Results: Firstly, a proper oleogel formulation was developed by using different waxes and lecithin mixtures as lipid structurants. Secondly, the developed oleogel samples were used for palm oil replacement in chocolate spreads in order to obtain alternative products rich in unsaturated fatty acids. Based on studied texture parameters, the oleogels samples showing the highest hardness values (141g) were selected for further use in chocolate spreads. Chocolate spread samples optimum composition was found for 53% sugar, 25% flax seed oil oleogel structured by SW and BE, 10% flax seed oil oleogel structured by SW, BE and lecithin, 7% cacao powder and 5% roasted hazelnuts.

Conclusion: Unsaturated vegetable oils were gelled with specific mixtures of lipid structurants, an innovative chocolate spread being developed, while sensory and instrumental texture profile were assessed.

Keywords: *chocolate spread, oleogel, organogel, texture profile analysis.*

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OLEOGEL BASED PUFF PASTRY FILLED WITH MEDLAR JELLY

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Introduction: Puff pastry products are well known for their high *-trans* and saturated fat content. Several dietary guidelines suggested a reduction in saturated fat consumption to max. 10% of daily energy. Moreover, very recently according to Commission Regulation 2019/649 it was stated that in the food intended for the final consumer, the content of *-trans* fat shall not exceed 2 grams per 100 grams of fat.

Aims: The aim of current work was to develop and assess fat compositions for puff pastry products obtained by total or partial replacement of saturated fat with compatible structured unsaturated lipids - organogels or oleogels.

Materials and Methods: Puff pastry products were obtained by a conventional method in the bakery pilot plant, the shortening fat being partially or totally replaced by oleogels. The texture profile analysis (5 mm target distance, 1 mm/s test and post-test speed, trigger load 1g) of oleogels was performed by CT3 Brookfield Texture Analyzer, equipped with 10 kg load cell and the sphere probe (TA18; 12.7mm). The Texture Texture Pro CT V1.6 software was used.

Results: Sunflower or pumpkin seed oils oleogel samples were obtained by using rice bran wax, sunflower wax and beeswax. The oleogel sample with the highest hardness value (169g) was selected for the replacement of regular fat on puff pastry compositions. The newly obtained pastry products were filled with medlar fruit (*Mespilus germanica*) pulp jelly.

Conclusion: The developed products showed similar techno-functional features while having a new medlar taste, presenting also a low content of cholesterol, *-trans*, saturated, interesterified or hydrogenated fats.

Keywords: *medlar, oleogel, puff pastry, saturated fat, texture profile analysis*

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THE INFLUENCE OF REVERSE OSMOSIS AND PASTEURIZATION OF WINE ON ITS PHYSICAL-CHEMICAL PROPERTIES

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Introduction: Reverse osmosis is currently being used in various fields but for winemaking it is often used to obtain wine with low degrees of alcohol (Massot, 2008). Pasteurization is a procedure applicable to wine for biological and enzymatic stability that can prevent casse or the development of indigenous microbiota (Cotea, 2019).

Aims: The climate conditions in 2018 have negatively influenced the grapes' health and the crops were affected by mildew. The purpose of these experiments is to improve the quality of wines in the case of affected raw materials by using fast stabilization techniques.

Materials and Methods: The wine samples were from Iași wine region by „Fetească regală” local grape variety. The final wine was pasteurized and also treated with reverse osmosis. As a comparison, some samples were treated with active coal, used in oenology for its indiscriminative absorption properties. We obtained two variants of pasteurized wine and eight after the osmosis process which were assembled together through crossing. The physical-chemical parameters were investigated following the OIV analysis methodology (OIV, 2018).

Results: For each sample the analysed parameters were different. We concluded that the pasteurization process decreased the volatile acidity and that reverse osmosis decreased the alcoholic degree. As expected, the treatment with active coal also contributed to decreasing volatile acidity and also the sugar contents.

Conclusion: The modern procedures used in this study can be used when the wine has some parameters that can be risky for its stability health. For example if the wine has high volatile acidity it can be stabilized by pasteurization and if the alcohol degree is high reverse osmosis can be used to reduce it.

Keywords: *reverse osmosis, pasteurization, wine*

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EFFECT OF GRAIN MOISTURE CONTENT ON POPPING YIELD OF SORGHUM GENOTYPES

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Introduction: Pop sorghum is a popular healthy snack food. Popping is a simultaneous starch expansion process, during which grains are exposed to high temperatures for short time. Factors which influence popping qualities of sorghum seeds are season, varietal difference, grain characteristics such as moisture content, composition of grain, physical characteristics, types of endosperm, and also the method of popping.

Aims: This paper aimed at providing popping characteristics of different sorghum genotypes according to different moisture content at traditional methods of popping.

Materials and Methods: For the purpose of increasing grain moisture level, six sorghum genotypes - mutant and hybrid lines (M1(6282), 1641, 1643, 1673, 16113, 16121) were soaked to 60, 120 and 180 min. Each sample (500 grain) was placed in an iron pan, containing 10g of salt maintained at a temperature of 160°C, covered with a lid and stirred briskly for 40 to 60 seconds. The samples were analysed in triplicate for popping percentage, popping volume and expansion volume. Manually separated the mixtures of unpopped and popped sorghum grain. Some grain characteristics (pericarp colour, grain diameter, 1000-grain weight) were also observed.

Results: The highest influence on popping yield had 12-14% grain moisture level in all genotypes. Mutant line M1(6282) (dark brown colour of pericarp), 16113 (red colour of pericarp) and hybrid line 1643 (white colour of pericarp) stood out with relatively better popping characteristics and particle size of popped grains regardless of the humidity of the seeds. There was a high correlation between the number of popped sorghum grains and the 1000-grain weight ($r = 0.831$).

Conclusion: We analysed different moisture levels which are influencing better popping efficiency with minimum time and energy requirement. Grains with 12-14% moisture showed the highest pop volume and expansion. There is a need to optimize processing methods and factors which governs the popping characteristics of sorghum grains in order to get high popping yield, less un-popped kernels and higher expansion volume.

Keywords: *expansion ratio, moisture, popping, popping yield, sorghum.*

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TRACE ELEMENT CONTENT OF POLYFLORAL HONEY AND BEESWAX FROM THE VICINITY OF NON-FERROUS METAL PLANT

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Introduction: Honey is sweet substance produced by honeybees (*Apis mellifera*), mainly from the nectar of various plants. Bee and their products occupy an important place in the trophic chain "toxicant-soil-plant-bee-bee product-man". There bees have a filtering ability against the toxins and give an indication of environmental pollution. They send signals in two ways: by high mortality and/or by deposition of pollutants in bee organism or in bee products.

Aims: Aim of the present study was to analyse trace element content of polyfloral honey and beeswax, produced in three beehives, situated in the vicinity of non-ferrous metal plant (KCM 2000) and to assess the hazardous risk at consummation.

Materials and Methods: Non-ferrous metal plant "KCM 2000"-Plovdiv is the biggest company for Pb and Zn production in SE Bulgaria. Its vicinity is one of the hot-spots in the country in terms of heavy metal pollution. For the purposes of the study, three beehives in this area have been chosen, as follows: BH1 – located at distance of 3.8 km from the smelter, SW; BH2 - located at distance of 4 km, NE; BH3 – located at distance of 4.6 km, SE. Representative polyfloral honey and beeswax samples have been obtained by certified beekeepers. Content of some trace elements (Al, Cu, Fe, Pb, Zn) was determined by inductively coupled plasma–mass spectrometry (Agilent 7700 ICP–MS).

Results: Data observed in this preliminary study showed approximately low content of heavy metals and toxic elements. Beeswax samples were found to contain significantly more Al, Cu, Fe, Pb and Zn, in comparison with the honey samples ($p < 0.05$). Exception was found only for Al in BH3 plot. On the basis of the trace elements content in bee products, the hazardous risk at consummation could be arranged in the following descending order: BH2 > BH1 > BH3.

Conclusion: Concentrations of trace elements in the studied honey and beeswax samples were approximately low. Spatial and seasonal fluctuations of heavy metals and toxic elements should be a subject of our future studies for confirmation of their high quality as food.

Keywords: *bee, beeswax, biomonitoring, honey, metal pollution, Plovdiv*

SOIL SALINITY INFLUENCE ON GROWTH AND DEVELOPMENT OF *OCIMUM BASILICUM* L.

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Introduction: Soil salinity stress is frequently encountered in crops as incorrect agricultural techniques are used. Excessive salt may induce alterations of plant functions. Assessments must be performed to find species suited for affected soils (1).

Aims: Establishing salinity influence on processes involved in development of basil plants and the suitability of cultivating this species, an important crop of culinary and medicinal interest, on saline terrain.

Materials and Methods: Seeds bought from a specialised store and peat based substrate were used for germination. NaCl was applied in 4mM, 10mM and 20mM. Chlorophyll and carotenoid pigments (2), total phenolic content (3) and cytogenetic analyses were performed.

Results: Chlorophyll fluorescence decreased, during 2 weeks of treatment. Salinity determined increased flavonoid and total phenolic contents and reduced chlorophyll contents, similarly to (2) and (3). Cytogenetic analysis showed that salt stress in young basil plants leads to variations of the cell cycle. Anatomical analysis indicated that on higher NaCl concentration the number of xylem vessels increased, to compensate dehydration, similarly to (2).

Conclusion: Considering that basil plant grew under salinity stress, basil crops appear suited for salinity affected fields, with positive effects on the economic value of the crop.

Keywords: *basil, salinity, stress*

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NEW ROMANIAN DISEASE RESISTANT PEAR GENOTYPES FRUITS EVALUATED THROUGH SENSORIAL ANALYSES

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Introduction: In the last years, pear orchards decreased in Romania due to specific pest and diseases difficult to control. In Voineşti Research Station for Fruit Growing new Romanian disease resistant pear genotypes were released and specific research is necessary.

Aims: The aim of this study is to present the fruit quality evaluation using sensorial analyses of some new Romanian disease resistant pear genotypes.

Materials and Methods: Four varieties (Corina, Euras, Orizont, Romcor) and two new hybrid selections (R3-146-F, H12-83-79) grafted on quince (CTS 212), on pear (Farold 40) and on own roots, in vitro propagated, were analysed. The trees are produced at the Voineşti Research Station for Fruit Growing and planted in the Experimental Orchard of the Faculty of Horticulture within the USAMV of Bucharest. Two canopy shape were used. The planting distances varied from 3.0 x 0.8 m, for Parallel U to 3.0 x 1.6 m, for Trident canopy. An integrated technology is applied, including drip irrigation. The sensorial analyses parameters monitored were: fruit size, fruit colour, attractiveness, firmness, pulp juiciness, pulp colour, taste and flavour. The target group was formed by the general public. The basic analyses like average weight, size, total soluble solids, dry matter and firmness were calculated and correlated with the sensorial analyses parameters.

Results: A comparison between the tested fruits according to the consumer preferences is presented. The best appreciations were received by the R3-146-F hybrid and Euras grafted on quince and also on pear. Significant correlation were calculated and observed between the attractiveness parameter and the measured fruit size, the appreciation of the fruit size and the measured one, the parameter taste and the total soluble solids measured.

Conclusion: The new Romanian disease resistant pear genotypes can be promoted for being cultivated on large orchards. Interesting results of the sensorial evaluations revealed that the bigger fruits with a higher quantity of sugars were more appreciated by the consumers. Important biochemical parameters for all the cultivars are compared.

Keywords: *Corina, Euras, Orizont, Pyrus communis, Romcor*

SEED GERMS - FUNCTIONAL INGREDIENTS IN JELLY STARCHY FOODS

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Introduction: The grain is mostly consumed as a whole grain or flour; however, protein fraction is concentrated in the germ, which is external, represents one third of the whole seed and surrounding the perisperm, composed mainly of starch (1).

Aims: The aim of this study is to propose innovative jelly starchy foods with the addition of quinoa germs and radish germs.

Materials and Methods: Functional ingredients in jelly starchy foods were subjected to physico-chemical and organoleptic analyses. Determination of total phenolic content was performed by Folin-Ciocalteu assay and antioxidant activity by DPPH assay.

Results: We presented the technology for making Turkish delight with the addition of quinoa germs and radish germs, thus obtaining 4 prototypes that were subjected to physico-chemical determinations; Quinoa is a pseudocereal with remarkable nutritional characteristics due to high content of gluten-free biologically valuable protein. The total polyphenol content differs significantly from one sample to another, in the case of the quinoa germ supplement sample there was a value of 193.15 (mg GAE/100g), and in the case of the quinoa germ and radish germs recorded the highest value of 543.44 (mg GAE/100g). Compared with whole quinoa, the germ doubles the protein content and triples the lipid content.

Conclusion: The product has numerous practical applications due to its high nutritional value, and could be used as a dietary supplement in the formulation of foods for the celiac population, athletes, children or the elderly that require protein diets.

Keywords: *germ, protein enrichment, starch, quinoa*

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ANTIOXIDANT ACTIVITY OF SOME EDIBLE FLOWERS FROM BULGARIA

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Introduction: Recently, there has been a considerable interest in finding natural antioxidants from plant materials to replace the synthetic ones. The edible flowers represent a valuable alternative source of bioactive compounds in this regard and have been used as food and herbs with increasing interest.

Aims: The present research paper was aiming to explore the antioxidant potential of seven edible flowers, which could serve as food ingredient- a topic still growing interest in Bulgaria.

Materials and Methods: The antioxidant properties of 7 edible flowers of the South Bulgaria, including *Viola tricolor*, *Cucurbita pepo*, *Sambucus nigra*, *Calendula officinalis*, *Hibiscus rosa-sinensis*, *Rosa damascena*, and *Allium ursinum* were evaluated by six different methods (DPPH, ABTS, FRAP, CUPRAC, ORAC and HORRAC assays). The contents of flower chemicals, such as total phenolics and total flavonoids content, were determined as well.

Results: The results showed that among all investigated extracts the highest antioxidant activity was found in the *Rosa damascena* and *Viola tricolor* ones. By comparing decoction and infusion as methods of extraction, the decoction ones revealed to be the most appropriate in respect of the evaluated compounds. The established total polyphenol content in the decocts of *Rosa damascena* and *Viola tricolor* was 56.66 ± 0.48 and 135.82 ± 1.50 mg GAE/g dw and the total flavonoids were 28.60 ± 0.43 and 15.87 ± 0.52 mg QE/g dw, respectively.

Conclusion: With the present research work, we demonstrated that the edible flowers can be a prominent source for biological active substances obtained from the nature.

Keywords: *antioxidant activity, edible flowers, water extracts*

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PHYTONUTRIENTS AND ANTIOXIDANTS ACTIVITY OF EXTRACTS FROM FIVE EDIBLE FLOWERS USED IN CULINARY

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Introduction: The application of edible flowers in human nutrition, increased constantly due not only to their decorative purposes and flavor enhancing properties, but also because they are a source of phytonutrients and antioxidants with healthy effect. The trend in consumption of edible flowers includes also application of petal extracts. However, the bioactivity of extracts fit for culinary purposes have still remained unrevealed.

Aims: The aim of the current study was to evaluate the natural pigments, phenolic compounds and antioxidant potential of water and 95% ethanol extracts five edible flower species - snapdragon (*Antirrhinum majus*), carnation (*Dianthus plumarius*), garden geranium (*Pelargonium hortorum*), petunia (*Petunia integrifolia*) and dahlia (*Dahlia decorative*).

Materials and Methods: Edible flowers extracts were obtained by ultrasound-assisted extraction and the yields were defined. Total chlorophylls, carotenoids, anthocyanins, as well as the total phenolic and flavonoids content were evaluated. Phenolic acids were detected by HPLC-DAD method. Antioxidant activities were evaluated by DPPH and FRAP methods.

Results: Water extracts gave higher extraction yields. In general, the total phenolic content and total flavonoid content dominated in water dry extracts. The highest carotenoids and total anthocyanins content were detected in snapdragon and dahlia, respectively. The total phenolic content dominated in water extracts of petunia, garden geranium, carnation and snapdragon demonstrated high values - above 30 mg GAE/g of dry extract. Sinapic acid was detected in all investigated edible plants. Gallic, caffeic, chlorogenic, p-coumaric, rosmarinic, sinapic and ferulic acid were detected only in carnation. Antioxidant activity was the highest in ethanol extracts of petunia, garden geranium, carnation by FRAP method.

Conclusion: The current study demonstrated the future application of water and 95% ethanol extracts from edible flowers for culinary purposes.

Keywords: *antioxidants, phenolic compounds, edible flowers, pigments*

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CHEMICAL CHARACTERISTICS AND TEXTURE ANALYSIS OF BISCUITS ENRICHED WITH SELENIUM AND JERUSLAEM ARTICHOKE FLOUR

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Introduction: The improvement of functional and healthy properties of cereal products by incorporation of different flours increased constantly. Jerusalem artichoke flour (JAF) from tubers is a rich source of inulin and polyphenols, that should improve nutritional and sensory properties of biscuits.

Aims: The aim of the current study was to evaluate nutritional values and textural properties of biscuits with the partial substitution of wheat flour with JAF.

Materials and Methods: Butter biscuits were formulated from a mixture of wheat flour with selenium content 0,01 mg/kg and different content of JAF (5. 7.5 and 10 %). The moisture, ash, protein, fat and carbohydrate content, selenium, the total phenols, flavonoids and antioxidant activity of JAF and the prepared biscuits were determined. To evaluate the textural properties of biscuits the rupture and deformation forces were measured by texture analyzer.

Results: The moisture content was in the range of 5-7 %, ash content was 0.8-1.0 %, protein 15-18 %, and lipid 18-20 %. Biscuits prepared with 10 % JAF flour demonstrated the highest inulin content (3.41 %) and the highest total phenol content in 22.99 mg GAE/100 g dw. The highest values of total flavonoids content and antioxidant activity by FRAP method were detected in biscuits with 7.5% JAF flour – 56.77 QE/100 g and 588.3 mM TE/100 g dw, respectively. The selenium content in sweet butter biscuit did not exceed the recommended levels of daily intake. The results from texture analysis showed that with increasement in JAF content in biscuits, the rupture force also increased, as biscuits prepared with 10% JAF flour was characterized with the highest rapture force 29.2 N and the lowest deformation force 0.43 mm.

Conclusion: Moreover, the formulation containing 7.5% JAF and 82.5 % wheat flour, with 25 % added sugar showed the highest rate of acceptance, resulting a healthier alternative, with balanced energy content, high natural prebiotics (inulin and fructooligosacharides, Se and antioxidants content.

Keywords: *biscuits, Jerusalem artichoke flour, inulin, selenium, texture analyzer*

Acknowledgment: This research was supported by the National Science Fund of „Competition for Financial Support for Fundamental Research - 2076", Project Code IH 06/1 (15.03.17), Ministry of Education and Science, Bulgaria

EFFECT OF PRESSURE LIQUID EXTRACTION AND ULTRASONIC IRRADIATION ON INULIN, PHENOLIC CONTENT AND ANTIOXIDANT ACTIVITY IN *CARLINA ACANTHIFOLIA* L. ROOTS

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Introduction: *Carlina acanthifolia* L. roots is a medicinal plant that is traditionally used in the treatment of various disorders, including stomach and skin diseases in addition to antimicrobial, anti-inflammatory, anti-ulcer application. These pharmacological properties are due to many bioactive compounds. However, the content of some substances depends on extraction procedure and used solvents. Nowadays, the application of “green” methods for extraction of natural compounds has gained more and more attention. In addition, the detailed information about inulin-type fructan in extracts from *Carlina acanthifolia* L. roots is still absent.

Aims: The object of the current research was to determine inulin and sugars content, phenolic content and antioxidant potential in 70 % ethanol and water extracts obtained by two “green” extraction methods: pressure-liquid extraction and ultrasound-assisted irradiation.

Materials and Methods: The content of total fructans, as well as inulin and sugars were analyzed by resorcinol-thiourea and high-performance liquid chromatography with refractive index detection. Total phenols and flavonoids were estimated using standard chemical assay procedures. Antioxidant activity was evaluated by four reliable methods (DPPH, ABTS, FRAP and CUPRAC).

Results: Inulin content varied from 0.5 to 11.2 g/100 g dw in prevalence of the ultrasound-assisted extract of the residues by the pressure liquid extraction. Total fructans values reached 15.3 ± 0.2 g/100 g dw in roots of *Carlina acanthifolia* L. Total phenolic content was 10.96 mg GAE/g dw. Additionally, the established antioxidant activities varied between 5.99 ± 0.28 and 205.83 ± 1.05 μ M TE/g dw.

Conclusion: The current study revealed *C. acanthifolia* roots as potential source of biological active substances with beneficial properties. The content of inulin dominated in water extracts in comparison with 70 % ethanol samples. The water extraction with ultrasound-assisted irradiation following the pressure liquid extraction demonstrated higher levels of bioactive compounds, probably due to cavitation process.

Keywords: *antioxidant activity, Carlina acanthifolia, inulin, pressure liquid extraction, ultrasound-assisted extraction*

IMPROVING THE QUALITY AND SHELF LIFE OF KAPIA PEPPER PASTE BY ADDITION OF ESSENTIAL THYME OIL

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Introduction: The Kapia varieties (*Capsicum Annuum* L.) are the best-known type in the Balkans. They are also in demand for the processing industry, as they do not rot during transport, the skin is very thick but can be pulled off after roasting and is easily digestible. Thyme essential oil contains more than 60 ingredients, most of which possess important antioxidant and antimicrobial properties.

Aims: The aim of this research was to highlight the importance of essential thyme oil as an effect on quality and storage stability of the kapia pepper paste.

Materials and Methods: The kapia pepper paste were produced by in-house methods to which was added a progressive quantity of thyme essential oil 0, 25, and 50 μl/100 g product. All three experimental samples obtained were stored at room temperature for 8 months during the experiments. The samples were analyzed for determination of acidity, pH, Brix value, ash content fat content and yeast and mould determination (DRBC culture medium). Total phenolic contents (TPC) were determined calorimetrically using Folin-Ciocalteu reagent with Gallic acid as the standard and antioxidant capacity was determined by DPPH (1,1-diphenyl-2-picrylhydrazyl) radical method. The Sensory Analysis was performed by 5 points hedonic scale.

Results: It was found that essential thyme oil had an inhibitory effect on yeasts and moulds in the samples in which it was added. The antioxidant activity increased with increasing concentration of polyphenols. The TPC was proven to be high (23,79 GAE/100 g product) at higher concentrations of thyme essential oil and lower concentrations in the sample without essential oil (20,17 GAE/100 g product). In relation to the consumer preference, the kapia pepper paste with the highest added thyme essential oil of 50 μl/100 g product, it was in consumer preferences.

Conclusion: The study showed the impact to use thyme essential oil in kapia red pepper paste production both for taste and shelf safety.

Keywords: *kapia pepper, paste, safety, thyme oil*

POTENTIAL OF PICKLE BRINE AS FUNCTIONAL INGREDIENT IN DEVELOPING OF A NEW TYPE OF KETCHUP

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Introduction: Pickles are preserved by a combination of increased acidity (reduced pH), added salt, reduced moisture and added spices. Brine properties change with the completion of fermentation. Additional changes in the brine may occur due to undesired microbial activity at any time during the active fermentation process and long term storage.

Aims: The aim of this research was to developed of new type of functional ketchup with pickle brine, no added sugar and food additives as a healthy alternative to ketchups marketed in Romania.

Materials and Methods: Preserved cucumbers by lactic fermentation in safe conditions for the consumer it was performed. Fermentation control was performed by monitoring the quality of the pickle brine liquid during fermentation to identify the amount of lactic acid and acetic acid by HPLC (controlled at 14,21, 42, 49 days after). A new type of ketchup with added cucumber brine was obtained in different concentrations (5%,10%,15%,20%) to see the optimal variation resulting from physico-chemical and microbiological analyses.

Results: Chromatograms show that the cucumber brine controlled after 42 days shows the highest amount of lactic acid, which is why it was used to obtain ketchup. As for acetic acid, it increases with the amount of lactic acid, but its value is always below the lactic acid value, less this happens on day 49 when the lactic acid value (34,68 g/L) is exceeded by the acetic acid value (40,70 g/L), which encourages us to consider optimally stopping fermentation at 42 days and collecting brine to obtain the new ketchup type. The lactic acid/acetic acid ratio in lactic fermented products it was an indicator of their sensory quality, which may affect the taste and aroma of the products.

Conclusion: The presence of lactic acid, considered a biologically active compound identified by HPLC and the safety of the pickle brine by microbiologically point of view, has the potential of a functional ingredient.

Keywords: *cucumber brine, ketch-up, functional, lactic-acid fermentation*

ANTIMICROBIAL PULVERISABLE SOLUTION FOR TREATMENT OF HARD PASTE CHEESE DURING MATURATION

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Introduction: The addition of antimicrobial substances to foods can be used to improve the safety of foods. Plants and plant products represent a source of natural antimicrobial substances to be used in foods because many of them have been reported to possess antimicrobial activity (Rattanachaikunsopon and Phumkhachorn, 2010). Essential oils are generally extracted by distillation and their antimicrobial or biological activities are directly correlated to the presence of the bioactive volatile components (Calo *et al.* 2015). The benefits of basil and thyme have been known since ancient times, because they were used as medicinal herbs under the form of tea and ointments to treat various diseases, but also as aromatic plants.

Aims: The study's aim was to reduce the significant economics losses in the industry due to the contamination of hard paste cheese during maturation used an sprayable solution with essential oil from basil and thyme.

Materials and Methods: EO were extracted by using a Clevenger-type apparatus (for 3 hours). The minimum inhibitory concentration (MIC) of the oil samples were assessed against five bacteria strains using the microdilution method. Application of the sprayable solution on cheese samples and evaluation of the antibacterial and antifungal activity during 21 days.

Results: Sample tested have a potent bactericidal activity against Gram + ve bacterial strain *S. aureus* and showed a moderate or weak bactericidal effect against the Gram - ne strain *S. enteritidis*. The total number of yeasts and moulds and the load of *S. aureus* of the cheese samples treated with the spray solution was lower than for control samples.

Conclusion: The results may suggest that new sprayable solution with essential oils from basil and thyme possess compounds with antimicrobial activity, and this solution can be used as natural antioxidants in food application.

Keywords: *antimicrobial activity, basil, cheese, thyme*

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EFFECT OF *SPIRULINA PLATENSIS* FORTIFICATION ON MICROBIOLOGICAL, PHYSICOCHEMICAL AND SENSORY PROPERTIES OF YOGURT DURING STORAGE

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Introduction: Yogurt is one of the most popular fermented milk products in the world, and contains beneficial viable micro-organisms that compete with pathogenic bacteria for nutrients and space (Noh *et al.* 2013). Addition of *Spirulina platensis* microalgae to traditional foods has received increasing attention because they are full of nutritional wonders and promising sources of bioactive compounds in order to increase functional product characteristics (Sengupta *et al.* 2018).

Aims: In this study, it was investigated the effect of yogurt supplementation with four different levels (0%,1%,3%,5%) of microcapsules with *Spirulina Platensis* on growth of the lactic acid bacteria. Also, sensory properties of the final product immediately and during storage for 21 days were investigated.

Materials and Methods: The number of lactic acid bacteria was determined on the MRS and M17 agar after 48/72 h of incubation at 37°C. Each yogurt sample was stored for 0, 7, 14, and 21 days at 4°C in a refrigerator to evaluate the physicochemical and sensory properties. Each batch of yogurt was made in duplicate

Results: The addition of 3% of *Spirulina* was significantly ($p < 0.05$) sufficient to conserve the microbiological and antioxidant properties and sensory acceptability of the final product. Results showed that the yogurt supplementation significantly improves the stability of the lactic acid bacteria, due to the essential amino acids, fatty acids, vitamins and many essential minerals and enzymes found in high quantity in *Spirulina Platensis* powder.

Conclusion: This research identified that the rich additions in polyphenolic compounds, fibres and vitamins could be potentially considered as a source of ingredients for yogurt supplementation

Keywords: *lactic acid bacteria, Spirulina Platensis, yogurt*

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THE EFFECT OF SOME FOREST BERRY FRUITS ON PHYSICOCHEMICAL AND SENSORY PROPERTIES OF YOGURT SHELF LIFE

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Introduction: Yogurt is very nutritious and fortified with fruits can provide an important concentration of biologic active compounds, as phenolic compounds with antioxidant activity.

Aims: The aim of the present study was to reports the effect of black mulberry (*Morus nigra*), black chokeberry (*Aronia melanocarpa*) and blackberry (*Rubus fruticosus*) fruits on some physicochemical parameters and sensorial properties of yogurt during refrigeration, compared to untreated yogurt.

Materials and Methods: Yogurt was prepared from cow milk, provided from a farm near Bucharest. The fruits used for the experiment were bought from a local market. Fruit puree was added at 0% and 5% (w/v). Yogurt samples were collected after 0, 3, 6 and 9 days of refrigeration for analysis of several parameters [pH, total acidity, syneresis, total phenolics content (TPC), anthocyanins concentration, antioxidant activity (AA), TBARS value, protein carbonyl content and sensorial properties]¹.

Results: Comparatively with control samples, the total acidity of treated samples decreased in the first 4 days and then increased slightly. The highest TPC was found in samples treated with black mulberry, and the highest AA in the samples treated with black chokeberry. Comparatively with untreated samples, in all samples treated with berries, syneresis and TBARS value were lower. Protein carbonyl values showed no significant differences ($p>0,05$) between the yogurt samples. The sensory evaluation results revealed no statistical differences ($p>0,05$) between the acceptability of the three types of yogurt.

Conclusions: The addition of black mulberry (*Morus nigra*), black chokeberry (*Aronia melanocarpa*) and blackberry (*Rubus fruticosus*) fruits on yogurt significantly enhanced the lipids oxidative stability, decreased syneresis and modified its sensorial properties in the acceptability limits.

Key words: *antioxidant activity, lipid and protein oxidation, syneresis, yoghurt*

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THE EFFECT OF REFRIGERATION PERIOD ON SOME PHYSICOCHEMICAL PARAMETERS OF ROMANIAN MINCED MEAT ROLLS (MITITEI)

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Introduction: Romanian minced meat rolls (“mititei”) are prepared from minced meat, garlic, spices, and sodium bicarbonate. Many Romanian consumers adore those meat products. To answer numerous requests minced meat rolls are stored by refrigeration / freezing.

Aims: The aim of the present study was to carry out a comparative study regarding the relationship of the stability of minced meat rolls during refrigeration and food additives.

Materials and Methods: Four types of minced meat rolls (three sold in Romania and one prepared in laboratory conditions) made from pork and beef, bacon, salt, sodium bicarbonate and spices were analyzed. The minced meat rolls were stored by refrigeration for 10 days. The physicochemical parameters evaluated were pH, water holding capacity during storage¹, color (Mb, MMb, MbNO), stability to rancidity of fats (TBARS)², nitrite and phosphate concentration³.

Results: The pH ranged from 7.23 - 7.73 (day 0) and 4.87 - 5.01 (day 10). There were no significant differences between the water holding capacity during refrigeration ($p > 0.5$). During refrigeration, the minced meat rolls prepared in the laboratory had a significantly higher concentration in metmyoglobin ($p < 0.5$) and significantly lower concentration in nitrosmyoglobin ($p < 0.5$). TBARS increased during refrigeration and was significantly higher in minced meat rolls prepared in the laboratory on days 8 and 10 ($p < 0.5$). No significant differences were found between nitrite and phosphate content in the three types of commercially available minced meat rolls.

Conclusions: Nitrite and phosphate play essential role in maintaining colour, aroma and water holding capacity in minced meat rolls stored by refrigeration.

Key words: colour, rancidity, romanian minced meat rolls (“mititei”), water holding capacity

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APPLE SCAB RESISTANT CULTIVARS FRUITS CHARACTERIZED THROUGH SENSORIAL ANALYSES

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Introduction: Apple scab (*Venturia inaequalis*) is one of the most important pathogen for apples, specific treatment being required. Every year, new resistant apple scab varieties are released by breeders that need to be tested in specific growing conditions.

Aims: The aim of this study is to present the fruit quality evaluation through sensorial analyses of more than 25 apple scab resistant cultivars cultivated in Bucharest area.

Materials and Methods: In the Experimental Orchard of the Faculty of Horticulture within the University of Agronomic Sciences and Veterinary Medicine of Bucharest more than 25 apple varieties are cultivated and monitored. Most of the trees are grafted of M9 rootstock, planted at 3.5 x 1.0 m and led as Vertical Axe. An integrated technology is applied, where the soil is maintained covered with a mixture of perennial grasses on the inter-row and clean with herbicide on the row. Drip irrigation is installed.

Results: The researches were conducted in 2018 period in two stages, monitoring the quality of fruits for two seasons, autumn and winter. The apples varieties were tested with different types consumers by gender and age including size, colour, attractiveness, firmness, pulp juiciness, pulp colour, taste and flavour. The basic biometrical analyses like average weight, total soluble solids, and firmness were calculated and correlated with the sensorial analyses parameters. The results show that tested fruits received good appreciations from the consumers. The parameters: fruit size, colour, pulp juiciness and colour received the biggest notes.

Conclusion: Conclusions stated that several apple scab resistant cultivars can be proposed to be introduced in large orchards for production, due to their fruit quality evaluation. At the first evaluation, Dalinette and Generos received the best appreciations. Florina and Enterprise were at the second evaluation with the best notes given by the consumers.

Keywords: *firmness pulp, juiciness, Malus domestica, pulp colour, taste*

STANCE4HEALTH EU PROJECT: SMART TECHNOLOGIES FOR PERSONALIZED NUTRITION AND CONSUMER ENGAGEMENT

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Introduction: The world is currently facing a Nutritional Transition, which has been onset by an obesogenic food environment resulting from a global adoption of the Western diet. Non-Communicable Diseases such as obesity, type 2 diabetes and metabolic syndrome are now collectively responsible for almost 70% of all deaths worldwide.

Aims: The overall objective of Stance4Health is to adopt of a better personalised nutrition based on the use of smart mobile technologies as well as tailored food production, which will optimize the gut microbiota activity.

Materials and Methods: Stance4Health will set out to accomplish these six specific objectives: 1. Definition of a high-quality metabolic network of the human gut microbiota and insights into how the network is affected by foods and culinary practices; 2. Development of food databases to be implemented the mobile app; 3. Development of a dietetic software for consumers; 4. Design of customized foods for specific (vulnerable) target groups (celiac disease, food allergies, overweight); 5. Citizen engagement with personalised nutrition; 6. Validation of the smart personalised nutrition strategies in adult and children populations, in a near to operational environment.

Results: Stance4Health will develop a novel ICT application that will provide individualized counselling about what foods are more recommendable to food retailers and super- or hypermarkets according to the overall needs/preferences of consumers.

Conclusion: The specific personalised nutrition tools developed along Stance4Health will be based on robust scientific evidence and knowledge from different fields like nutrition, medicine, food sciences, microbiology, computer sciences, and social sciences and humanities like economics, marketing, psychology and social anthropology.

Keywords: *consumer, nutrition, personalised, smart technology*

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3. <http://www.stance4health.com/>

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EXCORNSEED EU PROJECT: SEPARATION; FRACTIONATION AND ISOLATION OF BIOLOGICALLY ACTIVE NATURAL SUBSTANCES FROM CORN OIL AND OTHER SIDE STREAMS TO BE USED IN FOOD, SPECIALTY CHEMICALS AND COSMETIC MARKETS

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Introduction: Using biomass as raw material for high valuable products is an economical possibility and is the driving force for the development of biorefinery complexes. In biorefinery, almost all types of biomass feedstocks can be converted into useful outcomes for a row of markets through applying diverse technologies.

Aims: The EXCornsEED project aims to exploit the convergence between science, chemistry, biology, engineering and biotechnology tools for the creation of new knowledge and innovative applications, with the main goal to develop and validate an integrated process of innovative and highly sustainable extraction/purification/concentration technologies to be applied to biorefineries side streams (i.e. corn oil, thin stillage from bio-ethanol and rapeseed meal from biodiesel production).

Materials and Methods: A three-step approach will upscale the EXCornsEED process from lab level (few grams, TRL3) up to industrial pilot (1t/d capacity, TRL5) by extracting, purifying and concentrating high valuable products for the recovery of proteins and several other bio-active compounds (i.e. polyphenols, amino acids, fibers, lipid compounds, alkaloids and tannins, etc.).

Results: The concurrent presence of biotech producer, technology experts and product companies will guarantee the commitment towards a real market-driven project. Thus, proteins, and different bioactive ingredients will be obtained by extraction methods from industrial bio-refinery by-products and characterised within the markets of food, cosmetics and specialty chemicals.

Conclusion: EXCornsEED project will transform traditional bioethanol production in a future biorefinery concept, fully in line with EU strategies for a bio-based economy.

Keywords: *biorefinery, by-products, valorisation*

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2. <https://www.excornseed.eu/>

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FUNGUSCHAIN EU PROJECT: EXTRACTING VALUE FROM THE AGRUCULTURAL OFFCUTS OF COMMERCIAL MUSHROOM FARMING

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Introduction: Each week more than 60,000 t of mushroom by-products are generated in Europe. By-products are in the common way a huge disposal problem for the corresponding industry, while these by-products could also serve as a source of valuable compounds using their favourable technological and nutritional characteristics for further processing.

Aims: FUNGUSCHAIN aims with the valorization of agricultural residues from mushroom farming to set up new cascading possibilities to extract high value bio-based products.

Materials and Methods: FUNGUSCHAIN project is a new concept of biorefinery, which will be created to valorise mushroom outcomes with a 4 steps cascading approach: 1. Microwave-assisted extraction (MAE), a fast and reliable extraction technique based on heating induced by microwave radiation. 2. Pressurised hot-water extraction (PHWE), a powerful extraction technique using high pressures to maintain aqueous solvents in liquid state at high temperatures. 3. Saccharification fermentation (SF), a deconstruction methodology of the biomass into a sugar platform as starting point for the production of fermented biopolyesters. 4. Anaerobic digestion (AD) dedicates the remaining biomass to generate compost and biogas.

Results: FUNGUSCHAIN generates molecules such as antimicrobials, antioxidants or polyols by MAE applied in the cleaning, food and plastic sectors. Furthermore, bioactive proteins and polysaccharides received by PHWE can be directly used as food supplement. The biopolyesters obtained from SF will be used to formulate new bioplastic blends. Finally, due to AD, compost and biogas will be generated, closing the agricultural cycle.

Conclusion: The project FUNGUSCHAIN will obtain high value molecules/products using mushroom agrowastes, applicable in a wide range of products as well as closing the whole agri-cycle working closely to end-user requirements.

Keywords: *by-products, biorefinery, extraction methods*

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2. <https://funguschain.eu/>

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DEVELOPMENT OF YOGURT USING ALOE VERA PLANT AND ESSENTIAL OIL OF *CITRUS AURANTIFOLIA*

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Introduction: Yogurt is considered functional food and an important source of calcium, essential for the prevention of bone issues. Studies show that Aloe vera gel has more than 200 bioactive chemicals. Aloe Vera gel strengthens the immune system and has anti-inflammatory, antibiotic and antiseptic effects. The waste of Citrus processing industry, left after juice extraction, represents about 50% of the raw processed fruit. The peels, seeds and pulps can be used as a potential source of valuable by-products.

Aims: The aim of this work was to use essential oils from Lime peels as flavouring agent in the development of yogurt with addition of microcapsules of Aloe Vera extract.

Materials and Methods: The technology of yogurt manufacturing used pasteurized and homogenized milk with 3,5 % fat and selected lactic acid bacterial cultures of *Lactobacillus delbrueckii* ssp. *bulgaricus* and *Streptococcus thermophilus*. The essential oils were extracted from fresh peel of lime (*Citrus aurantifolia*) using a Clevenger-type apparatus and added to the yogurt. The yogurt samples were thermostated at 45°C for 3 hours. After that samples were pre-cooled at 20°C and cooled to 2-6°C for 12 hours. Aloe Vera gel was introduced into the yogurt by the microencapsulation technique to prevent oxidation reactions and to offer protection against the degradation of bioactive compounds due to thermal treatment.

Results: The yogurt obtained was evaluated by physicochemical, microbiological and sensorial analysis. Lime essential oil confers a citrus pleasant aroma and smell, well expressed in yogurt.

Conclusion: The quality parameters of the product and the viability of the lactic acid bacteria are maintained throughout the shelf-life, while the addition of lime essential oil and Aloe Vera extract increase the potential health benefits of the product.

Keywords: *Aloe Vera, essential oils, functional food, yogurt*

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EVALUATION OF PHYSICOCHEMICAL PROPERTIES OF HYPOCALORIC JELLY

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Introduction: Taken in consideration the consumers' growing interest to reduce their sugar intake in order to maintain a healthy lifestyle, the market of natural products is expected to grow in the next years. Candies are appreciated by consumers of all of age and are accessible in a range variety of forms including marshmallows, jellies, caramels, gummies and hard candies.

Aims: The aim of the study was to evaluate the physicochemical properties of hypocaloric jelly enriched with protein powder from acai, chia seeds and hemp.

Materials and Methods: In jelly industry, sugar alongside hydrocolloid and citric acid contributes to the product's gummy and chewy texture. An alternative for gel production without sugar is use of agar-agar, which has a superior gelling capacity, compared with gelatin or pectin. Jelly was produced using peach and raspberry juice, agar-agar and protein powder. Six prototypes of jellies were obtained and evaluated by physicochemical and sensorial analysis. For the textural profile analysis, the Brookfield CT3 Texture Analyzer, equipped with a 10kg load cell, was used.

Results: The protein content varied between 0,67 and 3,47 %, was higher than values reported by Acosta et al., 2008 (0,53 %). The antioxidant capacity of the samples ranged between 12,01 % and 39,22 %. The dry matter varied between 79,08- 82,04 %, similar with data reported by other researches. The sensory attributes for hypocaloric jelly averaged 6.8–8.2 in a 9-point hedonic scale consumer acceptance study.

Conclusion: The results revealed that hypocaloric jelly can be an alternative to classical jelly in order to provide bioactive compounds with health benefits to the consumers.

Keywords: *agar-agar, low calorie, jelly*

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USE OF THE SPRAY DRYING METHOD FOR MICROENCAPSULATION OF SIX PROBIOTIC STRAINS

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Introduction: Probiotics are living microorganisms capable to confer health benefits when ingested. The most usual probiotic bacteria genera are *Lactobacillus* and *Bifidobacterium*. A real challenge for developing new products of viable probiotics is incorporating cells into food matrix without causing undesired viability loss. (Nan Fu, 2018)

Aim: The focus of this work was to use the spray drying method for microencapsulation of different probiotic strains in order to keep a high cell viability during long periods of storage.

Materials and Methods: 6 different strains of probiotics (*L.plantarum*, *L.casei*, *L.paracasei*, *L.rhamnosus*, *L.acidophilus*, *B.bifidum*) where grown in MRS broth in controlled conditions of pH= 6.4 at 37⁰ C and 150 rpm for 18 h using a 1.9 litres bioreactor. The formed biomass was centrifuged at 7000 rpm for 8 min, washed 4 times and concentrated in sterile serum solution. The obtained slurry was transferred into carrier, which consisted of 24 % maltodextrin and 4 % glucose. Then the carrier was spray dried at 126⁰ C with a flow rate of 22 mL min⁻¹ into a fine powder, followed by storage at room temperature. Cell viability of the probiotic powders during 6 months of storage was determined with the pour-in plate method using MRS agar and the dried weight using oven drying method.

Results: The use of the casein free carrier as the microencapsulation matrix for probiotics presented a good cell protection for both spray-drying process and long periods of storage. During the 6 months period of storage the cell viability of the probiotic powder decreased from 4.5±0.5 *10¹² to 1.2 ±0.5 *10⁹ cfu g⁻¹ and the dried weight remained constant at 96.7±0.7 %.

Conclusion: This work proved that the use of spray drying method is an efficient way for preserving different probiotic strains at high cell viability for long periods.

Keywords: *microencapsulation, probiotics, spray drying.*

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CITRUS BY-PRODUCTS AS A POTENTIAL SOURCE OF BIOACTIVE COMPOUNDS

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Introduction: Citrus (*Citrus L.* from *Rutaceae*) is one of the most cultivated world fruit crops its consumption increasing every year. Citrus fruits are mainly consumed as fresh, but also used for the production of juices and other derived products, resulting a considerable amount of waste (including peels and pulp). Both citrus peels and pulp contain active phytochemicals that exert beneficial health properties (Bermejo *et al.* 2011).

Aims: Due to the potential of citrus waste as a source of valuable biomolecules, the present study focused on the assessment of the phytochemical content of four samples of citrus pulp obtained after the extraction of juice from oranges, red oranges, clementine and tangerines.

Materials and Methods: The pulp samples were oven-dried (50°C/24 h), finely milled and kept protected from light and humidity. Then, the citrus pulp powders were submitted to ultrasound-assisted extraction in order to produce extracts rich in bioactive compounds. The chemical characterization of the methanolic extracts included the evaluation of their total phenolic and carotenoid content (spectrophotometric methods) as well as their radical scavenging activity on DPPH radical.

Results: According to the obtained results the tangerine pulp contained appreciable amounts of phenolic compounds and carotenoids (390.97mg GAE/100g dw, 23.88mg/100g dw), followed by clementine, and red orange. The citrus waste samples exhibited good antioxidant properties, with values ranging from 23.19 to 29.19%, the scavenging free radicals' activity being directly correlated with the amount of carotenoids and phenolic compounds.

Conclusion: Thus, by-products from food processing industries with considerable amounts of bioactive compounds can be used as value-added ingredients for the development of functional products.

Keywords: *bioactive compounds, citrus pulp, waste exploitation*

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DETECTING METHYLATION LANDSCAPE OF GENOMIC DNA BY SURFACE ENHANCED RAMAN SCATTERING

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Introduction: Cancer cells display an aberrant cytosine methylation pattern characterized by an overall decrease in the overall percentage of methylated cytosines, that increases the affinity of cancer DNA to metal surfaces, enabling its sensitive detection by electrochemical methods. SERS- based methods for detecting the methylation landscape of genomic DNA is faster to implement and don't require prior amplification steps (such as PCR).

Aims: The spectral differences that arise because of the unique pattern of methylation seen in cancer DNA was detected by SERS. We analyzed DNA samples extracted from normal and malignant cell lines, demonstrating that the cancer-associated hypomethylation can be evidenced by SERS even in genomic DNA samples.

Materials and Methods:

Silver nanoparticles were prepared using the method introduced by Leopold and Lendl. For SERS measurements of DNA extracted from peripheral blood and from culture cell lines, hya-AgNPs was mixed with DNA and 0.5 μM $\text{Ca}(\text{NO}_3)_2$ and irradiated with 532 nm laser line.

Results: We validated the SERS-based detection of methylation level on samples of genomic DNA extracted from peripheral blood, of which n=17 came from patients diagnosed with AML and n=17 samples from healthy controls. Our experiments indicate that acquiring SERS spectra from DNA requires the presence of Cl^- , which forms DNA-specific SERS sites on the surface of silver nanoparticles. On the other hand, cations such as Ca^{2+} or Mg^{2+} aid the acquisition of SERS spectra of DNA by facilitating the chemisorption of Cl^- . In order to confirm the origin of the 1005 cm^{-1} band, we recorded the SERS spectra of cytosine and 5-methylcytosine (Figure 2).

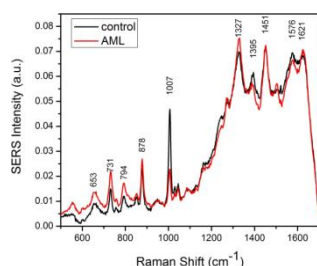


Figure 1. The average SERS spectra of control and cancer DNA

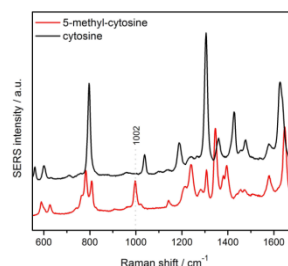


Figure 2. The SERS spectra of 5-methyl-cytosine

Conclusion: The label-free SERS detection of cancer DNA, without requiring any DNA amplification steps, represents a promising strategy that could be translated in the clinical setting for the screening and follow-up of cancer patients.

Keywords: DNA, methylation, SERS

MICROENCAPSULATION OF TOMATO PROCESSING BY-PRODUCT'S DERIVED CAROTENOIDS BY SPRAY-DRYING

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Introduction: Global tomato production is currently around 180 million tons, of which more than a quarter undergoes processing. The removed peels, seeds and some vascular tissues usually end up in landfills creating environmental pollution, in spite of their high content in bioactive components like carotenoids.

Aims: In the context of circular economy, which gained substantial interest lately, the aim of the present study is to highlight the alternative use of these vegetal wastes through the microencapsulation of carotenoids extracted from tomato processing by-products.

Materials and Methods: Gum Arabic and maltodextrin were used as coating materials dissolved in distilled water and the oil-in-water (o/w) emulsion was prepared by adding carotenoids in linen seed oil drop-by-drop to the biopolymeric solution, while homogenizing with an Ultra-Turrax at 10,000 rpm. The emulsion was fed into the spray-dryer using a peristaltic pump and the inlet and outlet temperatures of drying air used for the microencapsulation were 160 ± 2 °C and 70 ± 2 °C, respectively.

Results: The microcapsules obtained through spray-drying allows the protection of food ingredients, such as carotenoids and polyphenols from chemical degradation and environmental factors by converting liquids into functional powders that can be incorporated into various formulations.

Conclusion: The encapsulation of non-aqueous extracts by spray-drying protect the active agents of the extracts against oxidative and deterioration processes.

Keywords: *by-products, carotenoids, encapsulation, revalorization*

Acknowledgement: This research was co-funded by MCI-UEFISCDI, project number 37 PFE-2018-2020 “Creșterea performanței instituționale prin mecanisme de consolidare și dezvoltare a direcțiilor de cercetare din cadrul USAMVCN” and by the ERA-NET MANNUNET-II TOMATOCYCLE developed with the endorsement of UEFISCDI (2017-2020).

PAW-PAW HYBRID GENOTYPES (ASIMINA TRILOBA DUNAL) CULTIVATED IN THE BUCHAREST AREA

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Introduction: Paw paw or Northern banana (*Asimina triloba* Dunal) is the representative of the *Annonaceae* family that can be cultivated in temperate areas. The increasing demands from the consumers for this nearly unknown fruit with high nutraceutical potential require specific researches.

Aims: The aim of this study is to present the fruits pomological characteristics for 23 genotypes analysed, cultivated in the Bucharest area.

Materials and Methods: All the genotypes cultivated in the Experimental Field of Faculty of Horticulture within USAMV Bucharest are planted at 4.0 x 2.0 m, integrated technology. All the fruits were harvested between August and October 2018. For each genotype yield, weight per fruit, size, average number of seeds per fruit, average weight of seeds and seeds size were calculated. Biochemical analyses like total soluble solids, dry matter, acid ascorbic content, fruit acidity were done for several genotypes. Fruit quality evaluation through sensorial analyses was conducted for 13 genotypes.

Results: The study present a complex pomological characterization for the 23 paw paw genotypes including the harvesting period, correlation between fruits assessment by the consumers with morphological and biochemical analyses. A strong negative correlation was registered between the taste parameter and total soluble solids. Positive significant correlations were noticed at the attractiveness parameter with the size and colour of the fruit.

Conclusion: The most valuable genotypes from the Experimental Field according to the analyses performed and the consumer's preferences are taken in consideration for further research.

Keywords: *acid ascorbic, acidity, dry matter, Northern banana, total soluble solids*

EVALUATION OF THE BACTERICIDAL ACTIVITY OF SOME APICULTURE PRODUCTS WITH ADDITION OF ESSENTIAL OILS

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Introduction: The antibacterial activity of honeydew honey is currently well-known, being considered superior to blossom honeys. Regarding propolis activity, bactericidal properties have also been reported, due to the content of phenols and aromatic acids. Likewise, essential thyme and sea buckthorn oils have important antibacterial effects.

Aims: The purpose of our research was to test the antibacterial activity of three apitherapeutic products, containing honeydew honey (product 1), honeydew honey and sea buckthorn oil (product 2) and honeydew honey, propolis extract and thyme oil (product 3).

Materials and Methods: Honeydew honey and propolis extract were supplied by a Romanian commercial company and thyme and sea buckthorn oils were purchased from the commercial market. Initially, melissopalynological and electrical conductivity analyzes were performed to establish the authenticity of honey. Afterwards, we tested the bactericidal activity of the products, using Amoxicillin as a positive control. The tests were performed against the following standard strains: *Staphylococcus aureus* ATCC 6538P, *Bacillus cereus* ATCC 11778, *Escherichia coli* ATCC 10536, *Salmonella enteritidis* 13076, *Pseudomonas aeruginosa* ATCC 27853. The sensitivity of the international bacterial strains was measured by the diameter of the lysis zone by using agar diffusion test.

Results: The melissopalynological analysis revealed the specific elements of honeydew honey, while the electrical conductivity showed its authenticity, registering a value of 940 μ S. The most intense bactericidal activity was shown in product 3; however, in this case, we found the absence of the bactericidal effect on *Pseudomonas aeruginosa*, which was present in the first and second products, with reduced diameters of the lysis zones (8.72 mm and 7.33 mm respectively).

Conclusion: The results obtained revealed an appreciable level of bactericidal activity exerted by the three apitherapeutic products, which was still inferior to that shown by Amoxicillin.

Keywords: apiculture products, bactericidal activity, essential oils

BIOTECHNOLOGICAL ITACONIC ACID PRODUCTION: FROM BIOWASTES TO RENEWABLE, BIODEGRADABLE POLYMERS

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Introduction: Today's industry is still led by the usage of non-renewable petrochemicals, even though biomass is the only source of organic carbon on Earth, and a renewable feedstock. Organic acid production through microbial fermentation using various biomass wastes could play an important role in the production of biochemical building blocks. Itaconic acid (IA) is one of the most important organic acid obtained from lignocellulose biomass.

Aims: The aim of this study was to summarize recent advancements in biotechnological IA production in terms of substrates and optimal conditions used, the development made in metabolic engineering and the state-of-the-art in major applications of IA.

Materials and Methods: The most frequently used fungi for IA production are *Aspergillus* species, and mainly *A. terreus*; other microorganisms are also able to produce IA, like *Ustilago maydis*, species of *Pseudozyma* and *Candida*. In addition, metabolic engineering has unlocked an innovative path to improve the genetic and regulatory mechanics inside cells to expand IA production.

Results: The U.S. Department of Energy included IA as one of the 12 building blocks that can be transformed into varied high-value bio-based chemicals or materials from biomass. IA has versatile, value added applications in food like smart nanohydrogels and in the delivery of food preservatives and medical industry in the production of pH-sensitive microgels in anti-tumor drug delivery, and presents a viable solution to replace acrylic and methacrylic acid in polymers, being biodegradable.

Conclusion: Lignocellulosic wastes are encouraging and renewable substrates for IA production, but there is a request for additional research to make it profitable as an alternative regarding the traditional methods. The ecological IA-based polymers have abundant application possibilities and the demand for further studies to find other innovative polymers is still required.

Keywords: *Aspergillus terreus*, biosynthetic pathways, itaconic acid, metabolically engineered bacteria, polymers

Acknowledgments: This work was supported by a grant of the Romanian National Authority for Scientific Research and Innovation, CCDI-UEFISCDI, project number 27/2018 CO FUND-MANUNET III-NON-ACT-2, within PNCDI III and MCI-UEFISCDI, project number 37 PFE-2018-2020 "Cresterea performantei institutionale prin mecanisme de consolidare si dezvoltare a directiilor de cercetare din cadrul USAMVCN".

THE IMPACT OF SILVER NANOPARTICLES ON THE GROWTH OF PARSLEY PLANT

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Introduction: Silver is widely used in certain areas such as medical, jewelry, textiles and household items. Due to their antibacterial and antifungal activities, silver nanoparticles (AgNPs) are widespread in the environment, being currently one of the most frequently used silver compounds in products, such as toothpaste, fabric, electronic products, and detergents [1]. In terrestrial ecology toxicity, the focus on AgNPs has been limited to plants.

Aims: This study aimed to provide relevant data regarding the influence of AgNPs on the growth of the parsley plant *in vitro*.

Materials and Methods: For this study three varieties of parsley were used: Moss Curled 2, Plain Leaved (Sheeps) 2 and Gigante d'Italia. The culture medium used was ½ Murashige & Skoog 1962 (MS) without growth regulators (Duchefa Biochemie B.V Netherlands, code M0222, Murashige & Skoog Medium Including Vitamins, original concentration 4405.19 mg / L). The plants were exposed at different concentrations of AgNPs range from 10 µM up to 1000 µM. The influence of nanoparticles on plant growth was analyzed by determining total carotenoids, chlorophylls, and pheophytins. To quantify these compounds the solvent extraction was performed first. Plant carotenoids and chlorophylls were determined and quantified by using an HPLC system Agilent 1200 series, equipped with solvent degasser, quaternary pumps, DAD detector and automatic injector (Agilent Technologies, USA).

Results: AgNPs with a diameter below 100 nm determine the growth of the concentration of carotenoids and chlorophylls in the plants, compared to controls.

Conclusion: This study shows that AgNPs can slow down the growth and development of the parsley plants.

Keywords: *carotenoids, chlorophylls, silver nanoparticles, parsley.*

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Acknowledgment: This work was supported by two grants of the Ministry of Research and Innovation, PCCDI-UEFISCDI, project number PN-III-P1-1.2-PCCDI-2017-0056/ 2PCCDI 2018, within PNCDI III, and project number 37PFE/06.11.2018, within Development of the National Research and Development System, Subprogram 1.2 - Institutional Performance - Projects for Financing the Excellence in CDI.

INCREASING THE EFFICIENCY OF LIGNIN BIOREFINERIES BY SUPPLEMENTARY USE OF HYDROLYSATES

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Introduction : A horizontal-radial or continuous hydrothermal pretreatment of the biomass in a pressure-resistant, horizontally oriented autoclave or extruder will be realized within a 30 month national funded project (1). The work thus requires a procedural adaptation of several unit operations in up- and downstream.

Aims: The main goal is the utilization of the liquid hot water hydrolysates, which until now have been produced as by-products of lignocellulosic biorefinery focused on lignin production.

Materials and Methods: The fractionation of biomass (i.e. selective hydrolysis of lignocellulose in lignin and glucanes and fructanes has been developed in a previous ministry-funded project (2-3). The cost-effectiveness of the biorefinery developed in the preliminary project is to be increased by isolating and recycling the hydrolyzate in a secondary refinery, thereby fermenting unused residues in a biogas plant.

Results: The target products selected are primarily lactic acid and propionic acid (microbiological conversion of the hydrolysates), and also fructans and pentosans (separation from hydrolysates by chromatographic methods).

Conclusion: The exploitation possibilities of the project results fall on the one hand in a competitive and sustainable production, and cost optimization for lactic acid and propionic acid, but also in a scientific-technological contribution to the continuous biomass hydrolysis in a possible product cascade approach.

Keywords: *lactic acid, propionic acid, biorefinery, lignin,*

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EFFECT OF PROCESSING AND CONSERVATION ON THE VOLATILE PROFILE OF ORGANIC PAPRIKA SAMPLES (*CAPSICUM ANNUUM* L.): FREEZE-DRYING

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Introduction: Agricultural production in Europe has evolved towards more sustainable systems and organic production has become highly appreciated by consumers, particularly fruits and vegetables. Among the vegetables, capsicum peppers are known for their marked aroma quality, plenty of many volatiles with sensorial impact. In this regard, breeding trials of peppers for organic involve the processing and analysis of hundreds of samples in a very short period of time. Also, some foods include capsicum powder.

Aim: To assess how freeze-drying may change the volatile profile in bell peppers as useful information for both analytical purposes (i.e. a way of sample conservation) and sensorial quality of paprika lyophilized as food additive.

Materials and Methods: The volatile fraction of samples from bell pepper (*C. annuum*) cultivar *Largo de Reus*, were evaluated. Plants were transplanted in April 2018 and grown open field following organic practices in Sagunto (Valencia, Spain) under the spring-summer season. Fully ripe fruits were sampled in September 2018 and two blocks of samples (n=5 each) were prepared: (i) immediately analyzed (fresh fruit) and (ii) submitted to freeze-drying and analyzed 3 months later. The volatile fraction of samples was extracted by head space solid phase microextraction (HS-SPME) and analyzed by gas chromatography and mass spectrometry (GC-MS). Volatiles were quantified as 10⁶ GC peak area units (PAU).

Results and Conclusion: Compared to fresh fruits, freeze drying showed a remarkable impact in the volatile fraction. Thus, total volatiles decreased about 50% (17 vs 33 PAU), and particularly terpenoids, which almost disappeared (from 26 to 0.18 PAU in fresh and freeze-dried samples, respectively). By contrast, many alkanes and other aliphatic and aromatic hydrocarbons appeared de novo and their total levels evolved from 6.7 to 12.9 PAU in freeze-drying samples. Nevertheless, other relevant volatiles for pepper aroma like bell pepper pyrazine remained at similar levels.

Keywords: *gas chromatography, lyophilization, mass spectrometry, paprika aroma conservation*

FORTIFICATION OF OAT COOKIES WITH AMINOACIDS AND ESSENTIAL FATTY ACIDS FROM OILSEEDS

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Introduction: Functional food has increased in demand in recent years due to its beneficial effects on people's general health. Nutritional habits have also changed as numerous nutrition specialists have been working recently on raising people's awareness of the correlation between the food intake and their health. The nutritional features of oat and its multifunctional characteristics have highlighted its uniqueness among other cereals. Oat is an excellent source of vitamins, minerals, dietary fibres and other nutrients. In addition, oilseeds, which are a rich source of aminoacids and essential fatty acids, are food elements preferred by consumers, because of their taste.

Aims: The aim of this paper is to enrich oat cookies with amino acids and essential fatty acids from a mixture of sunflower, flax, sesame and pumpkin seeds.

Materials and Methods: The following determinations were made to achieve the physico-chemical profile: the moisture, alkalinity, fat, protein, the total phenolic content and antioxidant activity of the control sample and samples S5 (with 5% oilseed mix), S10 (with 10% oilseed mix), and S15 (with 15% oilseed mix).

Results: Three types of cookies were produced with different oilseed mix additions, which were compared with the cookies without oilseed mix (control sample). Considering the consumer preference test, the sample with the highest score was the one with 15% oilseed mix (S15). Regarding the physicochemical components, a considerable increase in the protein (from 7.32 ± 0.19 to $9.82 \pm 0.41\%$) and fat content (from 21.14 ± 0.18 to $29.85 \pm 0.25\%$) was found. Mention must be made of the significant increase both in the total polyphenol content (from 18.57 ± 0.11 to 29.38 ± 0.12 mg EAG / 100 g) and in the antioxidant activity (from 10.74 ± 0.21 to $19.69 \pm 0.10\%$) after the addition of the seed mixture was made.

Conclusion. Oat cookies, which are highly appreciated by consumers, represent a complex product with a high amount of essential amino acids, essential fatty acids, bioactive compounds and a remarkable antioxidant activity. The higher the oilseed mix percentage in oat cookies, the higher the consumers' appreciation.

Keywords: *fortification, innovative, oat, oilseeds*

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FUNCTIONALIZATION OF GOAT MILK YOGURT WITH MICROCAPSULES CONTAINING SEA BUCKTHORN OIL

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Introduction: Yogurt is a fermented food product, appreciated for its taste, texture and its healthy and nutritional properties. Yogurt is commonly produced by fermenting milk using a 1:1 ratio of lactic bacteria, *Lactobacillus bulgaricus* or *acidophilus* and *Streptococcus thermophilus* under controlled parameters (Dasa, 2019).

Sea buckthorn oil is getting popular among costumers and scientists due to its generous content in polyunsaturated fatty acids, carotenoids, polyphenols and tocopherols. Encapsulation of this valuable oil ensures its protection against unfavorable external factors (Drozińska, 2019).

Aims: The aim of this research was to evaluate the functional properties of goat yoghurt containing microencapsulated sea buckthorn oil.

Materials and Methods: The yogurt was obtained from standardized goat milk (2.8 % fat). The microcapsules were made from alginate with 5% sea buckthorn oil. For the final product minerals content, humidity, pH, acidity and microbiology determinations were conducted in order to establish product properties.

Results: Compared with the control sample, it can be underlined that the goat yogurt containing sea buckthorn microcapsules have better properties regarding all the mentioned parameters. With significant importance for the human health are the determination of *Lactobacillus* and *Streptococcus* number in the first, fifth and in the ninth day and the antimicrobial effect of the valuable oil. Probiotics number were above 10^7 by the ninth day and the antimicrobial effect against *E. coli* and *S. aureus* were registered at 22.68 $\mu\text{l/ml}$ and at 47.62 $\mu\text{l/ml}$ for *Salmonella enteritidis*.

Conclusion: In the present research work, we demonstrated that goat yogurt can be successfully obtained by using *Lactobacillus acidophilus* and *Streptococcus thermophiles* and further can be functionalized with sea buckthorn oil microcapsules. Promising results were obtained regarding the probiotic activity and the antimicrobial effect of the encapsulated oil.

Keywords: *functional food, goat yogurt, sea buckthorn*

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ROMANIAN FARMERS' PESTICIDE EXPOSURE PROFILE: UNDERLINE THE SAFETY CULTURE IN AGRICULTURE (PILOT STUDY)

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Introduction: The comprehending of the bases of safety culture is lacking and therefore, well-informed interventions to improved health, safety and risk management is gap in Romania. Occupational exposure to pesticides of the agricultural workers could lead to APP (Acute Pesticide Poisoning) being associated with headaches, fatigue, and damage done to genetic material (Aiassa, 2019). APP alters over 25 million agricultural workers worldwide each year (Alavanja, 2009). APP is not monitored or recorded in Romania. Farmers have their own knowledge, attitude, and behavior toward pesticides that can affect the incidence rate of APP. This work reviews publications using a systematic review process to inform a questionnaire that will be given to Romanian farmers. In this study were used 10 key search indexes, or focus areas to learn more about farmer's attitudes and exposure to pesticides.

Aims: To analyze the relationships of Romanian farmers' pesticide exposure profile, as well as farmers' knowledge, attitudes, and behaviors towards the potential health risks posed by pesticide exposure.

Material and methods: The use of a search index broke down question topics to further develop intentional questions. Each index domain contains two to six questions in the survey.

Results: We discovered lack of published data about Romanian farmers' pesticide exposure. The study developed an electronic survey to be pilot tested to farmers near Cluj-Napoca, Romania in the next three months. The survey contains questions that offers insight into each of the 10 search indexes. Future directions: Further, the study will be continued to pilot test the questionnaire to farmers near Cluj-Napoca, Romania. We will correct any errors in the questionnaire identified by the pilot group and send via e-mail to farmers (n=600) as well as face-to-face (50). Collect questionnaire results in winter and spring 2020.

Keywords: *occupational exposure of farmers, pesticides, APP (acute pesticide poisoning), questionnaire*

Acknowledgment: This project was supported by COST CA16123 - Safety Culture and Risk Management in Agriculture (SACURIMA)

SESSION 4: HORTICULTURE AND FORESTRY

IMPACT OF COMPOST APPLICATION ON FALL-SEEDED CAMELINA YIELD AND SEED QUALITY

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Introduction: Camelina (*Camelina sativa* L. Crantz) is member of the *Brassicaceae* family and can potentially serve as a low-input alternative oil source. It is generally grown as an early summer annual oilseed crop but can be grown as a winter annual in milder climates (Hunter and Greg, 2010). Winter camelina cultivation not only provides ecological benefits, but also has the potential to increase farm economic viability as its seeds can be used to produce both food- and industrial-grade oil for advanced biofuels as well as food and other industrial uses.

Aims: The objective of the study was to evaluate the affect of compost application on fall-seeded camelina seed yield and its quality characteristics.

Materials and Methods: A three year field study (2013, 2014, 2015 growing seasons) was conducted in Southern Greece in the region of Tripoli city. The field experiment was arranged in a randomized complete block design with three replicates and two treatments (compost application and untreated control). The soil was a clay loam with pH 6.5 and organic matter 1.5%. Camelina was sown by hand in early September, according to the environmental annual conditions in order to prepare a proper seedbed. The yield and quality parameters determined were: seed yield, weight of 1000 seeds, dry matter, ash, crude fiber, crude protein and oil content.

Results: The results indicated that the application of compost significantly enhanced the seed yield of fall-seeded camelina in all years but there weren't statistically significant differences concerning the seed quality characteristics as compared with the untreated control.

Conclusion: Compost application on fall-seeded camelina can strongly affect its productivity and benefit the adoption of winter camelina in Southern Greece.

Keywords: *compost, seed quality, seed yield, winter Camelina*

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BEHAVIOUR OF THE TORRENTIAL HYDROGRAPHIC NETWORK IMPROVEMENT WORKS. CASE STUDY: THE HYDROGRAPHIC BASIN OF GURGHIU

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Introduction: For the insurance of the long-term operation of the hydro-technical works, their maintenance and protection become an important part of their successful development. These landscaping works can be damaged by floods, by people and animals, by grazing, fires, frost-thaw variations, etc. (Băloiu, 1980).

Aims: The main purpose of this research is to monitor the behaviour of the hydro-technical works for the torrent correction and to draw attention to the importance of an advanced analysis of the technical efficiency of such works.

Materials and Methods: For the achievement of the targets proposed, information and documentation activities were developed, together with field activities, data processing, information interpretation and results analysis activities were carried out. A number of 34 hydro-technical works were observed and inventoried and completed in the observation sheets, the type-file model developed by Clinciu (1997).

Results: The breakdown and malfunctions of the hydro-technical works were investigated. By analyzing the presence degree of the cracks, it has been noticed that the work most affected by this type of breakdown is the spill area body as well as the left and right side discharged/spill area body. The spill area body has the highest percentage of infiltrations. Ruptures are most common in the bodies of the spill area, the radier and left side undischarged area. The radier is the work that recorded the highest degree of disintegration of over 70% in eight of the 24 analysed dams. In the case of barbacans, 30% of the cases registered warping over 80%.

Conclusion: For the analysis of the current state of the torrent improvement works under inventory, the damages that affect the safety and durability of works have been recorded. The most affected part is the water discharge area body, followed by the left and right water undischarged body.

Keywords: *hydro-technical works, breakdown, torrents*

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VISUAL IMPACT ON THE LANDSCAPE OF SURFACE MINING DEVELOPMENTS

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Introduction: Effects on the landscape related to its changes and its component elements - a process that can also affect the general character of the landscape. The visual effects refer to the visible changes resulting from a proposal - views from inhabited areas, open spaces, access ways or roads.

Aims: The study objective was to assess the landscape and visual impact generated by expansion of a gypsum quarry in Capusu Mare, Cluj County. The studied area was evaluated to determine likely scale of landscape damage and the visual impact. The main purpose of the study is to provide an overview and understanding the landscape values by means of developing stakeholder management actions to preserve these values.

Materials and Methods: The study was divided into two main stages and three phases. The visual impact was determined by assessing the degree of changes resulting from the introduction of additional structures and of the land systematization works over the character and elements of the existing landscape. All possible views on the proposed development have been taken into account. Later, the predicted impacts and mitigation were addressed. In the final stage, was approached the residual impact that cannot be fully attenuated.

Results: The results show that project implementation will cause damage to the physical environment and landscape structure will change *in situ*. The adjacent lands will undergo indirect, insignificant changes, especially from the point of view of the bio-components of the physical environment, but the landscape will maintain its functional sustainability.

Conclusion: The main impact on the landscape will take place on a local scale (*in situ*) affecting visual and aesthetic perception in the immediate vicinity of the development and from the points located at the upper level of the land, over a radius of 500 m - 1000 m.

Keywords: *landscape assessment, quarry*

STUDIES REGARDING THE LEVEL OF PASSIFLORA SPECIES KNOWLEDGE IN ROMANIA

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Introduction: *Passiflora* species originate from tropical and semi-tropical areas of the United States are introduced into the European flora where they are cultivated for their edible fruits, for ornamental value and pharmacological properties (Traub, 2007). Rarely, *Pasifloraceae* can be found in Asia, Australia or Africa (Dhawan *et al.*, 2004).

Aims: *Passiflora* is highly appreciated worldwide due to its many uses. Fresh flower market trends involve diversifying assortment of newly introduced exotic species. In this respect, the present study aims to express the knowledge level of this species and the degree that they are marketed in Romania after imports of ornamental floral plants.

Materials and Methods: The study of the *Passiflora* genus knowledge among the population in Cluj-Napoca respectively Romania has been based on a short questionnaire with 8 questions, applied to a sample of randomly selected respondents. For data collection there were used two methods, respectively online and personal. Finally, the data was interpreted cumulatively through graphs with the resulting percentages.

Results: From a total of 293 respondents, 63.5% said that the plants of the genus *Passiflora* are known and 36.5% of the respondents do not know them. Regarding the knowledge of *Passiflora* uses, 74.8% of the respondents checked "yes" for the ornamental purposes, 39.5% "yes" for the medicinal properties, respectively 62.8% - "yes" for the production of edible fruits.

Conclusion: The results obtained demonstrated that *Passiflora*, although an exotic plant recently appeared in the local flower market, has been remarked and appreciated among the autochthonous ornamental plants due to its distinctive ornamental qualities.

Keywords: *passion flower, questionnaire, respondents, survey*

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CONTRIBUTIONS REGARDING THE VARIABILITY OF SOME YIELD TRAITS AND PHYSIOLOGICAL FEATURES IN SEVERAL TOMATO GENOTYPES

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Introduction: The new tomato genotypes obtained by the Banat University of Agricultural Sciences and Veterinary Medicine "King Michael I of Romania" from Timisoara show special morphological and physiological insights, based especially on the parental forms that are old local populations, adapted to the specific pedoclimatic conditions.

Aims: The main objective of the research was to assess the production capacity of new hybrids compared with the parents based on the analysis of heterosis of some morphological characters as fruit weight and shape, number of fruits on plant and some physiological characteristics as chlorophyll content, net assimilation rate and stomatal conductance.

Materials and Methods: The experiment was conducted in greenhouse experimental facilities of the Plant Physiology Dpt., of BUASVM Timisoara. The biologic material was represented by four F₁ hybrids and their genitors; 'Grădinari' ♀ 'Banato F₁ Dudești V' ♂; 'Livezile' ♂ 'Miruna F₁ Cruceni' ♀ 'Sorada F₁ Rudna' ♂; 'Sânmartinul S' ♀ 'USAB F₁ Pordeanu' ♂. The main determined traits were: fruit weight/shape, no of fruit/plant, chlorophyll content (SPAD), photosynthetic active radiation ($\mu\text{mol}/\text{m}^2/\text{s}$).

Results: The results show that F₁ tomatoe hybrids manifest heterosis compared with parents for most morphological characters and for some of the physiological ones. On the other hand, regarding the level of the two types of heterosis (*cis* and *trans*), there are very different values regarding the amount of chlorophyll, for example, in the four hybrids with limits from -2,6 to -6,7% as to the average of the parents and -5.8 to -6.1% related to the superior parent, indicating a different phenotypic manifestation from one hybrid combination to another. Analyzing the cumulative effects of genotype and photosynthetic active radiation (PAR) on CO₂ assimilation rate, only 'Banato' hybrid was superior to parents, while in 'Sorada' and 'USAB' the rate of assimilation of CO₂ had significantly lower values than their parents.

Conclusion: The analyzed tomato hybrids shown great variability between themselves and compared to parental forms. The phenomenon of *cis/trans* heterosis has been manifested with higher frequency and intensity in the case of some morphological characters and is very low or non-existent for the physiological traits, especially those related to the intensity of photosynthesis.

Keywords: *chlorophyll content, fruit weight and shape, heterosis, photosynthesis, stomatal conductance*

INPUTS OF FERTILIZERS AND WATER ON BEHAVIOR OF GRAFTED AND NON-GRAFTED TOMATO PLANTS

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Introduction: The water needed to irrigate vegetable crops is getting less and less due to excessive climate change, while the production of chemical fertilizers requires the use of high amounts of energy, often unrenewable. The graft of vegetables is used to enhance nutrient uptake (Leonardi and Giuffrida, 2006), improve water use efficiency and fruit quality (Proietti *et al.*, 2008).

Aims: The objective of the paper is to emphasize the higher tolerance of grafted plants to the combined stress of reducing water quantity and lower dose of chemical fertilizers by identifying and establishing new combinations of genotypes and management practices, maintaining at the same time, the quality and yield of tomato crop, coupled with reducing the impact of some horticultural activities on the environment.

Materials and Methods: The experiment was materialized in the application of a differentiated irrigation and fertilization schedule in unheated greenhouse, reducing irrigation with 40% and fertilizer inputs with 30% from conventional technology. Some characteristics of the cultivated tomatoes were determined: average yield/ha, commercial and nutritional quality of fruits (soluble dry substance by refractometric method, total carbohydrates by Bertrand method, titratable acidity and vitamin C by chromatographic method).

Results: Analysing the influence of the rootstock on the average yield and quality of fruits, in conditions of fertilization of the tomato plants with lower amounts of nitrogen and phosphorus respectively water input, there was registered a higher production, a superior commercial and nutritive quality of tomatoes harvested from the grafted plants, comparatively with the non-grafted ones.

Conclusion: The preliminary result showed that the grafted tomatoes have a better growth and development capacity in conditions of lower inputs of fertilizer doses and irrigation norms.

Keywords: *irrigation, nutrition, rootstock, scion*

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DIFFERENTIATION AMONG ROMANIAN WINE REGIONS BASED ON LEAD ISOTOPE SIGNATURES

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Introduction. The geographical origin assessment of wine is of particular interest, being one of the most important factors that determine its commercial values. To establish the geographical origin of wines is a major concern issue for many countries around the world, in order to protect quality products in the case of false statements regarding their geographical origin.

Aims. The aim of the present research is to determine the Pb concentration and $^{206}\text{Pb}/^{204}\text{Pb}$, $^{206}\text{Pb}/^{207}\text{Pb}$, $^{206}\text{Pb}/^{208}\text{Pb}$ from four Romanian winemaking regions, in order to highlight reliable markers for wine geographical origin.

Materials and Methods. The Pb concentration and the ratios of $^{206}\text{Pb}/^{204}\text{Pb}$, $^{206}\text{Pb}/^{207}\text{Pb}$, $^{206}\text{Pb}/^{208}\text{Pb}$ were determined in 25 white and 9 red wines using ICP-MS methods. Wine samples were obtained under microvinification conditions and were represented by native and international varieties of vine.

Results. Based on $^{206}\text{Pb}/^{207}\text{Pb}$ isotope ratios it can be concluded that the vines grown in the Tîrnave vineyard [Blaj (1.1790 average value)], Huși vineyard [Huși (1.1958 average value wine center), Averești (1.1908 average value)] and Iași vineyard [Copou (1.1875 average value) wine center], show traces of atmospheric pollution with lead in vine (if $^{206}\text{Pb}/^{207}\text{Pb} \approx 1.1700\text{-}1.2200$ [atmospheric pollution]).

Conclusion. Pb concentration found in wines from four vineyards studied did not vary greatly and were well below the limits established by O.I.V. Significant differences can be observed between the obtained values for Pb in wines from Dealu Bujorului, Huși, comparing to wines from Iași and Tîrnave vineyard. Studies involving isotopic ratios of Pb differentiated the wine producing regions of Romania. Combining the $^{206}\text{Pb}/^{204}\text{Pb}$ with $^{206}\text{Pb}/^{208}\text{Pb}$ isotopic ratio may carry out a separation on the vineyards and wine-growing centers. Based on $^{206}\text{Pb}/^{204}\text{Pb}$, $^{206}\text{Pb}/^{207}\text{Pb}$ and $^{208}\text{Pb}/^{206}\text{Pb}$ a separation of the wine samples was possible.

Keywords: *geographic origin, isotope ratio, wine fingerprint*

THE EFFECT OF CYTOKININS ON THE MICROPROPAGATION OF HIGHBUSH BLUEBERRY (*VACCINIUM CORYMBOSUM* L.)

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Introduction: Cytokinins are key regulators of plant growth and development (Kieber and Schaller, 2014). Among the cytokinins, the most efficient ones in highbush blueberry micropropagation proved to be zeatin and 2-isopentenyladenine (Wang *et al.*, 2019).

Aims: The aim of this work was to determine the effect of zeatin (Z), dihydrozeatin (DHZ) and 2-isopentenyl-adenine (2 iP) on the shoot length and proliferation rate (PR) in three *Vaccinium corymbosum* L. varieties: ‘Blueray’, ‘Duke’ and ‘Patriot’.

Materials and Methods: The culture medium used in this research was prepared from stock solution: Woody Plant Medium (WPM), 100 mg·L⁻¹ Sequestrene 138, 100 mg·L⁻¹ Myo-inozitol, 2 mg·L⁻¹ vitamin B1, 1 mg·L⁻¹ vitamin B6, mg·L⁻¹ nicotinic acid, and 3% (w/v) sugar supplemented with 5 mg·L⁻¹ 2iP, 0.25 mg·L⁻¹ Z, 0.5 mg·L⁻¹ Z, 0.25 mg·L⁻¹ dihydrozeatin (DHZ), 0.5 mg·L⁻¹ DHZ and a combination of 0.5 mg·L⁻¹ Z + 0.25 mg·L⁻¹ DHZ. The gelling agent used was 4g/l of Plant agar and the pH of the medium was adjusted to 5 prior to the first autoclave run. The experimental design consisted of 10 inoculated shoots/vessel and 5 vessels/treatment. The average shoot length and proliferation rate was measured and calculated after 10 weeks of *in vitro* culture.

Results: The lowest PR (1.26±0.03) was recorded in ‘Duke’ on the medium containing 0.25 mg·L⁻¹DHZ, while the highest PR (4.26±0.10) of this variety was recorded on the medium supplemented with a combination of 0.5 mg·L⁻¹ zeatin and 0.25 mg·L⁻¹ DHZ. The highest average length of the shoots (3.82±0.07) recorded was also on this medium. Among the treatments, the highest PR (3.66±0.07) induced by a single cytokinin was obtained on WPM+5 mg·L⁻¹ 2iP. Similar results were obtained in ‘Blueray’ undergoing the same treatment with hormone combinations (0.5 mg·L⁻¹ zeatin and 0.25 mg·L⁻¹ DHZ); the highest PR recorded was 4.1±0.23. On the contrary, ‘Patriot’ showed the highest proliferation rate (5.06±0.11) on the medium supplemented with 5 mg·L⁻¹ 2iP, but the average length of the shoots was slightly lower (4.21%) than that on the medium with hormone combinations.

Conclusion: Dihydrozeatin in combination with zeatin can successfully be used in the micropropagation of some highbush blueberry varieties such as ‘Duke’ and ‘Blueray’, but in ‘Patriot’ the application of 2iP lead to a higher proliferation rate (5.06±0.10) as compared to the hormone combinations (4.38±0.16).

Keywords: 2-isopentenyladenine, dihidrozeatina, zeatina, proliferation, blueberry

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NEW HYBRIDS OF EGGPLANTS (*SOLANUM MELONGENA*) OBTAINED AT V.R.D.S. BUZAU

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Introduction: Nowadays, the Romanian market is being dominated by foreign eggplant cultivars, the most widely used are the ‘Aragon’ and ‘Mirval’ hybrids. Cultural practices must be suited to the conditions of the specific climatic areas (Nothmann, 1986)). In our country, the lack of local hybrids at these species led to the purchase of foreign hybrids at very high prices and these did not meet the consumers and growers requirements. (Vinatoru, *et al.*, 2013). Local varieties of eggplant (*Solanum melongena* L.) represent an elite germplasm for the development of hybrids specifically adapted to open field conditions (Rodríguez-Burruezo *et al.*, 2008).

Aims: Researches debuted with the establishment of a germplasm collection, and a particular emphasis was granted to the old, autochthonous cultivars. The germplasm collection obtained and utilized in the breeding process has been made up of 208 genotypes that manifested a distinct phenotypic expressivity.

Materials and methods: The general combinative capacity testing was realized by crossing each genotype with the tester genitors, A1Bz and A8. As a result of the general combinative capacity test, 39 valuable genitors were retained that manifested usable genetic availability for hybridization.

Results: Three valuable hybrids that significantly exceeded the control hybrid were retained. From these, H1Bz was patented and registered in the Official Catalogue of Plant Culture in Romania under the name of ‘Rebeca’ F1. In 2019, the other two hybrids will be proposed for testing in order to be patented.

Conclusion: Three valuable new hybrids were obtained which exceeded significantly the control variant. Out of them, H1Bz F1 was patented and registered in the Official Catalogue of Crop Plants under the name ‘Rebeca’ F1. The other two hybrids will be nominated in 2019 to be tested for patenting.

Keywords: *breeding, genotypes, heterosis, hybridization, Rebeca F1*

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INFLUENCES BETWEEN SOIL MICROBIOLOGICAL AND AGROCHEMICAL PARAMETERS IN AN ORGANIC EDIBLE ROSE PLANTATION

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Introduction: In organic orchards soil biological activity and agrochemical parameters are important for the quality of products. Increasing soil microbiological parameters is one of the most important activities at the beginning of the orchards establishment.

Aims: The aim of this study is to present the results of the most important part of the organic technology, improving and maintaining the biological soil activity, in an organic edible rose plantation.

Materials and Methods: In 2015, in the Experimental Field of the Faculty of Horticulture within USAMV Bucharest, an organic edible rose plantation with three edible climbing varieties from David Austin collection: ‘Crown Princess Margareta’, ‘Falstaff’ and ‘Brother Cadfael’ was established. Before and after planting, three ameliorative species: *Sinapis alba* L., *Phacelia tanacetifolia* L. and *Tagetes patula* L. were sown in seven variants for increasing the soil biological activity. After flowering the plants were mowed and after 14 days incorporated into the soil. Two types of mulches, woodchips and wool, were applied on the rose rows. Soil samples were taken at the beginning of the experiment and every year after using the ameliorative plants.

Results: The statistical analysis, performed with SPSS, revealed the following statistically significant correlations between: microbiological and agrochemical parameters, P_{AI} and soil respiration coefficient (in the 0-20 horizon), soil respiration coefficient and soil content in potentially assimilable potassium and humus (on the control rows), soil bacteria number and humus content (on the wool and control rows). A negative correlation between soil bacteria number and soil supplying with mineral nitrogen was observed.

Conclusion: The study detailed the importance of using ameliorative plants and organic mulch variants to improve the soil parameters and the interconnection between them.

Keywords: *ameliorative plants; edible Rosa sp; organic mulch; soil bacteria, soil fungi*

ESTIMATED COST OF PRODUCTION FOR MEDICAL CANNABIS (*CANNABIS SATIVA L.*) IN GREECE

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Introduction. In 2018, Greek Parliament passed the law 4523/2018 making the cannabis cultivation for medical purposes legal. For the granting of approval for installation and authorization, the applicant must submit documents for all stages (from cultivation to processing and production of medical final cannabis products). On the basis of legislation, the cultivation will take place under greenhouse or indoor conditions.

Aims. The objectives of this study were to estimate the start-up costs and the costs of cultivating and processing medical cannabis under greenhouse conditions in Greece.

Materials and Methods. A start-up business plan was drawn up for a medical cannabis operation in a 1 ha greenhouse. The analysis is divided into costs for business start-up, and then for cultivation and processing.

Results. The total investment budget was estimated at 4,960,044 €. A bank loan of 3,968,035.20 € was needed to complete the project. The annual depreciation was estimated at 370,192.50 €. The total incomes for the first year that the business starts operating was 9,515,520 €. From the second year, the incomes totalized 15,462,720 €. Net profit in the first year amounted to 3,584,621.70 €, while the annual net profits from the second to tenth year amounted to approximately 7.07 billion €.

Conclusion. The 1-hectare medical cannabis operation is an investment of 4,960,044 €, which requires a working capital of approximately 520,000 € in the first year, and from the second to the tenth it needs from 730,000 to 740,000 €, as well as it is a business with high depreciation. The Net Present Value with a value of 45,425,241.24 € is positive, which means that the investment is profitable.

Keywords: *business plan, cannabis, greenhouse production, medical use, production cost*

MICROPROPAGATION OF *VACCINIUM CORYMBOSUM* L. AND *CORYLUS AVELANA* L. IN TEMPORARY IMMERSION BIOREACTORS

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Introduction: Temporary immersion systems (TIS) were developed several decades ago to overcome the existing problems of that period such as malformations and loss of material due to asphyxia and hyperhydricity. These systems serve as an alternative for conventional micropropagation process based on automatization (Gianguzzi *et al.*, 2019).

Aims: The aim of this work was to develop an efficient micropropagation protocol for highbush blueberry (*Vaccinium corymbosum* L. ‘Duke’) and hazelnut (*Corylus avellana* L. ‘Tonda di Giffoni’) using the Plantform bioreactor.

Materials and Methods: The shoots (1.5-2 cm) used for this experiment were obtained from the *in vitro* regenerated highbush blueberry and hazelnut plantlets (10 weeks old) which have been cultured on a basal medium prepared from stock solution as follows: Woody Plant Medium, 100 mg·L⁻¹ Sequestrene 138, 100 mg·L⁻¹ Myo-inozitol, 2 mg·L⁻¹ vitamin B1, 1 mg·L⁻¹ vitamin B6, mg·L⁻¹ nicotinic acid, 1 mg·L⁻¹ zeatin, 3% (w/v) sugar, pH was adjusted to 5 for blueberry and 5.8 for hazelnut and solidified with 4g/l Plant agar. The medium prepared and used in the bioreactors had the same composition but without the gelling agent. The influence of different quantities of the culture media (300 ml, 400 ml and 500 ml/bioreactor) was tested for both species. The immersion time was once at every hour lasting for 1 min. and aeration was once/hour lasting for 4 min. each.

Results: The results show that highbush blueberry had the highest proliferation rate (6.20±0.81) in the bioreactor containing 500 ml of the culture medium. The longest shoots (4.19±0.25 cm) were recorded in the bioreactor with 400 ml of the culture medium. No statistically significant differences were recorded in terms of shoot length and proliferation rate between the three treatments tested. Both shoot length and proliferation rate showed significantly higher values than those recorded in conventional micropropagation process using solid medium gelled with Plant agar (Clapa *et al.*, 2018). Hazelnut had the highest proliferation rate (0.93±0.07) in the bioreactor containing 400 ml while the longest shoots (3.13±0.49 cm) were measured in the bioreactor containing 500 ml medium. Similarly, the highest rooting percentage (77.78%) in hazelnut was recorded in the bioreactor containing 400 ml medium.

Conclusion: Our research highlighted that blueberry (*Vaccinium corymbosum* L.) ‘Duke’ and hazelnut (*Corylus avellana* L.) ‘Tonda di Giffoni’ can be propagated by using bioreactors, although further research is needed to improve the efficiency of this method.

Keywords: *bioreactor, blueberry, hazelnut, micropropagation*

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INFLUENCE OF FERTILIZATION SYSTEM ON YIELD AND FRUIT QUALITY IN STRAWBERRY

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Introduction Strawberry is the most delicious and refreshing fruit. It is characterized by specific flavor and high content of vitamins and minerals. Mature strawberries are high in water (90%), total soluble substances (10%) and many dietary components. Following numerous studies in determining the volatile components of the strawberry it was found that strawberry flavor is given by 360 volatile substances (Pineli *et al.*, 2011).

Aims: The influence of fertilization system in six strawberry cultivars ‘Alba’, ‘Aprica’, ‘Clery’, ‘Joly’, ‘Fortuna’ and ‘Malling’ under the pedoclimatic conditions of Satu-Mare, Romania, in 2018, was studied.

Materials and Methods: The research has been carried out in a commercial farm, set up in spring of 2018 in Satu-Mare, Romania, and the biological material was purchased from Italy. The planting system chosen for the experimental plot was 40 cm between rows and 33 cm between plants within row.

Results: The fertilization system influenced the cumulative yield and fruit quality, with differences statistically assured. The highest average yield on poultry manure fertilizer was registered, followed by chemical fertilizer. ‘Clery’ cultivar registered the lowest average yield while ‘Aprica’ cultivar has recorded high quality fruit.

Conclusion: The experiment revealed that among the evaluated cultivars the most useful for cultivation in Satu-Mare were ‘Clery’ and ‘Joly’ cultivars due to their high productivity and high fruit quality in comparison with other cultivars. The current study indicated that strawberry is a suitable and perspective crop for organic cultivation.

Keywords: *cultivar, fertilization, strawberry, yield*

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EFFECTS OF GIBBERELIC ACID AND PHOTOPERIOD ON SEED GERMINATION OF *CYCLAMEN* SPECIES

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Introduction: Propagation of new cultivars is a significant process due to the one and a half year period required for the growth and development of wild type *Cyclamen*. In order to shorten the development process, it is necessary to establish a rapid evolution through each generation. Gibberellins (GAs) have been shown to be efficient in accelerating the growth of *Cyclamen persicum* cultivars. They play a major role in multiple plant growth development including breaking seed dormancy, organ elongation and controlling the blooming period.

Aims: Taking into account the medicinal importance of *Cyclamens*, the aim of the study was to investigate the response of multiple *Cyclamen* species to different concentrations of GA₃ and GA biosynthesis inhibitors under different light intensities. These methods were studied as a potential way to shorten the germination and propagation period in wild type *Cyclamen*.

Materials and Methods: Seeds were placed on one layer of Whatman No. 1 filter paper, in 9-cm-diameter Petri dishes. Additionally, they were germinated in the presence of increasing concentrations of GA₃: 0 (Control), 50, 100 and 150 ppm. Germination percentage, mean germination time and seedling vigour index were determined. The species were kept at a light exposure of 50-60 (LL) and 800-900 μmol /m² sec (HL).

Results: Exogenous GA₃ reduced the germination time by increasing doses, regardless if in the presence of LL or HL. Also, it was noted that the best administered concentrations were at 50 and 100 ppm in the species kept at LL, whereas in the species kept at HL the best concentration proved to be at 100 ppm.

Conclusion: In the present research work, we demonstrated that the development of *Cyclamen* species is strongly influenced by GA₃ treatment and light intensity.

Keywords: *gibberellic acid (GA₃), height control, light stress*

IN VITRO MULTIPLICATION OF *PERILLA FRUTESCENS* SP.

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Introduction: Perilla (*Perilla frutescens*) or commonly called beefsteak plant is one of the species belonging to the *Lamiaceae* family. This species is an annual bushy, upright and is native from the Himalayas and today is spread all over the world: Asia, North America, Europe (Miller, 1922). This species is related to coleus and basil and in Asian cooking is used as a garnish. Perilla leaves extract have different proprieties: anti-inflammatory, antidepressive, antioxidant, antiallergic and anorexigenic.

Aims: The objectives of this research were to establish the optimum disinfection methods, the rate of *in vitro* multiplication and the appropriate growth medium to ensure the genetic stability and healthy plants.

Materials and Methods: The experiment was carried out in the Micropropagation Laboratory of the Faculty of Horticulture, Bucharest, on three varieties of *Perilla frutescens*: *acute*, *frutescens*, and *purpurascens*. The planting material has been obtained from VRDS Buzau, therefore, it was of high quality. Clear and concise observations can be made to allow the optimum *in vitro* propagation technology for each variety and comparisons between them. We used MS (-) culture medium also for initialisation and multiplication phase and MS (+) supplemented with 4,44 µM 6-benzilaminopurine (BA) and 2,22 µM BA + 2,85 µM (IAA) only for multiplication phase.

Results: Our results showed the development of the main morphological processes and the physiological processes at the level of the explants passed on different culture media. Characterization and botanical identification was done by visual observation of each plant used in experiment. The evolution of explants on different growth medium was done by measurements, visual observation and photos taken during the experiment. Our *in vitro* results showed a higher multiplication rate on MS (-) for all varieties of *Perilla frutescens* under study. The annual potential multiplication rates obtained were different depending on varieties, culture medium and explant type.

Conclusion: In the present research work, we demonstrated that the best medium for *in vitro* multiplication of Perilla is MS (-) medium, both for *frutescens* and *purpurascens* varieties.

Keywords: *Asian species, in vitro culture, Perilla frutescens*

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URBAN REHABILITATION OF THE UNIRII SQUARE IN CLUJ-NAPOCA

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Introduction: Urban spaces are part of the everyday life of each person, regardless of size, placement and economic status of the urban landscape. Whether made up of decorative, utilitarian or landscape elements, they have a defining impact on the city's social and economic development. The development of the modern industry, the growth, diversification of the population needs and the deterioration of the urban environment, create issues whose solutions lay in the hands of architects and landscape architects.

Aims: The purpose of this project was to create and present a green space adaptable to the needs of the public and various events using perennial flowering plants and shrub species in concordance to a previously conducted urban survey.

Materials and Methods: Union Square is the nucleus of the medieval city of Cluj-Napoca, it was built around the 'St. Michael' church and covers around 3 acres. A total of 91 trees were counted in the Unirii Square: 9 planted randomly in the south and west side of the square, 33 around the church and 46 trees used as street alignments on the adjoining sidewalks. There are also a total of 12 metal planters with perennial and annual floral plants. For the realization of this concept, the fractal principle was chosen. This principle is based on the repeated use of geometric shapes and its dimensional multiples. Mobile containers house different flower and shrub species with different decorating periods. This concept design was divided into 4 distinct areas, each area featuring decorative elements that differ in complexity.

Results: This landscape design occupied 1615 m², out of which 1024 pedestrian routes, 519 dedicated to plants and 72 m² to seating areas. The space offered variety with partial interaction potential for citizens. They would have the opportunity to reposition modules to satisfy their needs.

Conclusion: The use of this type of design in a densely trafficked area, where cultural and entertainment events are held annually, creates numerous rearrangement possibilities to provide both a decorative area and a generous space for organizational constructions.

Keywords: *adaptable, flower, modules, shrub, urban design*

EVALUATION ON THE EFFECT OF TOPPING ON YIELD OF TWO CULTIVARS OF HEMP (*Cannabis sativa* L.)

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Introduction: The cannabis cultivation, for medical purposes, earned place last years in Greece (Folina, 2019). Although, there are absence of information about the optimum guidelines for hemp cultivation (Papastylianou, 2017), the cultivated area is extended.

Aims: In order to define the best cultivation practices for two of the most commercial hemp cultivars under the Mediterranean climate, the aim was to assess if topping can increase the CBD production.

Materials and Methods: A field experiment was carried out at Central Greece, during 2019 growing season. The experimental design was split plot, with main plot with the two European cultivars ('Fedora 23', 'Futura 75') and sub-plots the form of pruning (topping).

Results: The analysis of variance of our data revealed that all analysed characters except mean seed weight were significantly affected by topping. The plant height was not affected by topping. The leaf area was higher after topping for both cultivars, 2670 cm² and 2850 cm² in 'Fedora 23' and 'Futura 75' respectively. The number of nodes was higher on topped plants. The length and weight of inflorescences were significantly affected by the interaction of cultivar and topping. The CBD content was 2.09 % in topped 'Fedora 23' plants, while in the untopped ones was 1.87%, in topped 'Futura 75' was 2.47 % while in the untopped plants of the same cultivar was 2.21%.

Conclusion: Hemp gave a significant yield response to applied topping for both of the two cultivars. Further research should be carried out on agronomical practices to stabilize, if possible, how to increase the number of inflorescences and finally the CBD content.

Keywords: CBD, Fedora 23, Futura 75, hemp, topping

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STRESS TOLERANCE IN *BUPLEURUM TENUISSIMUM* L. (APIACEAE), A RARE, PROTECTED SPECIES FROM THE VALENCIAN SALT MARSHEs

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Introduction: Salt marshes represent unique, highly specialised ecosystems, occupied mainly by halophytic plants. ‘La Albufera’ Natural Park, located near the city of Valencia (Spain), includes many such salt marshes, in which ‘structural’ species that shape the typical halophytic communities, but also less frequent and unique, ‘differential’ halophytes, are present.

Aims: To contribute to conservation and reintroduction programmes of plant species of interest in the Natural Park, in this study we have analysed the responses to drought and salt stress of a rare differential halophyte, *Bupleurum tenuissimum* L. – which has been recently catalogued as extinct in ‘La Albufera’ zone – in comparison with another species of the same genus frequent in the area (*B. fruticosum* L).

Material and Methods: Young plants of both species were subjected for three weeks to salt stress (watering twice per week with 75, 150, 300 and 450 mM NaCl solutions), and water stress (completely stopping irrigation) treatments. Plants were then sampled, and growth parameters were measured. The level of oxidative stress and the activation of antioxidant compounds under drought and high salinity conditions were assessed in plant extracts using spectrophotometric assays.

Results: Stress-induced growth inhibition was observed in both species, but with quantitative differences between them, as *B. tenuissimum* was mostly affected by water stress and *B. fruticosum* by high salinity. Changes in the level of MDA (an oxidative stress marker) and the accumulation non-enzymatic antioxidants (total phenolics and flavonoids) followed the same pattern, increasing especially under drought conditions in the former species and under salt stress in the later.

Conclusion: Our data indicate that *B. tenuissimum* is more tolerant to salinity but much more sensitive to water stress than *B. fruticosum*, suggesting that prolonged drought could be the cause of the extinction of this species in ‘La Albufera’ Natural Park.

Keywords: *halophytes, oxidative stress, salt stress, water stress*

POLLEN GERMINATION CAPACITY AND POLLEN TUBE GROWTH OF EIGHT ROMANIAN KIWIFRUIT HYBRIDS (*ACTINIDIA* SPP.)

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Introduction: Kiwi is recognized as a highly nutritious fruit, having important biochemical characteristics that deliver a range of health benefits. Kiwi is a new fruit species that can be grown in Romania and the creation, testing and introduction of winter hardy genotypes, adapted to the local climate conditions is a priority. A common Italian-Romanian kiwifruit breeding program was initiated in 1993 and during the time, several hybrid genotypes were obtained and introduced to be tested. For pollinator (male) kiwi plants, breeding programs involve the selection of elites with high pollen germination and long flowering period.

Aims: The aim of this study is to evaluate the kiwi pollen grains from eight male hybrids for identifying the most suitable pollinators for kiwi female selections released from our breeding program.

Materials and Methods: During the peak male flowering period (middle of May – beginning of June) pollen grains were collected in Petri dishes from eight kiwi hybrids. The fresh pollen grains were maintained at room temperature for 12 hours and then placed in a 15% sucrose solution for germination. At different time intervals: 4, 8 and 24 hours, respectively, several measurements were done.

Results: Pollen germination percentage and pollen tube length were strongly influenced by the genotype. From the eight male hybrids, two genotypes: R2P8, R3P2 have been selected for further field tests, including artificial pollination and compatibility tests with the female kiwi selections.

Conclusion: In the present study we found out that the kiwi pollen registered high germination values after 24 hours, in 15% sucrose solution. Taking in consideration that most of the studied hybrids have been obtained from interspecific crosses (*A. deliciosa* × *A. chinensis*), in order to match the right level of ploidy for male-female couples, further studies using the flow cytometry have to be completed.

Keywords: *Actinidia deliciosa*, *A. chinensis*, male plant, germinability, sucrose solution

STUDIES ON THE PHENOLIC PROFILE OF CABERNET SAUVIGNON, IN TÂRNAVE VINEYARD

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Introduction: Grapes contain a large number of phenolic substances whose importance in metabolism and development of vine is remarkable. Polyphenols are designed to give color, velvety taste or astringency of wine (Babeș *et al.*, 2007). Polyphenols can be accumulated in different solid parts of grape bunches, seeds and through the process of maceration-fermentation on the mash they pass into wine (Geană *et al.*, 2016). Each phenolic compound evolves differently during ripening of the grapes.

Aims: The objective of the present research was the study of phenolic maturity in Cabernet Sauvignon grape varieties, the evolution of the phenolic compounds during maceration-fermentation, determining optimum phenolic level, in order to obtain high-quality red wines in the Tarnave vineyard.

Materials and Methods: Study on phenolic maturity of the Cabernet Sauvignon varieties cultivated in Tarnave vineyard was carried out in 2016-2018. Chemical analyzes were performed to determine the dynamics of the accumulation of polyphenols during grape maturation in must and wine. Analysis of polyphenols from grapes was performed with the Folin-Ciocalteu method and semi-automatic analyzer reading Y350. Wine was also analyzed for phenolic profiles.

Results: The physico-chemical analyzes carried out on the Cabernet Sauvignon varieties, in the Tarnave vineyard area, show that sugar and phenolic compounds have accumulated in varying quantities during the grape harvest phenophases and technological maturity. The sugar content in Cabernet sauvignon varieties has been situated between 158-180g/l while the polyphenol level in grape maturation phenophase has been noted between 230 mg/l at the beginning of the process and 590 mg/l at harvesting.

Conclusion: The wine characteristics serve for the description of grapevine phenolic potential standardization. Wines produced in Tarnava vineyard have the proper phenolic potential of *Vitis Vinifera* varieties to obtain high-quality red wines.

Keywords: *phenolic maturation, grapes*

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STUDIES ON THE IMPROVEMENT OF THE PHENOLIC POTENTIAL IN CABERNET SAUVIGNON, IN TÂRNAVE VINEYARD

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Introduction: Many aspects of both grape production and winemaking influence sensory properties and the wine quality. The colour represents an important parameter of red wine quality and this is characteristic to the cultivar, composition and age of wine. The red wine colour is determined by the presence of some specific substances, the anthocyanins, and can be affected by several factors.

Aims: The aims of the study was to discover the influence of some technological practices, like the bud load level and the duration of maceration-fermentation, on the quality of Cabernet Sauvignon wines from Târnavă vineyard during 2016-2018.

Materials and Methods: To study the effect of the bud load level on the phenolic potential of must and wine in the Cabernet Sauvignon plantation, there were applied three variants of pruning: with 20, 28 and 36 buds/vine. For optimizing the extraction of phenolic compounds from grapes, the maceration-fermentation period had two variants: 8 and 16 days. Chemical analyses, in accordance with the standards of the wine-making laboratory, have determined the accumulation of sugars, total acidity, pH and polyphenols in must and wine.

Results: To follow the dynamics of accumulation of polyphenols during maceration-fermentation, the must samples were daily collected to determine the content in phenolic compounds, sugar and alcohol. In 2016, the accumulation of sugars and total polyphenol was lower in all variants, because it was a rainy autumn. In all pruning variants, in 2017, grapes had proper sugar content. After 16 days of maceration-fermentation, all wines had a much higher content of polyphenols in all wines regardless the harvest year and the bud load. Cabernet Sauvignon wines had the highest content of anthocyanins in 2017 in the variants with 8 days of maceration-fermentation.

Conclusion: Interpretation of results in terms of technology practices indicated that in the Târnavă vineyard there can be produced quality red wines with designation of origin, if the climatic conditions are favorable to the vine growth.

Keywords: *Cabernet Sauvignon, maceration, wines, polyphenols*

CLEAVERS (*GALIUM APARINE* L.) RESISTANCE TO ACETOLACTATE SYNTHASE (ALS)-INHIBITING HERBICIDES AND ITS IMPACT ON GROWTH RATE

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Introduction: Cleavers (*Galium aparine* L.) is a common broad-leaved weed found in cereal fields (Karkanis *et al.*, 2016), its control being mainly based on post-emergence application of acetolactate synthase (ALS)-inhibiting herbicides (e.g. sulfonylureas). Continuous application of sulfonylureas such as tribenuron-methyl has led to the evolution of herbicide-resistant *G. aparine* populations (Sun *et al.*, 2011; Deng *et al.*, 2019).

Aims: The aim of this study was to examine if the reduced *G. aparine* control in durum wheat fields in Central Greece was due to the evolution of resistance to herbicides. In addition, the growth of three *G. aparine* populations was also investigated.

Materials and Methods: A pot experiment was conducted at the University of Thessaly during 2017. The susceptible *G. aparine* population (P1) and the presumed to be resistant populations (P2 and P3) were evaluated for resistance to ALS-inhibiting herbicides. The *G. aparine* populations were examined for resistance to tribenuron-methyl, bromoxynil+2.4-D, florasulam+2.4-D, and mesosulfuron-methyl+iodosulfuron-methyl-sodium applied at 1×, 2×, 4×, and 8× times the recommended rate.

Results: Our results showed that the *G. aparine* populations P2 and P3 have developed resistance to tested ALS-inhibiting herbicides, while these populations were susceptible to bromoxynil+2.4-D. Regarding the height, fresh and dry biomass of *G. aparine* there were no significant differences between the susceptible P1 and resistant populations P2 and P3.

Conclusion: The results of this study indicated that *G. aparine* has developed resistance to the ALS-inhibiting herbicides as tribenuron-methyl, florasulam, and mesosulfuron-methyl+iodosulfuron-methyl-sodium, while the resistant populations P2 and P3 were effectively controlled by the bromoxynil+2.4-D herbicide.

Keywords: *cross resistance, populations, sulfonylureas, wheat*

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YIELD PERFORMANCE OF FABA BEAN CULTIVARS UNDER DIFFERENT ENVIRONMENTAL CONDITIONS IN GREECE

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Introduction: Faba bean (*Vicia faba* L.) is an important grain legume, as a protein source for human and animal consumption. The increasing need for protein in the world has stimulated scientists to research for increased yield and quality in this crop (Karkanis *et al.*, 2018). Drought and heat are considered major constraints in faba bean growth and production in Europe. The most drought-sensitive growth stages are flowering, early podding, and grain filling (Katerji *et al.*, 2011).

Aims: The aim of this study was to determine the response of faba bean cultivars to different environmental conditions during 2018-2019 growing season.

Materials and Methods: Four inbred lines and two commercial cultivars were sowed in three different soil-climatic environments (Attica, Thessaly, Thessaloniki). At each location, a randomized complete block design with four replications was used. Different characteristics such as plant height, number of pods/plant, number of seeds/pod, seed yield and 1000-seed weight were recorded.

Results: The results indicated that all traits except 1000-seeds weight were significantly affected by different climatic environments. Seed yield, number of pods/plant and number of seeds/pod decreased with increasing drought conditions in Attiki region. 'Tanagra' produced higher seed yield and number of pods per plant under all locations. The late maturity inbred line K14 showed lower values for all measured characteristics.

Conclusion: This study adopts and implements a holistic approach of the production of faba bean cultivars in order to replace soybeans and lead to an increase in production of feedstuff directly available to sheep farmers.

Keywords: *drought, Vicia faba, yield, yield components*

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OBSERVATION ON THE FLORA CHARACTERISTICS OF THE 91V0 FOREST HABITAT TYPE IN THE ALPINE BIOGEOGRAPHIC REGION

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Introduction: Flora is an important indicator that characterizes a forest habitat type and provides important information about the pressures and threats to which forest ecosystems are subjected in a particular area

Aims: The 91V0 code forest habitat type consists of phytocoenoses of pure beech, molluscs, beet-firs and mixtures of beech, Norway spruce and fir with mulch soil with medium to high trophic (Donita *et al.*, 2005).

Materials and Methods: Research study is located in forest compartment 68 of VI. Iod yield management unit, Răstolița Forest District and is based on a square-shaped grid. The distance between the four observation points is 250 meters. Forest habitats evaluation, monitoring records which describe the type of habitat, the observation point codes, the bioregion and the scientific name of plants were noted.

Results: In the first studied forest area seven of the 18 plants specific for the 91V0 habitat type were identified, in the second area six, in the third area seven plants and in the fourth studied zone five plants characteristic for the respective habitat type were recorded.

Conclusion: The 18 plants identified as characteristic for the 91V0 habitat type are dispersed in 28% of the studied habitat type in the least representative observation point and 39% in the most representative ones.

Keywords: *habitats, 91V0, flora, representative plants*

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ARTIFICIAL NESTS – A USEFUL INSTRUMENT IN ATTRACTING INSECTIVOROUS AVIFAUNA IN ORCHARDS

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Introduction: Attracting useful avifauna is one of the methods used in the integrated and organic orchards to control fruit tree specific pests. Creating and maintain integrated ecosystems have important and sometimes difficult activities in the fruit growing area. In the integrated and organic orchards, a solution for attracting and maintaining the insectivorous avifauna is to build and place suitable nesting places.

Aims: The aim of this study is to present the results of the researches conducted during the 2015 - 2017 period when 64 artificial nests located in different orchards were monitored.

Materials and Methods: Artificial nests were built according to regulations and placed in three orchards in three different locations: Faculty of Horticulture within USAMV Bucharest, Moara Domneasca Ilfov County and Nursery and Fruit Growing Farm Istrița. Between 2015-2017, the monitored parameters were: distance between nests and the closest road, the mounting height of nests on the support, type and diameter of the support and nest orientation.

Results: The nests occupation rate and the bird species with a comparative analyze of the occupation rate according to the monitored parameters are presented for each orchard. Significant correlations were observed between occupation rate with nests type, support diameter 0-15 cm and support height.

Conclusion: The nesting density and diversity of occupied species were influenced by the orchard habitat but also by the technical parameters of nest construction and position of nests. The highest nests occupation rate was registered in Moara Domneasca orchard and the lowest in the Bucharest orchard, due to the windbreaks presence. In time, all the horticultural ecosystems registered an increase in the occupation rate of the artificial nests, the wild birds getting used with them and the new generations grown in artificial nests accepted them more easily.

Keywords: *biodiversity, ecosystem, organic pest management, useful birds, windbreaks*

CHARACTERIZATION OF ORNAMENTAL *MALUS* GENOTYPES AND THE STUDY OF THEIR POLLEN CHARACTERISTICS

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Introduction: Decorative apple species are used in many different areas such as: plant breeding for obtaining new varieties with genetic resistance to diseases, forestry for the establishment of cultivated forests, winter bird feeding, landscape architecture, products like jam, sweet-cider, cider, etc.

Objectives: Considering the multiple uses of these species, this study present the preliminary physical and biochemical characteristics of the ornamental apple genotypes cultivated in the northern part of Bucharest, as well as the study of their pollen germination.

Material and methods: Genotypes studied were: *Malus purpurea*, *Malus* × *zumi* ‘Golden Hornet’, *Malus* ‘Perpetu Evereste’, *Malus* ‘Red Sentinel’, *Malus* ‘Toringo Scarlet’, *Malus* × *scheindeckeri* ‘Red Jade’. The methods of analysis were physical as weight, firmness, fruit shape, peduncle length and biochemical represented by total soluble solids and dry matter. In order to determine the degree of germinability, a 10% sugar solution was used with 99.80% pure sucrose.

Results: The results showed that the analyzed fruits had a high content of total soluble solids (maximum 26.98%) and dry matter (maximum 33.18%) for the *Malus* ‘Toringo Scarlet’ variety. For germinability, the highest percentage was 54.90% recorded in *Malus* × *zumi* ‘Golden Hornet’ in the climatic conditions of the 2019 year.

Conclusions: Because the fruits analyzed have high sugar content, a high amount of dry matter and some varieties have red pulp, these ornamental apple genotypes can be used in plant breeding to obtain new cultivars. The germination percentage of pollen grains was not high due to the atmospheric conditions, with massive rainfalls during the period of blossoming and blooming, but significant for future researches.

Keywords: *Malus*, plant breeding, germinability

VARIATION OF MSIR IN ORGANIC CULTURE SYSTEM OF PEPPERS AS A SOIL MICROORGANISMS DIVERSITY MEASURE RELATIVE TO PLANT GENOTYPE

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Introduction: As agrosystems in Europe go towards more sustainable but productive ways of production, organic production has become a highly appreciated alternative. As part of the organic agriculture principles, the soil maintenance, enrichment and increasing biodiversity are considered in many steps of the production process, but not much in terms of genotype in plant and soil interaction.

Aim: To assess how different pepper plant genotypes change, or not, the soil microbial diversity by analysis of multiple substrate induced respiration (MSIR) using MicroResp® method, as part of a larger project focused on the rhizosphere diversity in both sweet and hot peppers.

Materials and Methods: Two different accessions from common peppers (*Capsicum annuum* L.), ‘Piquillo’ and ‘Serrano’, were evaluated. Plants were transplanted in April 2018 and grown open field following organic practices in Marxal dels Moros (Sagunto, Valencia, Spain) under the spring-summer season. Soil sampling was done twice: i) at the beginning of harvesting (June) and ii) at the end of the growing season (end of September). Soil was directly sampled from the roots (rhizosphere) as well as a blank one (soil taken of plant-free lanes). After that, we followed Campbell *et al.* (2003) methodology, but calibration was by inorganic $\text{Rx citric acid} + \text{sodium bicarbonate} \rightarrow \text{sodium citrate} + \text{carbon dioxide}$ with Dansensor’s CheckPoint O₂/CO₂®. Citric and malic acids were used as respiration substrates.

Results and Conclusion: The MSIR was statistically analyzed substrate by substrate (by ANOVA). No significant differences were found between accessions at the beginning of the fruiting season. The second sampling showed significant increases in respiration rates for ‘Serrano’ accession, in both substrates. When each accession and acid was compared against control (by Dunnett test), both substrates were significantly different (‘Serrano’ vs blank). ‘Serrano’ accession had significantly more microbial diversity at the end of the growing season, as MicroResp® MSIR rates demonstrated.

Keywords: *MicroResp, MSIR, soil, respiration*

PHENOTYPIC DIVERSITY OF WHEAT LANDRACES FROM SOUTH GREECE

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Introduction: In Greece, due to the geographical morphology and the presence of small-size farms, landraces can still be found under cultivation, especially by people in villages, who keep their own seeds and use them mainly for their own consumption or market them as specialty crops. Wheat landraces are heterogenous populations that can contribute as useful genetic material to breeding programs (Veteläinen *et al.*, 2009). The accurate description of the genetic diversity present between the landraces is needed for an appropriate management of this germplasm (Carvalho *et al.*, 2013).

Aims: The objective of this study was to investigate the phenotypic diversity of Greek wheat landraces from Peloponnese using morphological traits of the spike.

Materials and Methods: Fifteen wheat landraces were collected from the region of Arcadia, Central Peloponnese and seeded under a completely randomized design with four replications. For the computation of plant height, spike length, spikelets/spike, number of kernels/spike, mean kernel weight and awn color, 20 plants were randomly selected in each plot.

Results: The results indicated that the landraces were characterized with high levels of heterogeneity, and the coefficient of variation ranged between 19% to 32%. There were traits with a relatively high level of variation among landraces mainly in awn presence, awn color, spike length and weight.

Conclusion: This preliminary investigation could be the first step towards a more efficient germplasm management. Generally, the availability of genetic variation could be used in future breeding programmes.

Keywords: *Triticum*, diversity, spike traits

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EFFECT OF SUPER ABSORBENT POLYMER ON SEEDLING EMERGENCE AND GROWTH OF COTTON UNDER WATER STRESS CONDITIONS

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Introduction: Irrigation water availability has been identified as one of the major limiting factors of cotton productivity, especially during the hot and dry summer period of the Mediterranean region (Papastylianou and Argyrokastritis, 2014). The soil application of Super Absorbent Polymers (SAPs) may effectively increase water use efficiency, improve soil physical properties, enhance seed germination and emergence, crop growth and yield and reduce the irrigation requirements of plants (Guilherme *et al.*, 2015).

Aims: The objective of this study was to investigate the effect of Zeba (SAP) on seedling emergence and growth of cotton under limited water availability.

Materials and Methods: A set of pot experiments was conducted under completely randomized design with four replications of 25 seeds. Treatments included application rates of 5, 10, 15, 20 kg/ha and an untreated control, all under three levels of irrigation (adequate, moderate and deficit). The emergence performance was evaluated by final emergence percentage and mean emergence time. Root and shoot growth were measured for length and weight.

Results: The results indicated that the rate of application of Zeba, irrigation levels and their interaction had a significant effect ($p < 0.01$) on emergence parameters. All parameters decreased with the decreasing amount of Zeba and increasing water stress. Final emergence percentage at 20kg/ha application rate was 47%, 30%, 25% and 20% higher than at 0, 5, 10 and 15 kg/ha Zeba application respectively. The mean germination time increased with the reduction of Zeba application, especially at the lower water regime.

Conclusion: Zeba application exhibited potential to increase moisture conservation and enhance seedling growth of cotton.

Keywords: *Gossypium hirsutum*, seedling emergence, water stress, Zeba SAP

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NEW ROMANIAN DISEASE RESISTANT PEAR GENOTYPES FRUITS EVALUATED THROUGH SENSORIAL ANALYSES

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Introduction: In the last years, pear orchards decreased in Romania due to specific pest and diseases difficult to control. In Voineşti Research Station for Fruit Growing new Romanian disease resistant pear genotypes were released and specific research is necessary.

Aims: The aim of this study is to present the fruit quality evaluation using sensorial analyses of some new Romanian disease resistant pear genotypes.

Materials and Methods: Four varieties ('Corina', 'Euras', 'Orizont', 'Romcor') and two new hybrid selections (R3-146-F, H12-83-79) grafted on quince (CTS 212), on pear (Farold 40) and on own roots, *in vitro* propagated, were analysed. The trees are produced at the Voineşti Research Station for Fruit Growing and planted in the Experimental Orchard of the Faculty of Horticulture within the USAMV of Bucharest. Two canopy shapes were used. The planting distances varied from 3.0 × 0.8 m, for Parallel U to 3.0 × 1.6 m, for Trident canopy. An integrated technology has been applied, including drip irrigation. The sensorial analyse parameters monitored were: fruit size, fruit color, attractiveness, firmness, pulp juiciness, pulp color, taste and flavor. The target group was formed by the general public. The basic analyses like average weight, size, total soluble solids, dry matter and firmness were calculated and correlated with the sensorial analyse parameters.

Results: A comparison between the tested fruits according to the consumer preferences is presented. The best appreciations were received by the R3-146-F hybrid and Euras grafted on quince and also on pear. Significant correlations were calculated and observed between the attractiveness parameter and the measured fruit size, the appreciation of the fruit size and the measured one, the taste and the total soluble solids measured.

Conclusion: The new Romanian disease resistant pear genotypes can be promoted for being cultivated on large orchards. Interesting results of the sensorial evaluations revealed that the larger fruits with a higher quantity of sugars were more appreciated by the consumers. Important biochemical parameters for all the cultivars are compared.

Keywords: *Corina, Euras, Orizont, Pyrus communis, Romcor*

THE INFLUENCE OF ETHEPHON APPLICATION ON DEVELOPMENT AND PRODUCTION OF 'GOLDEN REINDERS' APPLE TREES

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Introduction: The fruit formation occurs during two vegetation periods, divided by the dormancy? Thus, in the first vegetation period ontogeny induction and differentiation of fruit buds occurs, but the second vegetation is characterized by blooming, fruit set, growing and maturing of fruits (Babuc *et al.*, 2013; Balan *et al.*, 2001). The growth regulators are among the chemical synthesis compounds with which fruit growers can influence and even direct plant growth and fructification processes. To temper the vigor of tree growth in favor of fructification is necessary to treat them with growth regulator, as Ethephon, which diminishes the development of trees in the favor of laying the generative buds and the constant fruiting of the plantation (Lieberman, 1979).

Aims: To evaluate the influence of Ethephon on the development and fructification of 'Golden Reinders' apple variety.

Materials and Methods: The study subject of the experience was 'Golden Reinders' apple variety grafted on MM106. The trees were trained as layered with free growth. The distance of plantation is 4.0×2.5 m. To study the development and fructification of the apple trees the following variants of treatment were experimented: 1. Control – no treatment; 2. Ethephon – 50 ppm; 3. Ethephon – 150 ppm. Ethephon was sprayed 3 – 4 weeks after blooming.

Results: The research was conducted during the period of 2015-2016. During the research, it was studied the main indexes of tree development, the quantity and type of fruit formations, the quantity of flowers and the degree of fruit set and the fruit harvest recorded in the plantation.

Conclusion: In the present research work, we demonstrated that Ethephon may be included in the technological system for monitoring the growth and fructification of apple trees, in the dose of 150 ppm, applied 3 – 4 weeks after blooming.

Keywords: *apple, Ethephon, growth, differentiation, yield*

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EMPLOYING AN ANALYTIC HIERARCHY PROCESS TO PRIORITIZE THE MOST IMPORTANT NON-WOOD FOREST PRODUCTS FROM SĂLAJ COUNTY

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Introduction: Recent demand trends for healthy food and organic products are increasing. In this context, non-woody forest products (NWFPs) gain recognition due to the fact that they can provide a supplementary source of income in the forestry sector.

Aims: The main purpose of the present paper is to highlight the most important non-woody forest products in Sălaj County.

Materials and Methods: For this purpose, a set of 19 criteria was taken into consideration and the analytic hierarchy process was applied to establish criteria levels. In order to facilitate the pair-wise comparisons in the application of the Analytic Hierarchy Process (AHP) were selected only eight NWFPs. Based on COST Action European non-woody forest products network classification the NWFPs were organized into four groups: mushrooms, tree products, understory plants and animals. Subsequently, the method was tested by using specialized software (Expert Choice).

Results: The selected NWFPs were: honey fungus [*Armillaria mellea* (Vahl) P.Kumm.], parasol mushroom [*Macrolepiota procera* (Scop.) Singer], acorns, *Tilia* flowers, wild strawberry (*Fragaria vesca* L.), St John's wort (*Hypericum perforatum* L.), European roe deer (*Capreolus capreolus* L.) and European pine marten (*Martes martes* L.). The two NWFPs with the highest potential were European roe deer and honey fungus, while the less important ones were *Tilia* flowers and St John's wort.

Conclusion: Sălaj County has great potential, diversity and distribution of the NWFPs, but this sector is underdeveloped and disorganized. This approach provides forest managers with information to develop further NWFPs management strategies.

Keywords: *analytic hierarchy process, forest management, non-woody forest products, Sălaj County*

THE INFLUENCE OF MACERATION-FERMENTATION TECHNIQUES ON THE CONTENT OF ANTIOXIDANT SUBSTANCES IN THREE EXPERIMENTAL WINES OBTAINED FROM *FETEASCĂ NEAGRĂ*

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Introduction: Food studies undertaken in the last years have paid particular attention to the quantification of compounds with antioxidant activity from the main classes of aliments, as well as demonstrating the benefits of the consumption of products with antioxidant activity.

Aims: The study aimed to identify and quantify the main phenolic acids with antioxidant activity from Fetească neagră wines. Also, it has been desired to highlight how the various maceration-fermentation techniques influenced the antioxidant capacity of three experimental wine samples.

Materials and Methods: In order to obtain the samples, it was applied three different maceration-fermentation techniques at the Fetească neagră must: traditional maceration, thermo-maceration and cryo-maceration. The content of phenolic acids and resveratrol was quantified using an HPLC method. The antioxidant potential was determined by two methods: DPPH and FRAP.

Results: Three of the five studied acids (all of them being framed as hydroxycinnamic acids) were identified in all samples. Of these, caffeic acid was identified in the highest concentrations. The maceration in traditional procedure provided the best results regarding the resveratrol concentration. Sample V₂ showed the highest antioxidant capacity, the results of the two tests being in agreement (110.29 μg/mL by DPPH test and 1027.32 μM Trolox/100 mL by FRAP method).

Conclusion: The cryo-maceration technique has led the wine with the highest concentrations of phenolic acids and the highest antioxidant capacity, while the highest concentrations of resveratrol were identified in V₃. The use of thermo-maceration technique resulted in the wine with the lowest resveratrol concentrations.

Keywords: *antioxidant activity, Fetească neagră, phenolic acids, wine*

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APPLE SCAB RESISTANT CULTIVARS FRUITS CHARACTERIZED THROUGH SENSORIAL ANALYSES

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Introduction: Apple scab (*Venturia inaequalis*) is one of the most important pathogens for apples, specific treatment being required. Every year, new resistant apple scab varieties are released by breeders that need to be tested in specific growing conditions.

Aims: The aim of this study is to present the fruit quality evaluation through sensorial analyses of more than 25 apple scab resistant cultivars cultivated in Bucharest area.

Materials and Methods: In the Experimental Orchard of the Faculty of Horticulture within the University of Agronomic Sciences and Veterinary Medicine of Bucharest more than 25 apple varieties are cultivated and monitored. Most of the trees are grafted of M9 rootstock, planted at 3.5 × 1.0 m and led as Vertical Axe. An integrated technology is applied, where the soil is maintained covered with a mixture of perennial grasses between rows and cleaned with herbicide on the row. Drip irrigation is installed.

Results: The researches were conducted in 2018 in two stages, monitoring the quality of fruits for two seasons, autumn and winter. The apple varieties were tested with different types of consumers by gender and age, regarding size, color, attractiveness, firmness, pulp juiciness, pulp color, taste and flavor. The basic biometrical analyses like average weight, total soluble solids, and firmness were calculated and correlated with the sensorial analyse parameters. The results show that tested fruits received good appreciations from the consumers. The fruit size and color, pulp juiciness and color parameters received the highest notes.

Conclusion: Several apple scab resistant cultivars can be proposed to be introduced in large orchards for production, due to their fruit quality evaluation. At the first evaluation, 'Dalinette' and 'Generos' received the best appreciations. 'Florina' and 'Enterprise' were at the second evaluation with the best notes given by the consumers.

Keywords: *firmness, Malus domestica, pulp juiciness, pulp colour, taste*

FIRST REPORT OF ALTERNARIA AFFECTING QUINOA CROPS IN CHILE

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Introduction: Quinoa (*Chenopodium quinoa* Willd.) is an emerging agricultural crop, which is cultivated in a wide range of geographic areas of Chile. In recent times, quinoa have been considered an alternative crop to address water scarcity in agriculture, expanding its cultivation to new degraded areas. In Chile, the cultivated area of quinoa is estimated in 706 hectares, with an average national production of 620 tons of grain during the 2015-2016 season and an average yield of 1.0 ton/ha. The Liberator Bernardo O'Higgins Region is the main producing area of quinoa, concentrating 53% of the national surface (Fuentes *et al.*, 2018). The increase of cultivated land area of quinoa in the country and its introduction in new geographical areas have raised concerns about adaptation and productivity factors. This concerns require for instance a wide scientific knowledge related to diseases affecting the crop, a poorly known factor at global and local scale.

Aims: The first aim of this study was to identify and characterize the causal agent of symptoms associated with necrotic spots on leaves of quinoa in different geographical areas of Chile (North: Colchane; Centre: Santiago and O'Higgins; and South: Chiloé). The second aim was to determine the prevalence and severity of the causal agent of symptoms associated with necrotic spots on leaves of quinoa in 45 genotypes established in the O'Higgins region.

Materials and Methods: During season 2016/2017 and 2017/2018 quinoa crops showing leaf spot disease were monitored in different regions of Chile. Isolation of causal agent was characterized by morphological and DNA sequencing analyses using four genetic regions (rDNA ITS, Calmodulina, ATPasa and ALT).

Results: The results demonstrated that causal agent of symptoms associated with necrotic spots on leaves of quinoa was *Alternaria alternata*. The pathogenicity test revealed that this species was able to produce severe leaf spot and blight disease on the host. Furthermore, the prevalence and severity of this disease was evaluate in 45 genotypes of quinoa - established in the coastal area in centre zone of Chile -, showing a prevalence of this disease in 93% out of genotypes.

Conclusion: There is no description and identification of this fungus causing disease in quinoa until now. This work constitutes the first identification and characterization of *Alternaria* spp. as a causal agent of disease affecting quinoa in Chile and the world.

Keywords: *Alternaria*, Chile, quinoa

EXHIBITION OF PLANTS OF THE *MAGNOLIA* L. GENUS IN THE COLLECTION OF THE “ALEXANDRU CIUBOTARU” BOTANICAL GARDEN (INSTITUTE)

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Introduction: The genus *Magnolia* belongs to the *Magnoliaceae* family, which is composed of about 85 species native to the Americas and Asia. The genus includes deciduous and evergreen species that are valued primarily for their spectacular flowers but also foliage and fruits. *M. Kobus* - kobus magnolia, *M* × *soulangeana* - saucer magnolia and *M. Stellata* - star magnolia, are the most important species used in landscaping (Dirr and Heuser, 1987). In our institute, there are specific deciduous magnolias, native to the Far East. They flower very early in spring, almost always before the leaves appear. Some of them flower again in summer but the second blooming is less decorative. They prefer fertile, cool, deep soil which stays moist but which is also permeable. They do not develop well on limestone, especially the varieties with tulip-shaped flowers. Magnolias can be divided into two groups: the first group includes varieties with star or lily shaped flowers with a compact shrubby habit, or are small trees, and can be planted single on lawns or with other spring flowering shrubs, from bamboo to Japanese maples. The second group includes varieties with flowers with tulip shape (*M* × *soulangeana* and its hybrids), which have a shrubby habit up to their 10th to 15th year and then become arborescent. They can be planted single on lawns or as bushes or shade trees near buildings because their roots do not damage foundations or obstruct drainpipes (Dirr, 2005).

Aims: The mobilization and introduction of plant species, the enrichment of the gene pool of ornamental plants and the promotion of environmental education have led to the creation of a new exhibition in the “Alexandru Ciubotaru” NGBI, aiming at creating the largest collection of taxa of the *Magnolia* genus in the Republic of Moldova and at accomplishing the ecological restoration of the institution after the natural disaster that occurred on April 19-21, 2019.

Materials and Methods: For the beginning, 21 varieties of magnolias have been mobilized, totalizing 52 specimens.

Results: The following species were planted at the initial stage of the exhibition: *Magnolia* ‘Galaxy’; *M.* ‘George Henry Kern’; *M. liliiflora* ‘Nigra’; *M.×loebneri* ‘Leonard Messel’; *M.×soulangeana* ‘Alba Superba’; *M.×soulangeana* ‘Alexandrina’; *M.×soulangeana* ‘Lennei’; *M. stellata* ‘Susan’; *M.×soulangeana* ‘Superba’; *M. stellata* ‘Royal Star’; *M.×loebneri* ‘Merrill’; *M. soulangeana*×*liliiflora* ‘Genie’; *M. stellata* ‘Kikuzaki’; *M.×soulangeana* ‘Speciosa’; *M. salicifolia* ‘Wada’s Memory’; *M.* ‘Honey Tulip’; *M.×soulangeana* ‘Boromeuszka’; *M.* ‘Ricki’; *M. campbellii* ‘Charles Raffil’; *M.* ‘Yellow Lantern’; *M.* (‘Jurmag4’) Burgundy Star.

Conclusion: Twenty-one species of the genus *Magnolia* have been successfully planted and all the plants are growing well.

Keywords: Botanical Garden, exhibition, *Magnolia* genus

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A COMPARATIVE TECHNO-ECONOMIC ANALYSIS OF ORGANIC AND CONVENTIONAL *NIGELLA SATIVA* L. CROP PRODUCTION IN GREECE

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Introduction. Organic agriculture constitutes a holistic production management system based on a set of agricultural practices respectful of the environment from production stages until handling and processing. Organic agriculture has experienced a rapid development worldwide during the last two decades. *Nigella sativa* L. is a commercial medicinal plant since its seeds are characterized for their unique properties, and they are traditionally used as a medicament for a variety of disorders of the cardiovascular system and digestive track. *N. sativa* cultivation could offer innovative and high-quality products, especially under organic cropping system.

Aims. The present study aimed to examine the prospects of *N. sativa* production in Greece and to evaluate the economic outcomes of the cultivation of this crop under organic and conventional cropping systems.

Materials and Methods. A case study was implemented on an existing farm in Aliartos area situated in Viotia regional unit of Central Greece region. For the comparative analysis of organic and conventional *N. sativa* production, two business plans were developed, one for each cropping system. The total area of the studied farm was 40 ha where originally grown wheat. The *N. sativa* crop was introduced in an area of 4 ha. The business plan for each type of farming system included 36 ha of wheat and 4 ha of *N. sativa*.

Results. The economic analysis revealed that the cost of conventional *N. sativa* seed production was 4.91 € ha⁻¹, whereas the cost of organic seed production was 6.09 € ha⁻¹. The organic and conventional *N. sativa* selling prices were 17.00 and 12.00 € ha⁻¹, respectively. Moreover, the financial performance of the farm significantly improved after the introduction of organic *N. sativa* crop, as the net profit increased by 118% compared to the initial net profit of the farm, while the increase in the conventional system was less at 96%.

Conclusion. *N. sativa* is a new crop opportunity with high net profit, especially under organic farming, as the inflow of external imports is lower.

Keywords: *business plan, Nigella sativa, organic farming, techno-economic analysis*

RESEARCH CONCERNING THE USE OF SOME MULCHING METHODS FOR LAVENDER

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Introduction: *Lavandula angustifolia* Mill. is a precious and an appreciated plant worldwide for its essential oil, which is used for treating a lot of human diseases like anxiety, hypnotic, cold, with anti-inflammatory and antiseptic properties and it is also used in the cosmetic industry for soap, cream, perfumes. Regarding to this important benefit of the lavender, we should obtain a good quality essential oil, considering that when harvesting the lavender flower stem, the weeds could pollute the essential oil by mixing with the plants (Hoeberechts *et al.*, 2002). For the use of lavender essential oil in medicine and cosmetics it is recommended to collect flowers from fields which are not contaminated with chemicals from herbicides.

Aims: The topic of this research was how the production of lavender can be influenced by applying organic farming obtaining good results quantitatively (a high vegetable raw material) and qualitatively (essential oil of the highest quality). For this purpose, the main objective of the research was to use different mulching methods to reduce weeds.

Materials and Methods: This experiment it was accomplished during a period of two years (2018-2019), at the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, in the didactical field. The biological material used in the experiment comprised two *Lavandula angustifolia* Mill. cultivars ('Codreanca' and 'Sevtopolis') in three experimental variants: unmulched (control) and mulched with straw/hay and mulch foil. We have evaluated the weed density (number of weeds)/1 m² and the type of weeds sprouted in the experimental field in each treatment scheme.

Results: In the mulching experiment, it was observed that from the three variants applied, the mulch foil was the most successful, because the weeds reached the surface only through the planting holes.

Conclusion: In the present work it was demonstrated that weed control by mulching with foil reduced to 20% on 1 m² the number of weeds, compared to the control (unmulched) version in which the percentage was 50% per 1 m².

Keywords: *lavender, mulching, weed control*

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EFFECTIVENESS OF DIFFERENT HERBICIDES AGAINST PURPLE NUTSEDGE IN COTTON AND SOYBEAN

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Introduction: Purple nutsedge (*Cyperus rotundus*) is globally an important perennial weed. Infestations with this species lead to losses in yield and quality of crop production. In soybean, a density of 21 nutsedge plants/m² has been reported to cause 9.1–11.5 % yield losses (Das *et al.*, 2014). However, results from field trials revealed that intercropping of sorghum, soybean and sesame in a cotton crop inhibited *C. rotundus* density (70-96%) and dry matter production (71-97%) (Iqbal *et al.*, 2007).

Aims: The present study was conducted to determine the effectiveness of different herbicides in *C. rotundus* present in cotton and soybean cultures.

Materials and Methods: The treatments were eight: control, PRE s-metolachlor (X, 2X), pendimethalin, POST trifloxysulfuron, bentazone, pyriithiobac sodium, pelargonic acid. The plot size was 1.25 m × 3.30 m, with 3 replicates for each treatment. Assessments were made for nutsedge plants density/m², fresh and dry weight of aboveground shoots and height of specific plants (2 per plot). Moreover, density/m² of cotton and soybean plants, visual assessment of phytotoxicity and plant height response of specific cultivated plants were assessed.

Results: Differences were observed in *C. rotundus* densities among treatments, while s-metolachlor was the most effective with 40-50% less plants related to control. POST herbicides lead to effective control of purple nutsedge, but some of them revealed phytotoxicity to soybean, while soybean plants/m² were 15-20% less than control.

Conclusion: Current solutions for the control of nutsedges appear to be short-term, considering that regrowth is often not estimated. Competition among perennial weeds and cultivated plants should be assessed long-term through new a.i.

Keywords: cotton, *Cyperus rotundus*, soybean, weed management

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THE MANAGEMENT OF GRAPEVINE TRUNK DISEASES IN VINEYARDS OF CENTRAL TRANSYLVANIA

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Introduction: Grapevine trunk diseases (GTD) are among the most important disorders reported in vineyards in central Transylvania. On average, up to 5% of the vineyards are affected by the GTD although there are also vineyards where the incidence of the attack exceeds 15%. Recent studies show that the importance of pathogens in wood is so great that they are considered limiting factors that affect the stability of the world's vineyards (Larigon *et al.* 2009, Fontaine *et al.* 2016, Tomoiaga *et al.* 2018) This paper presents results obtained by researchers at SCDVV Blaj within the COST F1303 project, "Sustainable control of grapevine trunk diseases".

Objective: The main objective of this study is to develop new sustainable management alternatives for the GTD control.

Materials and methods: Variants tested were: V1 = conventional variant that included prophylactic, cultural and two treatments with fungicides based on Carbendazim, Cu and Popiconazole, V2 = the agroecological variant that included prophylactic, cultural measures and two treatments with biofungicides based on: *Trichoderma atoviridae* strain 8, *Trichoderma atoviridae* strain B11 and *Trichoderma harzianum*.

Results: Prophylactic preventive measures combined with agrotechnical measures play an important role in limiting the spread of the attack. Conventional fungicides and biofungicides tested help reduce the symptoms of GTD, but not enough to help reduce the premature death of grapevine.

Conclusions: The research work will continue by testing new innovative strategies adapted to biotic and abiotic stress factors in order to prevent and control GTD.

Keywords: *Biopesticides, grapevine trunk diseases (GTD)*

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BEHAVIOUR OF SOME GRAPEVINE VARIETIES TO THE *GUIGNARDIA BIDWELLII* FUNGUS ATTACK

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Introduction: *Guignardia bidwellii* or black rot of vine is one of the most dangerous diseases that occur in vineyards in central Transylvania. Depending on climatic conditions, inoculum reserves and susceptibility of vine varieties or, if the attack is not adequately controlled, harvest losses associated with this disease may vary between 5-100% (Tomoiağa and Comsa, 2010). Although at present there are different methods and means of preventing and fighting the black rot attack, genetic resistance is the most rational and economical way to control this disease.

Objective: Testing the resistance of new varieties and homologated clones at SCDVV Blaj to the *Guignardia bidwellii* attack.

Materials and methods: The behavior of vine varieties to the *Guignardia bidwellii* fungus attack was characterized by the evaluation of the symptoms severity. The diagnosis was completed with the microscopic analysis of the pathogen. For classification of varieties in terms of susceptibility/resistance to the black rot attack, a 4 classes scale was used, depending on the attack rate values.

Results: The results obtained revealed the tolerance for the 'Rubin' 'Astra', 'Brumăriu', 'Selena', 'Blasius' varieties, the 'Sauvignon-9 BI', 'Riesling de Rhin 7-2', 'Neuburger-10 BI', 'Iordana 9-1 BI' clones while susceptibility for 'Amurg', 'Radames' varieties and 'Traminer roz-60 BI', 'Pinot gris-34 BI', 'Fetească regală-21 BI', 'Riesling italian-3 BIBI', 'Fetească albă-29 BI', 'Muscat Ottonel-12BI' clones.

Conclusions: Taking into account the average values of the attack degree during the experimental period, the results obtained between 2016-2018 regarding the behavior of varieties in the climatic conditions specific to the studied area denotes that the lowest values of the attack degree were registered for the 'Rubin', 'Astra', 'Brumăriu', 'Selena', 'Blasius' varieties.

Keywords: *attack rate, Black rot, resistant varieties*

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CHANGES OF WEED FLORA DUE TO NITROGEN ADDITION IN SUNFLOWER

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Introduction: Nutrients and primarily nitrogen (N) may influence germination, emergence, density and growth of weeds (Sweeney *et al.*, 2008). N rates and herbicides are also known to influence weed flora, although their interaction has not been extensively studied (Catchcart *et al.*, 2004).

Aims: Despite studies that reveal the importance of N on weed flora and crop-weed competition, only limited information is available on how specific weed species respond to increasing soil N levels. This was the main objective of the present study, focusing on the main weed species of a sunflower crop.

Materials and Methods: A field trial was conducted in Domokos region, in central Greece with *Helianthus annuus*, hybrid "LG 5658". The experiment was established under a split-plot design with three replications, three weed control treatments (pendimethalin, imazamox and untreated) and three nitrogen levels (300 kg ha⁻¹, 150 kg ha⁻¹ and untreated). Weed density was recorded for the main species and several agronomic parameters of sunflower were measured.

Results: It was found that crop yield was increased with the increase of the rate of N. Moreover, weed density was increased in plots where 30 kg N per ha were applied compared to untreated plots. Density of several species was stimulated by the high rate of N compared with the untreated control. However, some weeds were not significantly affected by fertilization. Susceptibility of *E. crus-galli* and *X. strumarium* to imazamox was also influenced by N level.

Conclusion: This study revealed the high responsiveness of important weed species of sunflower to N. Such a finding could be further exploited through programs of integrated crop and weed management. Moreover, differences in herbicide efficacy resulting from different N levels may alter weed flora and explain possible weed control failures.

Keywords: *Helianthus annuus*, sunflower, nitrogen, weed flora

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EVALUATION OF POLLEN GERMINABILITY IN ROMANIAN PEPPER GENOTYPES

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Introduction: In order to develop an efficient breeding protocol adapted to the changing climate which demands higher plasticity for cultivated crops due to extreme conditions that occur more frequently, we focused on pollen study because it is the most sensitive and exposed part of the fruit setting (Raja Reddy and Kakani, 2006). Pollen germinability in *Capsicum annuum* var. *grossum* L. has been linked to deterioration under high temperatures, which are frequent in greenhouse conditions (Karni and Aloni, 2002).

Aims: The aim of this study was to evaluate the pollen germination capacity of potential male parental genitors for breeding purposes.

Materials and Methods: *In vitro* pollen germination capacity was quantified for 14 local *Capsicum* cultivars in order to evaluate which ones are best fit as male genitors. In order to assess which cultivars present the highest performance regarding pollen quality, pollen grains from each cultivar were germinated on media containing 15% sucrose and 1.5% agar at 24°C. Germinated pollen grains were assessed after 24h and 48h for each cultivar. Grains were considered germinated when the pollinic tube had at least doubled in size compared with the pollen grain.

Results: The microscope observations showed that the genotype has a considerable influence on pollen grain germinability. In our study, five out of the 14 cultivars showed more than 30% germinability, the highest percent being registered for ‘Stef’ cv. (42%) followed by L21 and L22 with 32%, local variety from Salaj county (31%) and ‘Cornel’ cv. (30%). The lowest percentage was registered for ‘Bucur’ cv., ‘Vlad’ cv., L50 and two local populations.

Conclusion: Based on our observations, the most favourable male genitors for artificial hybridization are the cultivars with more than 30% recorded germinability. These results offer useful information for selecting the best genitors for *Capsicum* breeding programs.

Keywords: *Capsicum annuum* var. *grossum*, pollen germinability, plant breeding

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NEW GENOTYPES OF LEAF MUSTARD (*BRASSICA JUNCEA*), BRED AND ACCLIMATIZED AT VRDS BUZAU

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Introduction: The *Brassica* genus is one of 51 genera in the *Brassicaceae* tribe and is the economically most important genus within this tribe, containing 37 different species (Gomez-Campo, 1980). Since 1996, *Brassica juncea* has been studied in the Breeding Laboratory of VRDS Buzau. The researches aimed at acclimatizing, improving and developing the specific crop technology for this species. The plant provides edible roots, leaves, stems, buds, flowers and seed (Rakow, 2004). Oil can be extracted from the seeds and used as a spice, similar to mustard, but with a spicier flavor. Among the seven edible oilseeds cultivated in India, rapeseed-mustard represents 28.6% of the total oilseed production and ranks second after groundnut sharing 27.8% in the India's oilseed economy (Shekhawat *et al.*, 2012)

Aims: Obtaining genotypes with distinct phenotypic expressivity, suitable to be grown in protected spaces and field, adapted to the pedoclimatic conditions of our country.

Materials and Methods: Research has begun with a valuable germplasm collection consisting of over 20 genotypes, of which 7 have been genetically stabilized. Research was difficult because of species entomophilia and had to be optimally insured with specific isolation spaces. The breeding method used was the repeated individual selection.

Results: The genetic potential of the germplasm base was evaluated and the seven obtained families were measured biometrically and phenologically and only genotype 1 showed a narrow variability range of the main characters. It has been tested both in protected areas and in the field with the indication that in protected areas plants were more vigorous from the vegetative point of view, the rosette being made of succulent leaves, strongly corrugated. These succulent leaves are consumed which become aromatic and spicy as the plant matures.

Conclusion: G1 has been registered since 2017 at ISTIS Bucharest for approval under the temporary name Aroma. The feedback from the testing committee and from the growers whom received promotional seedlings and seeds were encouraging, the species being a real success among producers and consumers.

Keywords: *spicy, genotype, aroma, phenotype*

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NEW GENOTYPES OF SWEETLEAF (*STEVIA REBAUDIANA* BERTONI), ACCLIMATIZED AND BRED AT VRDS BUZAU

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Introduction: *S. rebaudiana* Bertoni has been known for many centuries by indigenous tribes of South America, who called it “kaa-hee” (sweet herb). South American Indians used stevia both as a sweetener and as a medicinal plant. Folk medicine of Paraguayan indigenous tribes recommends it particularly as a substance strengthening the heart, the circulatory system and regulating blood pressure. (Marcinek *et al.*, 2016). *Stevia rebaudiana* is often used by the food industry due to its steviol glycoside content, which is a suitable calorie-free sweetener (Carrera-Lanestosa *et al.*, 2017). In 1990, Ovidio Rebaudi was the first chemist to study the chemical characteristics of the substances extracted. Its name was later changed to the current one, and it was recommended not only for food production, but also for the medicinal effects that were attributed to it (Yadav *et al.*, 2011). In Romania, during the 1980s, this species was studied in addition to other sweetener plants, such as Jerusalem artichoke (*Helianthus tuberosus*), sweet sorghum, sweet iris, etc. After 1996, the researches were restarted intensively at VRDS Buzau by the Breeding and Biodiversity Conservation Laboratory.

Aims: Obtaining genotypes with distinct phenotypic expression, adapted to the pedoclimatic conditions of our country and their expansion as crop vegetable.

Materials and Methods: Research began with the evaluation of an important germoplasm collection and the valuable genotypes were intensively bred resulting two genotypes with distinct phenotypic features. The method used was repeated individual selection, with particular attention being paid to genotypes that demonstrated increased resistance at low temperatures.

Results: The two genotypes have distinct phenotypic characteristics and exhibit high resistance to low temperatures. L1 presents lanceolate leaves, pubescent stems and erect habit while L2 has slightly ovoid smaller leaves and the plant has thin branches and globular habit. The foliage is smoother and darker.

Conclusion: The obtained genotypes will be proposed for releasing as far as they can be successfully cultivated in the warmer areas of the country as a perennial plant and as an annual plant in the colder areas.

Keywords: *steviol, glycoside, sweetener, genotype, breeding*

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COMPARATIVE EVALUATION OF THE ATTACK OF *EURYTOMA SCHREINERI* SCHR. ON TRANSGENIC PLUM AND TWO CONVENTIONAL PLUM VARIETIES

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Introduction: The plum seed wasp (*Eurytoma schreineri* Schr.) is a polyphagous pest that can cause significant damage to the plum crop. The attacked fruits have a weak development and begin to fall as they approach to maturation, and then mummify. HoneySweet transgenic plum was created as a necessity for an effective control to *Plum pox* virus in endemic areas, and has many advantages derived from its resistance to the virus (Scorza *et al.*, 2013), among these being the possibility to reduce the number of treatments with insecticides against aphids (Zagrai *et al.*, 2018).

Aims: In the context of reduction the number of insecticide treatments in HoneySweet crop, the studies have been extended to assess its behaviour to the attack of *E. schreineri*.

Materials and Methods: The experiment was performed within an experimental plot containing HoneySweet transgenic plum and two conventional plum cultivars (Stanley and Reine Claude d'Althan). The frequency of the attack of *E. schreineri* was followed for two consecutive years (2017-2018). Then a comparison of behaviour between transgenic and the two conventional varieties to the attack of *E. schreineri* was made.

Results: The observations made in 2017 indicated the presence of *E. schreineri* in all three varieties, but with a predilection for the Stanley variety. The results revealed a massive attack caused by wasp on plum seeds of Stanley (F% = 56.3), that drastically decreased its yield in 2017. The other two varieties were also affected, but the frequency was much lower, respectively 19.3% in the Reine Claude d'Althan and 11.4% in HoneySweet. In 2018 the attack frequency was much diminished in all three varieties, probably due to the reduction of the biological reserve due to the elimination from orchard of attacked fruits, fallen on the ground. However, attack frequency keeps the order, the most intense attack was also recorded in Stanley (18.1%), followed by Reine Claude d'Althan (8.9%) and HoneySweet (6.8%), that recorded a statistically similar frequency.

Conclusion: The overall results confirm the high sensitivity of the Stanley and a tolerance of HoneySweet transgenic plum and Reine Claude d'Althan to the attack of *E. schreineri*.

Keywords: *Eurytoma schreineri*, plum, transgenic plum

SESSION 5: ECONOMICS AND RURAL DEVELOPMENT

SPECIFICITY OF DOING AGRIBUSINESS OUTSIDE EUROPE

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Introduction: The research aims to create favourable preconditions and to support food SMEs to enter and be competitive in the markets the network has chosen as the most promising for the export. They are: 1. North America: Canada, United States of America; 2. China; 3. Middle East countries: United Arab Emirates, Saudi Arabia, Kuwait, Oman, Iraq.

Aims: A consortium of European partners are intended to transform the current network into a Supply Chain Network (SCN) or FoodNet meta-cluster that can be defined as a trans-national grouping of cluster initiatives, which focuses on the food (fresh, bio & eco) and logistics and

is open to the participation of customers, distributors, suppliers, competitors, non-profit organizations, research institutions and public administration. The strategic objective is to support the European food sector companies market development and especially internationalisation, what includes identification of external markets, creating favourable paths, and provision of knowledge and skills necessary to become globally competitive and perform successfully in the international arena.

Materials and Methods: By assets are meant intangible resources, such as knowledge, skills, experience, competencies, contacts, formal and informal networks necessary to enter the selected markets and stay competitive in these markets in a long term. These resources can be owned by any of members of partners. The required condition is will and readiness of involved stakeholders to share, exchange and jointly use the assets for achievement of joint and individual objectives.

Results: In autumn 2018 the partnership agreement was signed for reinforcement of the collaboration among partners and involvement of new actors. The findings are addressed to a wide range of stakeholders, primary to companies in the food sector (especially fresh, bio, eco producers), companies of the logistics, non-profit and sectoral organisations (e.g. food producer groups, clusters). Participation of public and private business support institutions is foreseen in a form of development and provision of support measures, necessary to build up capacity of companies for internationalisation. Possible input of other stakeholders, such as research organisations, public administration is indicated.

Conclusion: There are good conditions for European SMEs in order to create favourable preconditions and to support food SMEs to enter and be competitive in the markets the network has chosen as the most promising for the export.

Keywords: *agrifood export, consumer behaviour, metacluster*

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PERCEPTION OF RURAL LANDSCAPE ON BORCA, NEAMŢ COUNTY

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Introduction. The landscape is one of the main elements of the territory. In the conditions that the rural tourism is enhance more and more in Romania, the landscape suffers the modifications in the dynamics of own process. It is noted that the rural environment is the fragile one, who can be transformed rapidly and in this context must be exploited sustainably.

Aims: The purpose of this article is to determine the perception of the locals, including local decision-makers, and the tourism stakeholders regarding the importance and the involvement of the landscape on local economic development. Because in only a few years it has been important changes in the way of land use and traditional activities, due to the new activities like tourism, raised in this rural area.

Materials and Methods: The study focus on the representation of the landscape by the local administration and other distinctive territorial actors, who actively participate in the dynamics of the rural landscape. This research is holding on the review of social-media web sites, with great visibility which shows the description of this specific rural area and put the relevant and most beautiful photos of the landscape. The study is complemented by an examination of perceptions of rural characteristics from the varied perspective of locals, decision-makers and tourism actors.

Results: Knowing that the preponderant orientation of tourism determines a transformation of the landscape. The actions of the various stakeholders reveal how tourism shall relate to the landscape, as well as the influence of anthropogenic pressures on the countryside. All this information and data will highlight local perceptions of land development and the rural landscape.

Conclusion: In the light of new changes, rural tourism may replace the other traditional activities, follow from the transformation of the landscape. The visibility and the aperture expose this territory to increased pressure because the risk of irreversible transformations can lead to a loss of rural landscape.

Keywords: *landscape perception, rural landscape, tourism stakeholders*

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ANALYSIS OF MARKET TRENDS WITHIN THE ROMANIAN SILK INDUSTRY

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Introduction: According to the literature, sericulture is a field of animal husbandry that focuses on silkworm rearing, as well as the processing of obtained production in finished products. The industry of sericulture is practiced in small scale, also named cottage industry. Sericulture industry has a long history within Romania as well, but its development has declined to global factors such as introduction of synthetic fibers, followed by negative economical effects caused by the occurrence of the world wars and by national factors such as political shifts and economical system shifts (Mărghițaș *et al*, 2005).

Currently, Romania, has a silk industry focused on processing into final products and marketing, including export of obtained production. (Dezmirean *et al*, 2008).

Aims: This paper aims to analyse the silk and silk products production, as well as trends in import and export sectors of the Romanian Silk Market within global context, and to analyze the drivers that can affect the movement of trends within the analysed sectors. The timeframe considered for analysis is set between years 2001 and 2018, so a complex evolution of the production, import and export sector can be properly analysed.

Materials and Methods: The quantitative data used in the current study that focuses on the was obtained from official statistical entities (INSEE, EUROSTAT, ITC, UNCOMTRADE) and from scientific literature.

Results: According to analysed statistical data, Romanian Silk Industry, currently, is mainly focused on production of silk fibre products, as it relies heavily on imported raw material. The silk product export sector is well developed, with main export products focused on silk textiles and silk yarn.

Conclusion: Further research will allow identification of current trends in the silk and silkproduct market, as well constrains that affect this industry, but also certain opportunities that can arise.

Keywords: *sericulture, silk, potential, import, export*

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ATTITUDE OF ROMANIAN CONSUMERS TOWARDS THE USE OF RHUBARB

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Introduction: The use of rhubarb stalks as food is a relatively recent innovation in Europe although in Islamic world has been eaten since the 10th century. In traditional Chinese medicine, rhubarb roots of a number of species have been thought of as a laxative for several millennia. (Barceloux, 2012). Today, with greenhouse production, it is available throughout much of the year. Rhubarb is grown primarily for its fleshy leafstalks, technically known as petioles but rhubarb leaves contain poisonous substances, including oxalic acid. In the petioles, the proportion of oxalic acid is much lower, and consists mostly of malic acid (McGee,2004).

Aims: Having multiple utilisation and being an emerging market, in this work, we assessed the degree of knowledge of Romanian population about this plant, the most common utilization and the population awareness about its main benefits.

Materials and Methods: A research was conducted through a omnibus internet based questionnaire comprising 17 questions from 208 respondents

Results: More than 85% of the respondents have heard about rhubarb, but only 29% have ever used it, especially as a prepared food in jellies and compote or as filling for pies, tarts, and crumbles. The great majority of the respondents were agreed the idea of the necessity of promoting and more intensively used of rhubarb in their alimentation, but also in cosmetics and natural pharma products

Conclusion: The Romanian population has low knowledge about rhubarb plant and its usefulness. Following the interest that was shown by the respondents about the multiple uses of this plant we assess the existence of a great potential in future market development both in cultivation and final product.

Keywords: *rhubarb, market, consumer, attitude*

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SESSION 6: ANIMAL SCIENCE

TESTING AND EVALUATING THE MATHEMATICAL MODEL OF ENERGY AND PROTEIN METABOLISM FOR MONOGASTRIC ANIMALS

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Introduction: Testing and evaluating a mathematical model is a continuous process which may start from the very beginning of the modelling project. An approach which is different from this one is, undoubtedly, inefficient. This paper analyses both the dynamic, determinist, Newtonian or semi Newtonian-type models, and the empirical models based on biological hypotheses.

Some modellers speak broadly of validation and verification, although we consider that the terms of *testing* and *evaluation* are more adequate to the proposed purpose.

The term testing is taken here with the meaning of the control of methodological corrections. This means: the mathematical equations must present correctly the biological hypotheses which are considered; the equations must be consistent per se and compatible in terms of measure units; any algebraic and mathematical analysis considerations must be correct and achieve the set purposes. In fact, for large and complex models it may be very difficult to avoid making such errors, so that it is preferable to suppose that such errors will be done and, therefore, seek in every stage of model achievement a method which to detect the errors as soon as they are done. Finding them later might be quite impossible.

Aims: To put mathematical language, by simulations and optimizations these models are effective instruments of decision orienting bearing positive consequences both on the biologic and economic plans.

Materials and Methods: Experimental data and mathematical special programs.

Results: Optimizing diet formulations according to production requirements and providing thus the possibility to develop strategies for an efficient animal production.

Conclusion: In the present research work, we improved the methods of feeding animals.

Keywords: *energy balance, feeding norms, mathematical modelling*

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BIOLOGICAL ASPECTS OF ANADROMOUS STURGEONS IN LOWER DANUBE RIVER

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Introduction: In the early 1900s, six species of anadromous sturgeons were caught in Danube River: beluga (*Huso huso*), Russian sturgeon (*Acipenser gueldenstaedtii*), stellate sturgeon (*Acipenser stellatus*), Atlantic sturgeon (*Acipenser sturio*), ship sturgeon (*Acipenser nudiiventris*) and sterlet (*Acipenser ruthenus*). At the moment, only three species are actually migrating in Danube River (beluga, Russian sturgeon and stellate sturgeon).

Aims: Knowledge on migration, spawning and time spent for spawning is not very well known. There is only indirect information on the spawning grounds; it is assumed that they are located in the area where adult sturgeons and larvae are captured in large number. These data and information may complete particular knowledge about biology of sturgeons.

Materials and Methods: Specialized sturgeons drift bottom gillnets and appropriate boats operated by two or three fishermen were used. A total number of 118 sturgeons were investigated: 24 beluga, 57 stellate sturgeons and 37 Russian sturgeons. Capture was seized and sexed. Total length (TL, cm), total weight (W, Kg), gonad weight (GW, g) was taken for each specimen by genre and stage of gonad maturity. Gonadosomatic index (GSI) was calculated using the formula: $GSI = GW / (W - GW) \times 100$. Average data \pm SD were given and compared by two-way analysis of variance (ANOVA).

Results: The investigated sturgeon species were still present in the Danube River even there is a warning signal of a very low number of Russian sturgeon, at least in the last time. Mature sturgeons are present in captures mainly into the spawning areas. Young sturgeons have been found in various places during the downstream migration. Main reproduction characteristics are comparable in sturgeons migrating into Danube River and also the rivers that flow into the Caspian and Azov seas. In the beluga males GSI was 2.68 (extremes: 1.2-3.7) into the Danube, compared to 3-9 in the Volga River. In the stellate males GSI was 3.83 (extremes: 2.61-5.85), compared to 5.8 in the Volga River. GSI of the females with an average of 15% in the 3 species into the Danube River is similar in the Volga River: 15.4 % in the beluga and 15 to 20% in the stellate sturgeon. Absolute fecundity was extremely variable depending on the age and the size of females (565000-16600 in beluga, 67890-17800 in stellate sturgeon and 89170 -15000 in Russian sturgeon). Relative fecundity was 4708 (beluga), 7987 (stellate sturgeon) and 5828 (Russian sturgeon).

Conclusion: The size of Danube River anadromous sturgeons considerably decreased since the early 20th century, when some beluga individuals weighted 200 kg to 600 kg and a length of 3 - 5 m. In our catch the largest individual was a 23 years old female weighting 145 kg. At the moment the weight of most sturgeons into the Danube River is lower than the ones in other rivers, comparatively. For example, average weight of the stellate sturgeon in the Kuban River is 11 kg (females) and 5.6 kg (males). Into the Danube River they weight 8.5 and 5 kg, respectively.

Keywords: *Danube River, sturgeons, biometric data, migration*

**LENGTH-WEIGHT RELATIONSHIP OF PUMPKINSEED
(*LEPOMIS GIBBOSUS*, LINNAEUS 1758)
FROM AN EUTROPHIC GRAVEL PIT LAKE SYSTEM**

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Introduction: Most of the hydrographic basins in Romania are affected by the exploitation of aggregates necessary for constructions (gravel, sand) (Corcheș *et al.*, 2013). As a result of these exploits, deep pits remain and are supplied with groundwater, as they are located in the vicinity of rivers. Over time, these water accumulations turn into true aquatic ecosystems, presenting a specific flora and fauna. Concerning fish species, their presence is due to natural mechanisms such as the presence of communication galleries with rivers, floods or the population through birds and aquatic mammals. Anthropogenic interventions can also lead to the introduction of fish species, through uncontrolled populations (Matern *et al.*, 2019). As the biogenic capacity of these gravel/sand pits is low, the fish species that live here are opportunistic, resistant and with remarkable adaptability to these environmental conditions. One of the first species that prefer these sandy stony structures is the pumpkinseed (*Lepomis gibbosus*) (Uzunova *et al.*, 2010).

Aims: In this study, we performed a length-weight relationship (LWR) analysis of the pumpkinseed population (*Lepomis gibbosus*) from flooded gravel pits in the major riverbed of the Someșul Mic River.

Materials and Methods: A number of 131 specimens of pumpkinseed were caught from the flooded gravel pits through sportfishing techniques and with the help of traps. Each specimen was weighed and its total length was measured. Allometric growth was subsequently calculated. The interdependence between length and weight is generated in most cases by the food resources that fish have in a given habitat.

Results: The studied pumpkinseed, *Lepomis gibbosus*, specimens had a negative allometric growth ($b < 3$) according to the equation $W = 0.0222L^{2.857}$.

Conclusions: Invasive fish species populations require additional attention because of their plasticity and capacity of adapting to different water bodies. Phenotypic changes are usually a response to the adaptation to new environments.

Keywords: *body shape, morphometry, invasive species, allometry*

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OPTIMIZATION OF FEEDING RATION OF COMMON CARP FRY IN A RECIRCULATING AQUACULTURE SYSTEM WITH CONTROLLED CONDITIONS

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Introduction: Intensification of the aquaculture process requires the development of a complete procedure of feeding. Common carp (*Cyprinus carpio* L.) is one of the most important species of farmed fish.

Aims: This experiment was aimed to determine the optimum feeding ration for common carp fry with the average initial body weight of 5.49 ± 0.06 g (W) and the total length of 60 ± 0.5 mm (L).

Materials and Methods: Fishes used in the study was obtained from the last natural carp reproduction in the Open Growth System in August 2018. They were divided into four experimental groups, in duplicate: V1-3.0%, V2 – 3.4%, V3 – 4.0%, and V4 – 4.4% of the stock mass.

Results: For developing optimal feeding ration procedure of fish under controlled conditions, many zootechnical parameters should be taken inattention. For example, the stocking density, temperature, water temperature, dissolved oxygen, pH, nitrites, nitrates, ammonia, etc. must fall within the appropriate limits for the rearing of common carp (Kucharczyk *et al.*, 2013).

The optimal ration is an extremely important topic to study in the culture of species since the chosen ration should balance an excellent growth rate with a low feed conversion ratio (Poot-López, Hernández and Gasca-Leyva, 2014). In this sense, the bioeconomic model allowed the optimal rations to be estimated for common carp fry, by the growth conditions in this RAS.

Conclusion: The uptake of food in aquaculture is considered to be crucial in feeding systems and affects the weight and diet conversion efficiency.

Keywords: *common carp fry, feeding ration, RAS*

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THE QUALITY INDICATORS OF RAW MILK PRODUCED FROM A CATTLE FARM IN IASI COUNTY

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Introduction: Milk has a very important role for human diet, being indispensable for the growth and development of human body. Now, the consumers place particular emphasis on milk health and her physico-chemical quality (Karoui R., 2017). In the food industry, are implemented specific standards which have a main purpose the quality assurance and the risk prevention, by establishing and screening the critical control points.

Aims: Entire population, worldwide, has the right to a healthy and nutritious diet, both in quantitative and qualitative terms. The aim of this paper was to analyse the quality of milk, obtained under a farm of bovine, in Iași County.

Materials and Methods: For the purpose investigations, have been used samples of fresh milk, harvested directly from farm, in sterile containers and very well homogenised. A number of 50 determinations were performed, for each sample, respectively for each parameter analysed. To appreciate the quality of milk, were made the next investigations: Thörner Method-for determining of the milk freshness, Gerber Method-for determining of the fat content and Buruiană Method-for determining of the casein content. For establishing the degree of contamination of milk, were made the reductase test with methylene blue and resazurin (Nollet *et al.*, 2011). The total number of somatic cells from milk (NCS/mL) has been determined using a special equipment, called Somascop.

Results: The acidity of milk, indicated a mean value of 16.48°T (degrees Thörner), which proves a properly freshness of samples analysed. The fat content was in the range of 3.69%-4.78%. Therefore, if we relate to standard it is considered that the milk has a high fat content. The average content of casein was 2.89%. After perform the reductase test, the milk analysed was range in second quality class, with a content of 202520 NCS/mL, somatic cells, value located below maximum limit admissible in European norms.

Conclusion: The physico-chemical analyzes have generated results which falls within the limits of specific standards, thus demonstrating, the quality of the analyzed samples. By the application of heat treatment (pasteurization/sterilization), would be significantly reduce the microbial load of milk and also, would be increase the consumer safety.

Keywords: *Composition, milk, quality, safety food*

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EFFECTS OF DIETARY N-3 PUFA RICH MIXTURE AND PROBIOTIC ON GROWTH PERFORMANCE, PLASMA PARAMETERS AND INTESTINAL pH IN BROILER CHICKS

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Introduction: Modifying fatty acid composition of broilers diets by using n-3 PUFA rich sources such as linseed, peas or their mixture and combination with probiotic can contribute to anti-inflammatory function improving performance and health status.

Aims: The effects of dietary n-3 PUFA rich mixture based on extruded linseed and peas seed with or without probiotic (*Lactobacillus acidophilus*) supplementation on growth performance, some plasma metabolites and intestinal pH in broilers at 42d of age were investigated.

Material and Methods: One-day-old mix sexed broilers (n=400; Ross 308) were divided into 4 groups with 4 replicate each. Birds were fed for 42d with control diet (C, corn-soybean meal diet) and experimental diet (LPM, extruded linseed and peas seed mixture, 1:4) with or without *Lactobacillus acidophilus* (5.0×10^{10} CFU g⁻¹) supplementation at a dosage of 20 g/ton feed. Blood samples were collected at 42d of age. The plasma lipoprotein metabolites (total cholesterol, triglycerides, glucose, total protein, total bilirubin, albumin, creatinine, uric acid, and urea nitrogen, BUN) were determined by Spotchem EZ SP-4430 chemistry analyzer (Arkray, Japan).

Results: The growth performance of broilers at 42d of age (BW, ADFI, ADG, and FCR) fed LPM diet was comparable with the C diet (P>0.05), while the probiotic supplementation slightly improves the broilers performance (P>0.05) irrespective of diets. The pH of ileum and cecum content were not affected by dietary treatments (P>0.05). The plasma total protein increase (P=0.005) and BUN decrease (P=0.04) as an effect of the LPM diet, while the other plasma protein parameters range in normal limits. The probiotic addition had a significant effect by decreasing the total cholesterol (P=0.03).

Conclusion: The results indicate that dietary n-3 PUFA rich mixture represents a good alternative that partially replaced soybean meal in broilers diet with a positive effect on performance and plasma protein profile. Moreover, the probiotic addition improves plasma lipid in broilers.

Keywords: broilers, n-3 PUFA mix, performance, plasma parameters, probiotic

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THE INFLUENCE OF FEEDING LEVEL ON GROWTH PERFORMANCES OF EUROPEAN CATFISH (*SILURUS GLANIS* L., 1758) JUVENILES UNDER RECIRCULATING WATER CONDITIONS

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Introduction: The growth of the European catfish in controlled environmental conditions by treating and recirculating water, like recirculating aquaculture systems (RAS), is a progressive challenge for aquaculture in Romania, at least from the perspective of business that can bring profit to investors.

Aims: The growth parameters of this voracious fish in two different feeding levels are presented in this paper, in order to know more about the feeding management of one summer-old *Silurus glanis* juveniles in the intensive culture conditions.

Materials and Methods: Two feeding levels were tested (R1=1.5% BW/day and R2=2.5% BW/day), in duplicate, during 6 weeks, and the biomass gain (BG), feed conversion ratio (FCR), specific growth rate (SGR), protein efficiency ratio (PER), morphometric relationship between length-weight (LWR) and coefficient of variation (CV) were assessed.

Results: Data revealed that the overall mean weight of the biomass was doubled during the trial, from 14.92 kg to 31.17 kg, and the body growth significantly increases with the increment of the feeding rate (13.48 kg in R1 and 17.70 kg in R2), underlying the good potential of the species, at this life stage, for fast-growing under intense conditions. The calculated SGR in R1 was 1.43%/day and in R2, significantly higher, as 2.05 %/day, for the almost similar values of FCR (0.74 g/g) and PER (2.50 g/g) recorded between the treatments.

Conclusion: Our results regarding the growth performances of the one summer old European catfish, expressed by production parameters SGR, FCR and PER, indicated a good increment of the biomass weight in parallel with the increasing of the feeding level. The use of the self-feeders for this species seems to be a better operating action for increasing the feed acquisition, resulting in a more homogenous population and better feed management.

Keywords: *feeding rate, fish condition, growth performance, Silurus glanis*

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FIELD OBSERVATIONS REGARDING THE RESPONSE OF SOME FISH SPECIES TO ELECTRONARCOSIS

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Introduction: Fish fauna survey for diversity purposes has developed over the years. The use of electronarcosis has become more and more popular because it is highly effective in most of the cases, especially in freshwater. In vast ecosystems such as the Danube Delta, fish survey is also conducted with industrial fishing gear (Cocan and Mireșan 2018). Constant and accurate fish survey is of great biological and ecological importance in order to protect biodiversity.

Aims: The purpose of this paper is to provide field-related information of fish reactions to electric stimuli during electrofishing sessions. In this sense, field operators will have additional knowledge when approaching different types of water and improve their catch rate.

Materials and Methods: This study is based on field observations during electrofishing sessions that took place between 2013 and 2019 on Ruscova River, Someșul Cald River, Someșul Rece River, Iara River, and Danube Delta Branches. The reactions of 2653 fish specimens from 23 species belonging to 8 families and grouped in 6 orders were observed (Bănărescu, 1964). We analyzed the reactions of fish to electric shocks applied by using SAMUS 725 MP electrofishing apparatus, powered by a rechargeable battery (12V, 75A). Fish reactions were grouped in four categories according to their movement pattern when the power button was switched on: a - the fish swims at the water surface, b - the fish jumps out of the water, c - the fish swims in the water column, d - the fish swims at the water bottom. The incidence of movement pattern after the electric shock was analyzed as follows: xxx – commonly, xx – sometimes, x – rarely, 0 – not observed.

Results: Based on our field observations and classification of reaction-movement patterns we provided a clear image regarding what to expect when using electrofishing as a fish survey method.

Conclusion: The fieldwork observations while using electrofishing techniques regarding fish reactions and movement patterns to electric stimuli can be useful for other researchers. When fishing for a certain species, it is of great importance to adjust the gear (nets, landing nets) and also to have information on how fish might react. This knowledge can improve the catch rate and reduce the number of fish that avoid or escape the electrofishing operator.

Keywords: *Electrofishing, Hucho hucho, electric stimuli, swimming pattern, diversity*

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RESEARCH ON THE EVALUATION OF METABOLIC LIPIDIC PARAMETERS FOR THE “ROMANIAN SPOTTED” CATTLE BREED IN DIFFERENT PHYSIOLOGICAL STATES

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Introduction: Lipids are an essential source of energy for the animal body (Frey H.J. *et al.*, 2018). Knowing the concentration of biochemical parameters is important in cases of early diagnosis of certain diseases (Boișteanu and Iolanda 2002).

Aims: The aim of the study is to monitor the fluctuations of 5 lipidic indicators (cholesterol, triglycerides, HDL, LDL and total lipids) at cattle found in different physiological categories.

Materials and Methods: The research was conducted on three groups of animals: 12 lactating cows, 12 in advanced gestation and 12 non-lactating cattle. Blood samples were collected from the jugular vein. Were used vacutainers with no additives and the harvested blood samples were centrifuged at 3000 rpm for 10 minutes in the JP Selecta Cencom II Centrifuge. The determination of plasmatic parameters was performed using the Cormay Accent 300 automated analyzer.

Results: Significant fluctuations were observed at the results of lactating cows, triglycerides and HDL presenting low values compared to other physiological categories. The values obtained at lipoproteins with low density (LDL) were significantly lower in the dry cow group. The cholesterol and total lipids values showed uniformity for the three batches.

Conclusion: As a result of the researches carried out there is a possible variation of the lipid indicators, depending on the physiological state of the studied animal. The dairy cow's body passes regularly through tumultuous changes that must be sustained through rational exploitation.

Keywords: *biochemical parameters, cattle, lipids.*

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RESEARCH ON THE IMPACT OF THE ADDING THE APPLE VINEGAR IN RATION OF THE HEAVY LAMBS AND MONITORING THE RUMINAL pH AND AVERAGE DAILY GAIN

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Introduction: Apple vinegar maintains the ruminal pH and will stimulate the rumen microbes that are the substrate that breaks down cellulose, hemicellulose, and lignin (Karasov and Douglas, 2013).

Aims: The study's objectives are based on the monitoring of ruminal pH and average daily gain (ADG) in Karakul of Botoșani lambs, following the addition of apple vinegar in ration.

Materials and Methods: The study was conducted on a group of 90 weaned lambs. The ration consisted 30% chopped natural hay and 70% feed concentrated. The lambs were divided into 3 equal batches: control group (G1), experimental group (G2) at which ration was supplemented with 8 ml of apple vinegar/day/animal and experimental group (G3) was supplemented with 12 ml of apple vinegar/day/animal. Apple vinegar was pulverized over the concentrate mixture. At 30 days after starting the experiment, the lambs were weighed individually using scale Walle-Platform and then 5 animals from each batch were slaughtered. Then the ruminal fluid was harvested and was determined the pH with digital pH-meter Ino Lab.

Results: As a result of study, was observed differences between the control group and the experimental groups. Thus at the batches G1 there was a daily average increase of 260 g, at the batch G2 290 g and at G3 310 g. Control group (G1) showed an average ruminal pH of 5,5 and experimental groups (G2 , G3) an average of 5,9.

Conclusion: There are differences between the groups studied through variations of ruminal pH and ADG denoting that apple vinegar may have a potential influence.

Keywords: *apple vinegar, lambs, pH, ADG*

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CASE STUDY OF HYDRAULIC STRUCTURES ON THE CAMPENESTI FISHERY, CLUJ COUNTY

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Introduction: The Câmpenești fishery is located on Feiurdeni valley and is composed of Feiurdeni lake, 6 fish ponds, a nursery and household annexes, summing up a total of 103 ha. The structures are mainly used for pisciculture, but also serve as a defence system against flooding. Currently pond number 6 is the most well-maintained structure of the fishery, being used for sport fishing, and recently received 10 tons of fish (local and asian cyprinidae).

Aims: A case study on Feiurdeni lake presents and describes hydrotechnic structures, their purpose, and also reveals shortcomings of the project, while introducing recommendations regarding future maintenance and repair works. The article contains general overview of the planning within the Someș river catchment area, as well as elements of ichtyofauna.

Materials and Methods: From a technical point of view the elements of Feiurdeni lake are: Feiurdeni dam (made from earth); wasteway (Keutner type sharp edged); energy dissipator; outlet and inlet structures (monk type).

Results and discussions: Considering the discharge capacity the following flow rate values were obtained: $Q_{\max 1\%} = 84 \text{ m}^3/\text{s}$ and $Q_{\max 5\%} = 60 \text{ m}^3/\text{s}$ for the surface discharger; $Q_{\max 1\%} = 6,4 \text{ m}^3/\text{s}$ and $Q_{\max 5\%} = 6,4 \text{ m}^3/\text{s}$ for the outlet monk system, $Q_{\max 1\%} = 1,7 \text{ m}^3/\text{s}$ and $Q_{\max 5\%} = 0,8 \text{ m}^3/\text{s}$ for the inlet monk. Also it was found that the hydrotechnical works are in a relatively good technical state, there are no slides, infiltrations or erosions at the dam's slopes.

Conclusion: Maintenance and repair works should be considered regularly, in order to have bottom drains and surface dischargers in optimal state of use.

Keywords: *Fishery structures, flow, hydrotechnic constructions*

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ASPECTS OF RATIONAL FEEDING OF ORNAMENTAL CARP DURING THE FRY SEASON

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Introduction: Koi carp appear to be an ornamental variant of the East Asian common carp that were taken to Japan from China and bred for coloration and scale patterns (Axelrod, 1973; Grant *et al.*, 2006). Carp fry is a critical stage in the early life of this species. Fry are the transitional stage between the dependence on yolk sac then natural food for nutrition and the shift to artificial feeds. With their poorly developed digestive system, fry feeds must be formulated carefully to gain the maximum advantage of supplementary feeding (Al-Noor *et al.*, 2014).

Aims: The current study was carried out to evaluate the importance of *Cyclops* in ornamental carp fry diets and its effects on feeding and growth performance as well as fry survival rate.

Materials and Methods: Ornamental carp fry (average weight 0.03g) were obtained from induced breeding with pituitary extract at MoRas Center, “Dunarea de Jos” University of Galati. Fish were distributed in culture system of 3 glass aquariums each containing about 40 liters of dechlorinated tap water, acclimatized to the laboratory conditions for 3 days and to the experimental diets for 2 other days. Before the beginning of the experiment, weak and abnormal fish were excluded and the remaining fish redistributed on aquariums at 390 fry/aquarium. The experiment included 3 treatments. Fish were weighed at ten days and feed ration was adjusted accordingly. Specific growth rate (SGR), feed conversion efficiency (FCR) and protein efficiency ratio (PER) were calculated according to Oprea (2000). Fish survival was monitored also during this experiment which lasted for 4 weeks from June to July 2019. Water quality parameters (temperature, oxygen and pH) were monitored on a daily basis and maintained within the suitable ranges for this species.

Results: The best growth and survival results were obtained in V3, where the fish were fed with 14 g of frozen cyclops per day. The weakest results were obtained in variant V1, where the fish were fed with 7 g of frozen cyclops per day.

Conclusion: In the present research work, we demonstrated that rational feeding during the fry period limits fish growth and favours cannibalism.

Keywords: cyclops, *Cyprinus carpio*, fry, growth, survival

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THE PRINCIPAL COMPONENT ANALYSIS USED AS A HIERARCHICAL METHOD FOR STATISTICAL VARIABLES

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Introduction: The principal component analysis was first described in 1901 by Pearson and subsequently by Hotelling in 1933. The method consists of finding the best way to represent “m” samples using vectors with “n” variables, so that similar samples can be represented by points as close as possible.

Aims: The purpose of the paper is to show that the principal component analysis method may be used as a method of ranking the statistical variables.

Materials and Methods: In order to determine the principal components from lots of variables, the method used is the analysis of eigenvalues and eigenvectors, which starts from a representation of the data through a symmetric matrix.

Results: We used the principal component analysis method in the following practical situation: the study of a survey group of dentists consisting of 60 respondents (53.3% women and 46.7% men, aged from 26 to 55) who answered a questionnaire consisting of 16 questions with the purpose of being able to evaluate situations encountered by dentists in the exercise of their profession concerning the following issues: posture at work and working hours, age, pain onset, gender. At this stage of the study, we tried to rank the 16 questions, and to see how many and which of them are most relevant, by determining the main components for the survey group. As a working method, the correlation matrix between the 16 variables was calculated and the principal components were determined as those for which eigenvalues .

Conclusion: The advantages of this method are significant, as this type of analysis highlights the most important variables, for further in-depth analysis.

Keywords: *Biostatistics, Correlation matrix, Principal component analysis*

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SPERMATOOZOA ABNORMALITIES IN RAINBOW TROUT SEMEN SAMPLES FROM FIAD (BISTRIȚA NĂSĂUD COUNTY) TROUT FARM

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Introduction: In teleost fish, the whole of the processes involved in the formation of spermatozoa and their release and in fecundation are extremely diverse. Spermatogenesis in trout is well separated in cycles and the spermiation yield varies according to species but also within the same species, for example in trout it varies between 20 - 90 % and the main environmental factor influencing spermatogenesis is photoperiod and temperature (Billiard, 1986). Spermiation is directly influenced by short-term variations which cause an immediate response, such as exceeding the critical thermic threshold, the appearance of proper environmental conditions (laying substrates) or social stimuli (presence of females ready to ovulate) (Billard, 1983).

Aims: The purpose of this paper was to analyse the spermatozoa abnormalities of the Rainbow trout semen samples (males, age 6), collected from Fiad trout farm, Bistrița-Năsăud County, characteristic's which help for a better selection of the breeding groups.

Materials and Methods: The specimens used in this study were from Fiad trout farm, Bistrița-Năsăud County. The number of specimens from which semen samples were collected was 25 males (age 6 years). The study took place during the period of December 2018 - January 2018. To obtain the semen samples, the trout specimens were anesthetized with clove oil (a solution used as an anesthetic) to avoid and to restrain the potential harmful situation during manipulation and to decrease the amount of stress that they are subjected during investigations. For the phenotypic characterization of the spermatozoa a total of 250 photography's were taken, 10 for each specimen with Nikon Eclipse 50i microscope and Nikon D300 digital camera. The photography's taken were analysed with ToupView-AmScope software. Drafting, graphics and spreadsheets were edited in Microsoft Word v. 2019.

Results: All abnormalities on any spermatozoa observed were counted and then were divided into groups (abnormalities of sperm head and acrosome, coiled sperm tail, etc.)

Conclusion: Our results lead to a better understanding of trout sperm biological features, including its spermatozoa behaviour and anomalies. Furthermore, due to the fact that trout's adopt a reproductive strategy of external fertilization, the sperm cells are released into the environment before fertilization and thus they are subjected to different environmental conditions that may affect their viability, mobility etc. Therefore, abnormalities in sperm cell movement, behaviour and morphology may provide integrated endpoints that can determine the effects of water quality and habitat conditions.

Keywords: *abnormalities, external fertilization, morphology, spermatozoa*

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OXIDATIVE STABILITY OF BREAST MEAT FROM BROILERS FED DIETS SUPPLEMENTED WITH SYMBIOTIC AND ORGANIC ACIDS

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Introduction: The use of dietary antibiotics in poultry industry resulted in problems such as development of drug-resistant bacteria, drug residues in the body of the birds and imbalance of normal microflora (Awad *et al.*, 2009). Synbiotics and organic acids are one of the most promising alternative to antibiotics (Gunal *et al.*, 2006). Symbiotic is defined as a mixture of probiotics and prebiotics that beneficially affects the animal by stimulating host's welfare. Acidification of diets with weak organic acids like formic, propionic or lactic, decrease the colonization of pathogens and improve the digestibility of nutrients.

Aims: The purpose of this study was to investigate the effect of symbiotic and organic acids on oxidative stability of breast broiler meat.

Materials and Methods: The experiment was conducted on 150, Ross 308 chicks aged 2 days assigned to 5 experimental groups with 30 chicks per group. The chicks were housed in metabolic cages (6 chicks/cage). The experimental diets differed from the control diet (C) (conventional diet) by 1% symbiotic supplement (E1) and 0.15% organic acids supplement (E2) The supplements were commercial products, produced by BIOMIN, GmbH Austria. At the end of the experiment 6 chicks/group were slaughtered and samples of breast were collected.

Results: The production parameters showed no significant differences between groups. At the end of experiment, no significant differences were noticed for any oxidative parameter measured in breast samples. After 4 days of refrigeration (4⁰C), no significant differences in primary oxidation products (peroxide value (PV), conjugated dienes and trienes (CD, CT)) between groups were noticed. The secondary oxidative products (p-anisidine, TBARS) were significant (P<0.05) smaller for E groups, compared to C. After 7 days of refrigeration (4⁰C), the organic acids supplemented group (E2) had significant smaller values for primary (CD) and secondary oxidation products. For E1 group, a significant decrease was registered in terms of p-anisidine and TBARS values.

Conclusion: The results of the study indicate that symbiotic and organic acids supplements improve broiler meat quality by increasing oxidative stability of breast during storage.

Keywords: *meat, oxidative status, organic acid, symbiotic*

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COMPARATIVE ANALYSIS OF BIOACTIVE COMPOUNDS AND NUTRITIVE QUALITY OF SOME LOCAL PLANTS AS NATURAL ANTIOXIDANT PHYTOADDITIVES FOR POULTRY FEED

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Introduction: Herbs, spices and various plant extracts have antioxidant and antimicrobial properties, which stimulate the growth of beneficial bacteria and minimize pathogenic bacterial activity in the gastrointestinal tract of poultry. Currently, the synthetic antioxidants are avoided due to their negative impact on human health. Thus, finding new sources of natural antioxidants to prevent or retard lipid oxidation in meat products is a challenging demand for nutritionists.

Aims: This study was designed to investigate the content of bioactive compounds with antioxidant properties from three local plants: dandelion, burdock and lady's bedstraw and the possibility of using them as feed additives in poultry nutrition.

Materials and Methods: The investigated bioactive compounds in the selected plants were: lutein and zeaxanthin, β -caroten, vitamin E and total polyphenols. The antioxidant capacity of the plants was assessed by DPPH and ABTS radical-scavenging activity. Proximate analysis and fatty acids composition were also studied.

Results and discussion: Dandelion registered the highest content of lutein and zeaxanthin (185.78 $\mu\text{g/g}$), β -caroten (57.57 $\mu\text{g/g}$) and vitamin E (63.77 $\mu\text{g/g}$) from the analysed plants. The content of total polyphenols decreased in the order of lady's bedstraw > dandelion > burdock. As shown previously, the phenolic compounds contributed significantly to the antioxidant capacity, which is reflected in the ABTS radical-scavenging activity. In this study, lady's bedstraw showed the highest ABTS radical-scavenging activity (39.3 mM eq trolox), followed by dandelion (33.33 mM eq trolox) and burdock (23.16 mM eq trolox). The DPPH radical-scavenging activity (mM eq trolox) were in the same range of values for all studied plants, proving a comparable proton-donating ability of plant extracts.

Conclusion: These results showed that the plant extracts had an increased antioxidant capacity most likely because of the synergistic effects of antioxidative components. The assessment of nutritional quality proved the potential use of studied plants in animal nutrition.

Keywords: *antioxidant capacity, burdock, dandelion, lady's bedstraw, nutritional value*

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ANTIBACTERIAL EFFECT OF MULBERRY LEAF EXTRACT AGAINST SILKWORM GUT BACTERIA

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Introduction: The domesticated silkworm, *Bombyx mori*, is the most widely utilized species of silk producing moths in sericulture. Silk and secondary sericultural products (i.e. sericin, fibroin, chrysalis extracts, mulberry and mulberry leaf extracts) are used in numerous fields of research and production, including industries such as textile, foods, biotechnology, cosmetics, pharma and medicine (Padamwar and Pawar 2004). Taking the productive value of silkworms into consideration, it's surprising to see a lack of efficient medication which breeders can administer against bacterial diseases in silkworm populations. Hence, the certainty that a silkworm population perishes within 24-72 hours after being infected by pathogenic bacteria (Miyazaki *et al.*, 2012. Phenolic compounds and flavonoids found in mulberry leaves (*Morus latifolia*) can help silkworms to protect themselves against bacterial infections.

Aims: The aim of this study was to test the effect of mulberry leaf extract (*Morus latifolia*) on two bacterial strains (*Staphylococcus aureus* and *Escherichia coli*) which are pathogenic and typically found in the gut of the silkworms, respectively.

Materials and methods: Overnight bacterial cultures were grown in a 96-well plate in the presence of ethanol mulberry leaf extracts.

Results: The present findings suggest that the growth of *S. aureus* and *E. coli* are completely inhibited by the presence of mulberry leaf extracts, even at very low concentrations.

Conclusion: Our results suggest that the mulberry leaves don't only serve as sustenance for the silkworm, but they could also contribute as natural gut microflora regulators and antibacterial agents against pathogenic infections.

Keywords: *antibacterial effect, Bombyx mori, flavonoids, Morus latifolia, polyphenols*

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SESSION 7: BIOTECHNOLOGY

CHARACTERIZATION ON *HELIX POMATIA* USING FT-IR SPECTROSCOPY

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Introduction: *Helix pomatia*, common names the Roman snail, Burgundy snail is a species of large, edible, air-breathing land snail, a pulmonate gastropod terrestrial mollusc in the family Helicidae. Snail shells are aguanic invertebrate exoskeletons, primarily made up of calcium carbonate Ca CO₃, 95-99% and other organic components Mg CO₃, 1-3%. In the biomedical research field a great attention is driven for calcium phosphates synthesis and obtaining of ceramics. Hydroxyapatite and tricalcium phosphate are a class of calcium phosphate related ceramic materials that can be used in ortopedics and dentistry for tissue regeneration and biomedical applications owing to their excellent bioactivity and biocompatibility.

In the last year, FT-IR spectroscopy has been introduced as a very efficient and non-destructive analytical tool for the reliable way to determine the functional groups of organic and anorganic compenents.

Aims: In the present study it was investigated a principal components of beech acorn powder using FT-IR technique.

Materials and Methods: The sample from FT-IR spectrum was obtained from 0.2 mg powder of burgundy snail from *Helix pomatia* (Romania site). Fourier Transform Infrared (FT-IR) spectra were performed in the absorbance with a spectrophotometer FT-IR-4100 Jasco, using KBr pellet technique. Spectral resolution was set at 4 cm⁻¹ and all spectra were acquired over 256 scans. The spectral data were analyzed using Origin 6.0 software.

Results: Infrared spectra for smnail shell powder are shows characteristic absorption bands for carbonate ions at 1792, 1479, 1082, 855, 711 cm⁻¹ (Anjaneyulu *et al.*, 2016).

Conclusion: FT-IR spectroscopy could provide quantitative information concerning the functional groups of treem components.

Keywords: *burgundy snail (Helix pomatia), FT-IR (Fourier transform infrared)*

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STUDY OF BERRIES USING FT-IR SPECTROSCOPY

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Introduction: Essential oils, plant extracts as well as fruit juices play an important role as raw materials in many products such as cosmetics, food industry constituents and medicine. Moreover, plant derivative products can be utilized as natural food additives instead of artificial food additives, that are considered harmful to human health. Anthocyanins and polyphenols from wild fruits/berries have recently drawn great attention due to their numerous health-promoting properties acting as free radical scavengers in vivo and in vitro, reducing considerably deleterious effects of free radicals which are mainly generated by reactive oxygen species (Heo and Lee, 2005). The advantage of using phytochemicals is obvious due to many benefits as reduced toxicity, a wide range of pharmacological actions, rarely manifested side effects and infrequent presence of contraindications. Fourier transform infrared (FT-IR) spectroscopy is one of the most widely used methods to identify chemical compounds and elucidate the chemical structures.

Aim: In this work we analyze and effectuate a comparison between molecular structures of berries fruits dried at room temperature using vibrational spectroscopic techniques (FT-IR).

Materials and Methods: The sample from FT-IR spectrum was obtained from 0.2 mg powder of fruits/berries. FT-IR spectra were performed in the absorbance whit a Jasco FT-IR-4100 spectrophotometer using KBr pellet technique. Absorption intensity for each frequency of vibration is monitored by a detector. Measurements were carried out on infrared scale of 650-4000 cm^{-1} and spectral resolution was set at 4 cm^{-1} and all spectra were acquired over 256 scans. The spectral data were analyzed using Origin 6.0 software.

Results: The principle consists of the detection of compositional differences between samples based on different vibrations of chemical groups at the specific wavelengths of the spectrum (400-4000 cm^{-1}).

Conclusion: FT-IR spectroscopy is a simple, rapid and accurate method to detect a chemical compound in the food products and has been proved to be a simple and fast alternative with minimum sample preparation requirement.

Keywords: fruits/berries, FT-IR (*Fourier transform infrared*)

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PRODUCTION OF GLUTEN-FREE BEER FROM BARLEY MALT BY IMMOBILIZED PROTEASE IN FLUIDIZED BED REACTOR

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Introduction: The recently growing demand for gluten free (GF) beer is leading to the development of alternative approaches to be applied in brewing. The main strategies for producing GF beer are: i) the use of naturally GF grains or pseudocereals as raw materials; ii) the precipitation of proteins using tannins, silica gel or PVPP; iii) the degradation of gluten during the brewing process by enzymatic treatments.

Aims: The current work focuses on the development of an innovative and sustainable biocatalytic tool for the continuous production of GF beer, based on the application of immobilized prolyl endopeptidase from *Aspergillus niger* (AN-PEP).

Materials and Methods: The food-grade enzyme AN-PEP, currently used in the brewing industry for haze prevention, has been immobilized on *A. Niger* chitosan beads. A commercial beer from barley malt was treated for 10 h in a fluidized bed reactor (FBR) containing the immobilized AN-PEP. The reduction of gluten content was determined by means of competitive ELISA based on the R5 antibody (RIDASCREEN® Gliadin competitive).

Results: The immobilization increased the thermal stability of the protease, which showed similar catalytic properties in model-beer (toward the synthetic substrate Z-Gly-Pro-pNA) when it was applied at 20 °C or at 50 °C. The continuous treatment in FBR was optimized varying the amount of immobilized AN-PEP as well as the flow rate, and the suitable conditions to achieve the gluten detoxification in real beer were: 10 g of immobilized AN-PEP and flow rate of 728 mL/min. The gluten content in the commercial beer from barley malt, reached the concentration of 19 mg/kg after 9 h and 15 mg/kg after 10 h of treatment in the FBR.

Conclusion: The continuous treatment allowed us the detoxification of gluten content in the commercial beer from barley malt, reaching the level under the minimum (< 20 mg/kg) requested for GF food. From an industrial point of view, this preliminary study offers an innovative and sustainable biocatalytic approach for the continuous production of GF beer.

Keywords: *Covalent immobilization, Continuous treatment, gluten-free beer*

Acknowledgement: This work was financially supported by BioEnBi project (Grant 85-2017-15362), funded by Lazio Innova Spa, Lazio Region (Italy), Progetti Gruppi di Ricerca 2018–2020.

PREVENTION OF HAZE FORMATION IN POMEGRANATE JUICE BY CONTINUOUS MULTI-ENZYMATIC TREATMENT

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Introduction: One of the main problems occurring throughout the production of pomegranate juice is the presence of colloidal suspensions and/or sediments that make the product cloudy. The clarification approaches traditionally applied (clarifying agents and subsequent filtration) significantly affect the anthocyanin levels and the colour of pomegranate juice.

Aims: Despite numerous studies that investigated the effect of pectinases or proteases for fruit juice clarification, no research has been conducted on their combined use in immobilized form. This research was aimed to develop a food-grade multi-enzymatic system, based on immobilized proteases and pectinases for exploiting their synergistic action in the selective hydrolysis of haze-active molecules in pomegranate juice.

Materials and Methods: Bromelain from pineapple stem (protease) and Pectinex® BE XXL (pectinase) were immobilized on *A. Niger* chitosan beads. The covalent immobilization was demonstrated by SEM and DSC investigations. The multi-enzymatic system was applied in a fluidized bed reactor (FBR), varying the protease-to pectinase ratio (1:2 or 1:4) and the treatment time (4 h or 8 h), for preventing haze formation in pomegranate juice.

Results: The process carried out using the protease-to-pectinase ratio 1:2, for 8 h, was the most suitable in terms of immediate (– 49%) and potential (– 70%) turbidity depletion compared with the untreated juice, after 21 days. At the end of the storage period, this biotechnological approach allowed a significant reduction of haze-active molecules in juice, preserving it from colloidal instability as well as from the possible related color degradation tendency.

Conclusion: In the present research work, we demonstrated that this innovative multi-enzymatic system could be applied for a continuous, efficient, selective, and long-lasting clarification of pomegranate juice.

Keywords: *Covalent immobilization, Fluidized bed reactor, Pomegranate juice, Clarification*

Acknowledgement: This work was financially supported by BioEnBi project (Grant 85-2017-15362), funded by Lazio Innova Spa, Lazio Region (Italy), Progetti Gruppi di Ricerca 2018–2020.

EXTRACTION METHOD FOR KERATIN FROM SHEEP'S WOOL

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Introduction: Wool is a natural fibre that is used by humans for its properties: thermal, breathability, absorbent for toxic substances, fire resistance, etc. Approximately 50% (mass percent) of wool fibers are keratin, a usable protein, which is an attractive material due to its excellent mechanical and thermal properties that can be successfully used to create biocompatible materials for medical purposes.

Aims: Our study proposed a new environmental friendly method to obtain keratins and keratin-associated proteins (KAP) fractions from the sheep's wool.

Materials and Methods: The extraction implicates a natural deep eutectic solvent (NADES) at low temperature. The extracted keratins were characterized by FT-IR, SEM and prepared for mass spectrometry analysis.

Results: The extraction of keratin using an eco-friendly solvent (NADES) had been proposed. The method used low temperature and extraction time than the actual industrial methods. The keratin-associated proteins (KAP) fractions have been determined and characterised using mass spectrometry techniques.

Conclusion: In the present research work, we demonstrated that keratin could be obtained by different extraction treatments, milder than the methods used currently in the industry.

Keywords: *FT-IR, keratin, SEM*

Acknowledgment: This work was supported by CCCDI – UEFISCDI, project no. PN-III-P1-1.2-PCCDI-2017-0569

BACILLUS SUBTILIS PROBIOTIC: AN ALTERNATIVE TO ANTIBIOTICS FOR MONOGASTRIC NUTRITION

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Introduction: Probiotics are live microbial feed supplements which beneficially affect the host animal by improving its intestinal microbial balance (FAO, 2016). Probiotics can be an alternative to antibiotics in animal nutrition (Nithya and Halami, 2013). Many strains of some *Bacillus* sp. are currently used as probiotic dietary supplements in animal feeds (Bernardeau *et al.*, 2017). The *Bacillus* genus ability to form spores is beneficial and allows for long-term storage without the loss of viability compared to the nonspore-forming bacterium. The spores can survive for hundreds of years to the low pH of the gastric barrier (Dumitru *et al.*, 2019) and also, can influence the small intestine to exert their probiotic efficacy providing benefits to the host.

Aims: To obtain a *Bacillus* spp. strain with high probiotic benefits, in the present study the *Bacillus subtilis* ATCC 6051a was selected for *in vitro* evaluation.

Materials and Methods: The strain was examined phenotypically and for some probiotic criteria as: resistance to pH by simulated gastric juice (pH 2 and 3), bile salts (simulated intestinal fluid), survivability (%), resistance to heat, the resistance of antibiotics.

Results: The strain is a Gram-positive, rod-shaped bacteria, arranged in short chains or in small irregular pairs with the ability to produce spores. The strain shows good viability at pH 2 and 3, with a survival ability more than $\geq 80\%$. Also, oxgall (0.3%) addition during 4 h of incubation with a survival $\geq 85\%$, was registered as well. The culture was sensitive to all antibiotic tested, with a highly susceptible (between 16 – 25 mm of the zone of inhibition) to erythromycin, clindamycin, amoxicillin, chloramphenicol, ciprofloxacin, amikacin and kanamycin. The strain was found to be sensitive to vancomycin, gentamicin and tetracycline.

Conclusion: Overall, the results suggested that the strain present some potential probiotic characters and can be further assessed for antibacterial activity, induction of local immune response etc., as a feed additive with interesting benefits application in animal nutrition.

Keywords: *animal nutrition, Bacillus, probiotic properties*

PHOTOCOLORIMETRIC ANALYSIS OF *CORNUS MAS* FRUIT USING THE CIELAB COLOR SYSTEM

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Introduction: One of the species of the genus *Cornus* that can be used in the food industry is cornelian cherry (*Cornus mas*) (Yilmaz *et al.*, 2009). Fresh or processed for various purposes (such as food industry, medicine etc.), these forest fruits have a dark red color and this property can be correlated with the antioxidant activity.

The organoleptic properties are very important qualities for food industry; colour being one of the most relevant attributes for characterizes the food.

Aims: The aim of this study was to compare the colorimetric analysis using CIELAB system (Drkenda *et al.*, 2014) for fresh, dried and lyophilized fruits extract by *Cornus mas*.

Materials and Methods: The fruit of cornelian cherry were purchased from a local market (Galați). The measurements of photocolometric analysis were done using the Colorimeter CR 410 Chroma Meter (Konica Minolta, Japan).

Results: The results obtained using the photocolometric analysis shown a significant difference between the samples (L, a, b, c, h and ΔE).

Conclusion: The colour of the cornelian cherry fruit extracts differs depending on how the fruit is treated before extraction. The most intense colour of the extracts was for dried fruit, and the least colourful extract was for fresh fruit. Laboratory tests have shown that *Cornus* table fruit varies by species and method of extraction. According to Islamovic *et al.*, (2014), the region and harvesting season cornelian cherry fruits influence colorimetric tests.

Keywords: CIELAB system, *Cornus mas*, photocolometric analysis

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NON-HORMONAL FEED ADDITIVES AS AN ALTERNATIVE IN ANIMAL REPRODUCTIVITY (A MINI REVIEW)

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Introduction: Nowadays, a modern trend of the animal husbandry is to increase the reproductive potential of livestock and poultry. There is a large interest worldwide in discovering new and safe non-hormonal biologically active substances obtained from natural sources, which will substitute the synthetic hormones. The positive influence on reproduction in livestock of the biologically active substances of natural origin such as isoflavones, carotenoids, minerals, phytohormones, PUFAs, etc. represent a potential alternative. These substances are derived from various plant sources and micro and macro algae as well. In addition, those substances could provoke positive changes in animal reproduction practices, corresponding to the modern EU requirements for quality and safe for the human health nutrients.

Aims: Taking into account the great interest toward non-hormonal additives in the animal husbandry, the summarizing the known is important in respect of the trend of substitution of the hormonal ones.

Conclusion: In the present review, we demonstrated that the non-hormonal feed additives are potent alternative influencing the animal reproductivity.

Keywords: *livestock, nonhormonal biologically active substances, reproduction.*

Acknowledgment: This work was supported by the Bulgarian Ministry of Education and Science under the National Research Programme "Reproductive biotechnologies in livestock breeding in Bulgaria (Reprobiotech)" № 0406-105.

RESEARCHES ON THE IMPACT OF TERMIC TREATMENT ON THE ANTIOXIDANT POTENTIAL OF CABBAGE VARIETIES

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Introduction: Vegetables from Brassicaceae family are known worldwide for a rich bioactive composition (Medina *et al.*, 2015). These vegetables are highly nutritious, providing nutrients and phytochemicals such as vitamins, carotenes, fiber, soluble sugars, minerals, glucosinolates and phenolic compounds (Podsedek, 2009). Cabbage (*Brassica oleracea* L. var. capita) is one of the most important vegetables consumed worldwide due to its nutritive properties.

Aims: The level of vitamin C, polyphenol constituents, Trolox equivalent antioxidant activity (DPPH) and content of chlorophyll and carotenoids were determined for four processed cabbage varieties (Buzau, Buzoiana, Magura, Isalnita) by boiling at different temperatures for 5, 10, and 15 minutes.

Materials and Methods: Four white cabbages: Buzau cabbage, Buzoiana cabbage, Magura cabbage, Isalnita cabbage. All varieties were cultivated (Research and Development Resort for Vegetables, Buzau, Romania) in the same conditions, the same location, with the same agro-technical practices and harvested when reaches the optimal maturity.

Results: Compare with fresh-cut cabbage, the boiling method was found to cause reduction in antioxidant compounds, Also the boiling time increases, the antioxidant activity decreases.

Conclusion: Results indicate that health-promoting compounds were affected by this cooking method. It is recommended to use less cooking time to retain the optimum benefits of the health-promoting compounds.

Keywords: *antioxidant activity, Brassicaceae, cabbage*

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ASSESSMENT OF MIGRATION RATE AND ECOTOXICITY OF SOME BIOMATERIALS BASED ON PLA AND WINEMAKING WASTE

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Introduction: The popularization of polymeric packaging materials has resulted in increased concerns over the migration of undesirable components into foods. It is therefore important that the formulation of plastic packaging materials is designed so that the polymerization process is as complete as possible. On the other hand the polymer materials community has responded to environmental issues in several ways, notably through recycling schemes and the introduction of biodegradable packaging but perhaps the greatest response is the growth of interest in a materials science and technology that uses “no new carbon” and therefore makes use of biomass in order to preserve economic growth. The main sources which could be deployed in biopolymer production are potato waste, mango seed, citrus peel, coffee waste, straw, sugar bagasse, wine making waste, etc.

Aims: The aim of the present study was to determine the migration properties of some biodegradable materials based on PLA and wine making waste, which could be used in food industry as packaging materials.

Materials and Methods: The migration properties of the studied biomaterials were determined from a food safety point of view, and in order to assess the effect of the components of the material on the environment, it was determined the ecotoxicity on cucumber (*Cucumis sativus*) and radish (*Raphanus sativus*) seeds using the simulants from the migration tests.

Results and conclusion: In the present research work, the tested biomaterials based on PLA and winemaking waste showed good migration properties, the values being less than 10 mg/dm² (according to Regulation no. 10/2011). The ecotoxicity tests showed that the tested materials did not present negative effects over germination and development of cucumber and radish seeds.

Keywords: *biomaterials, ecotoxicity, migration, packaging*

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SESSION 8: VETERINARY MEDICINE - FUNDAMENTAL AND PRECLINICAL SCIENCES

SOME ATTITUDES OF THE STUDENTS OF VETERINARY MEDICINE AND ANIMAL SCIENCE IN SERBIA

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Introduction: Veterinarians and animal scientists belong to professions that are the most responsible for providing welfare of animals. Student attitudes toward animals will influence how they work with animals (and their human counterparts) in their future careers (Hazel *et al.*, 2011; Relić *et al.*, 2011).

Aims: The aim of this study was to compare students of veterinary medicine and animal science in terms of attitudes that point to the level of empathy towards animals and the professional orientation.

Materials and Methods: A total of 243 students of all years of study participated in the survey. The questionnaire consisted of 29 items: 9 demographic questions and 20 questions of Animal Attitude Scale (AAS) (Herzog *et al.*, 2015).

Results: Students of both faculties showed the most similarity in relation to religiosity and nutrition, as well as previous education, experience with animals before the start of studies and the level of empathy towards animals. They differed in responding to the certain questions from AAS related to use of different animal species (e.g. farm animals and companion animals).

Conclusion: Veterinary and animal science curricula for prospective farmed animal practitioners should devote attention to animal welfare, and should be adjusted by the way of presenting to students.

Keywords: *animals, animal science, attitudes, students, veterinary medicine*

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PRELIMINARY STUDY ON PHENOTYPIC DETECTION OF ESBL AND AMP-C β -LACTAMASE-PRODUCING *ESCHERICHIA COLI* ISOLATES FROM SLAUGHTERED PIGS

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Introduction: The presence of extended-spectrum beta-lactamase-producing *Escherichia coli* in food animals is a public health concern. The aim of this study was to phenotypically detect the extended β -lactamase and AmpC β -lactamase-producing *E. coli* isolated from farm pig caecum samples in three slaughterhouses from North-Eastern Romania.

Materials and Methods: A total of 128 caecum samples collected during 2016-2017 were analysed. After collection, samples were pre-enriched by cultivation on peptone water at 37°C for 22 hours. ESBL and AmpC screening was carried out by cultivation on MacConkey medium (Oxoid, Basingstoke, UK), with addition of cefotaxime. The colonies which had a typical *Enterobacteriaceae* morphology on MacConkey medium were confirmed as being isolates of *E. coli* based on biochemical properties (MIU, TSI and API 20E). For phenotypical confirmation of ESBL isolates, the microdilution method was carried out in broth using EUVSEC2 plates that contain cefoxitine, cefepime, cefotaxime, ceftazidime and clavulanate combined with cefotaxime and ceftazidime. The results were analysed based on the synergy tests between clavulanic acid and ceftazidime and/or clavulanic acid and cefotaxime. Phenotypical detection of AmpC – β – lactamase - producing strains was carried out through a stable AmpC cephalosporin: cefepime.

Results: Following ESBL/AmpC screening, 51 out of the 128 analysed samples (39.84%) grew on MacConkey medium with cefotaxime and they were identified as *E. coli*. After performing microdilution in broth using EUVSEC2 plates, 40/51 (78.43%) isolates were identified with ESBL phenotype, 5/51 (9.8%) isolates with ESBL/AmpC phenotype, and 6/51 (11.76%) isolates with AmpC phenotype.

Conclusion: In this preliminary study, the obtained results phenotypically confirm the presence of ESBL and AmpC producing *E. coli* in slaughtered farm pig populations from the North-East of Romania.

Keywords: *AmpC*, *E. coli*, *ESBL*, *slaughtered pigs*

PRELIMINARY SEROEPIDEMIOLOGICAL INVESTIGATION REGARDING *M. AVIUM* INFECTION IN WILD BOARS AND FOXES

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Introduction: Determining the *Mycobacterium avium* seroprevalence among wild animal (boars and foxes) populations brings additional significant information regarding the distribution, transmission and host range of nontuberculous mycobacterial infections. When present, clinical signs and lesions are similar to those observed in domestic animals.

Aims: The present study aimed at identifying *Mycobacterium avium* seroprevalence in wild boars (*Sus scrofa*) and wild foxes (*Vulpes vulpes*) samples, from the Eastern region of Romania.

Materials and Methods: An indirect ELISA assay was used to identify anti-*Mycobacterium avium* IgG antibodies in sera samples and thoracic fluids, using a commercial kit, ID Screen® *Mycobacterium avium* Indirect Multi-species (ID.vet, Innovate Diagnostics, France), according to the instructions provided by the manufacturer.

Results: A total of 367 wild animal samples were collected from eight counties: 275 wild boars sera samples from Iași (n=209), Botoșani (n=11), Bacău (n=17), Galați (n=27) and Covasna (n=11) and 92 fox samples of thoracic fluid from Iași (n=30), Suceava (n=20), Neamț (n=19), Vaslui (n=11) and Galați (n=12). Specific *Mycobacterium avium* antibodies were not detected in wild boar sera samples tested. From the samples tested from foxes, one was positive (1.08%), originating from Galați County.

Conclusion: Our results may be correlated with a reduced distribution of *Mycobacterium avium* subspecies in the environment and a low prevalence of infections caused by these bacteria in wild animals. The current assessment shows that foxes have a limited role in the epidemiology of nontuberculous mycobacterial infections.

Keywords: Foxes, *Mycobacterium avium*, seroprevalence, wild boar

INDUCED SEPSIS BY CECAL LIGATION AND PUNCTURE IN A RAT MODEL: HEPATIC AND RENAL HISTOLOGICAL FEATURES

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Introduction: Animal models have been developed in an attempt to study the pathogenesis of sepsis and to test potential therapeutic agents.

Aims: The current study aims to determine the main hepatic and renal histological features that can be detected in induced sepsis by cecal ligation and puncture (CLP) in a rat model.

Materials and Methods: Regarding the material, we used 20 adult-male Wistar rats. Ten rats represented the control group (group 1), whereas the individuals from group 2 (no.=10) undergone CLP protocol for sepsis induction. The experimental protocol was approved by the National Sanitary Veterinary and Food Authority, Cluj (Romania), project number 116/11.05.2018. The endpoint of the experiment was pre-set to 10 hours post-surgery when the rats were euthanized. Eventually, the necropsy exam was performed and the tissue samples (liver and kidney) were collected for further processing by classical paraffin technique, followed by H&E staining.

Results: The main renal lesions detected histologically in CLP rat model of sepsis were: glomerular congestion and edema, hyalinization of glomerular mesangium, presence of hyaline in the urinary space with associated compression atrophy of vascular glomerular tuft, discrete granules of hyaline in the lumen of cortical tubules, and reduction of the urinary space of corpuscles. The hepatic lesion identified histologically was represented by isolated miliary necrotic foci.

Conclusion: The histological findings described in a range of sepsis-induced protocols are scarce. Our results suggest that the CLP model of sepsis in rats triggers some detectable renal and hepatic histological changes. Further histological details are required for a better understanding of CLP-induced sepsis on animal models.

Keywords: *histology, sepsis, model, puncture, rat.*

ASSESSMENT OF VARIOUS FISH QUALITY INDICES UNDER *NIGELLA SATIVA* SEED OIL SUPPLEMENTATION EFFECT DURING COLD STORAGE

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Introduction: Fish and aquaculture products have always been one of the top choices of consumers most preferred commodities. The EU household expenditure on fishery products has increased in the recent years, reaching a 15-year peak in 2017 (EUMOFA, 2018). As with most perishable products, increased interest for extending fish shelf life, using cheap, non-toxic products, lead to publication of studies searching for most effective natural solutions. *Nigella sativa* has been proposed as antibacterial solution for various types of commodities, such as cheeses (Georgescu *et al.*, 2018) and fresh fish (Ozpolat and Duman, 2017).

Aims: Considering the promising studies indicating *Nigella sativa* as an efficient antimicrobial solution for some commodities, we assessed its influence on the microbiological quality, physico-chemical parameters and sensory properties of fresh fish during cold storage.

Materials and Methods: Samples of filleted fresh carp (*Cyprinus carpio*) were treated with 0.2, 0.6 and 1% v/w *Nigella sativa* seed oil (NSSO) and tested for chemical, microbiological and sensory quality at 1, 3, 6, 9, 14 and 21 of storage at $0-2 \pm 1^\circ\text{C}$.

Results: Both pH and total volatile basic nitrogen were positively influenced by NSSO. Aerobic plate count (APC) and coliform bacteria rising shift was slowed down by NSSO, with a positive correlation with NSSO concentration. Sensory quality decreased with storage time with a higher rate for control group and the decreasing rate was reversely proportional with NSSO concentration.

Conclusion: This study shows promising results for the possible use of NSSO as a natural solution for promoting longer shelf life and better quality for cold-stored fresh fish.

Keywords: fish, *Nigella sativa*, quality indices, seed oil.

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CORRELATIONS BETWEEN ROSE WINE QUALITY AND CONSUMERS' SAFETY IN A SOUTH – EASTERN ROMANIAN VINEYARD

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Introduction: In the last years, the consumption of rose wines has increased due to the diversity of natural climatic conditions, assortments, preparation technology and taste which determined the existence of a very large range of wines, with different chemical composition.

Aims: In the context of high consumption of different types of rose wines and given the consumer demand regarding food safety, the purpose of this study was represented by the quality control of these products using physicochemical methods and a comparison with the legislative requirements. Also, taking into account the food safety concept sanitations test were done in various stages of technological flow.

Materials and Methods: Twenty samples of rose wine (3 types of dry wine –Merlot, Cabernet Sauvignon, Feteasca and one type of sweet wine – Busuioaca Bohotin) were submitted to analyse regarding the alcoholic concentration, total acidity, total sulphur dioxide and residual sugar. For the determinations were used classical methods of investigations.

For the sanitations tests were used swabs and the Lumitester PD 20 equipment. The samples were collected from the main critical points of the technological flow (sweepings, weak pipes, drains, maceration vessels, fermentation vessels, stainless steel tanks).

Results: The results ranged from 12 to 13,4 % vol for alcoholic concentration, 5,17 to 6,30g tartaric acid/l for total acidity, 125 to 185 mg/l for total sulphur dioxide and 1,7 to 56 g/l for residual sugar. All rose wine assortments respected the product specifications imposed by the legislation and producer.

The sanitation test results ranged between 30-80 RLU. The results were in correlation with legislative standards.

Conclusion: In the studied winery the technological flow for rose wines respects the technological flow encountered in most of the specialized units, with small variations that give the originality of the products.

The data analysis shows that there are no significant differences between the four rose wine varieties analyzed.

In conclusion, it can be said that the products obtained within the studied unit meet the quality requirements imposed by the legislation and the consumption of these products does not represent any risk for consumers' health.

Keywords: *food safety, physicochemical methods, rose wines, sanitation tests*

CORONAVIRUS IDENTIFICATION USING PURIFIED POLYCLONAL ANTIBODIES AND FLUORESCEIN ISOTHIOCYANATE – LABELED IG

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Introduction: The diagnosis is difficult to establish in many viral diseases, especially since clinical symptoms are not very characteristic (Hartmann, 2005). Feline coronaviruses are no exception, especially as the lethal disease (FIP) differs from that produced by the non-pathogenic strain (FCoV). FIP is an immune-mediated disease induced by a mutant feline coronavirus strain that infect macrophages (Diaz and Poma, 2009). Typically, virus detection in faeces, diseased tissues and fluids is performed using qRT-PCR and RT-PCR (Pedersen *et al.*, 2009).

Aims: the purpose of our study was to test the effectiveness of using anticoronaviral antibodies obtained from ascites fluid from FIP-confirmed cats instead of monoclonal, from economic reasoning.

Materials and Methods: 20 samples of ascitic fluid harvested from cats presenting clinical signs of the wet form of feline infectious peritonitis were tested for the presence of coronavirus using molecular methods (RT-PCR) with OneStep RT-PCR Kit (Qiagen). Direct immunofluorescence tested two primary antibodies: Pierce monoclonal mouse anti-coronavirus antibodies, Thermo scientific and polyclonal antibodies obtained in our lab by purification with saturated ammonium sulphate. As secondary antibodies we used Fluorescein (FITC) AffiniPure Goat Anti-Cat IgG (H+L) from Jackson Immuno Research.

Results: The results of the study were satisfactory, all of the ascites fluid samples being tested being positive by using both primary antibodies. Direct immunofluorescence is a specific and rapid method that can establish the diagnosis within hours, unlike RT-PCR that is lasting and much more costly.

Conclusion: Direct immunofluorescence using coronaviral antibodies obtained in our lab is an alternative method to detect feline coronavirus in clinical samples, less expensive.

Keywords: *antibodies, coronavirus, immunofluorescence, polyclonal*

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THE EFFICIENCY OF WHOLE BLOOD TRANSFUSION THERAPY CONDUCTED ON DOGS

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Introduction: The therapeutical procedures of blood transfusion in human and veterinary medicine are required for the recovery of patients with major tissue oxygenation deficits, namely in patients with advanced anaemia or circulatory shock.

Aims: The objectives of this study were to demonstrate the efficacy of whole blood therapy by evaluating the safety of whole blood supply on canine patients, and to monitor the clinical evolution of patients and their haematological parameters at 6 hours and then 5 days post-transfusion.

Materials and Methods: The study was conducted over a period of 12 months at the Emergency Hospital at the Faculty of Veterinary Medicine Cluj-Napoca. The study included 22 patients of different breeds and different ages. They received at least one unit of blood based on clinical consult and haematological parameters. The diagnoses of patients were internal or external haemorrhage caused by different traumas, haemorrhagic gastro-enteritis caused by various infectious diseases or parasitic diseases and coagulopathy. The amount of administered blood was determined using a formula found in many bibliographies.

Results: Only 7 patients (31.81%) achieved the desired haematocrit value at 6 hours after transfusion. In patients who failed to reach the desired haematocrit level, no post-transfusion adverse reactions or intra or extra-vascular haemolysis reactions were observed. Five days after transfusion, we were able to get access to only 13 of the enrolled patients in this study because 5 of them were discharged during this time and did not return to re-evaluation, 4 patients died and for 2 of them was made the decision to have them euthanized due to the complexity of existing pathologies.

Conclusion: The efficiency was demonstrated for the patients with coagulopathy for which we used fresh whole blood (because platelets are inactivated at low temperature) and we managed to restore the bleeding and clotting time to the physiologic values in short time. Transfusion therapy in dogs could be lifesaving in emergency situations.

Keywords: *blood, dog, emergency*

EFFECTS OF LACTOSER IN THE MANAGEMENT OF OBESITY EXPERIMENTALLY INDUCED IN RATS

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Introduction: Whey is an excellent source of protein and peptides, lipids, vitamins, minerals and lactose (Smithers, 2008).

Aims: The objective of the study was to investigate the nutraceutical functional effects of Zonar lactoser in the management of obesity experimentally induced Sprague-Dawley rats.

Materials and Methods: The study was conducted on 30 rats, the animals were randomly distributed in 6 groups: negative control group (CN), n = 5; positive control group (CP), n = 5; hypercaloric and zonar group (HPZN), n = 5; standard and zonar group (STZN), n = 5; obesity group 1 (OB1), n = 5 and obesity group 2 (OB2) n = 5. Animals were weighed and measured weekly. At the end of the experiment, blood was collected from the retroorbital sinus for biochemical analysis.

Results: The lactose-supplemented groups showed a significant decrease in oxidative stress, triglycerides, cholesterol and serum glucose compared to the CP group. This study demonstrated that a diet supplemented with Zonar lactose over a 10-week period can prevent obesity in rats.

Conclusion: This study demonstrated that a diet supplemented with Zonar lactose over a 10-week period can prevent obesity in rats.

Keywords: *lactose, nutraceuticals, obesity, Sprague-Dawley rats*

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HISTOLOGICAL, CHEMICAL AND MICROBIOLOGICAL EVALUATION OF PORK HAM MADE FROM INJECTED FROZEN MEAT

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Introduction: The food industry embraces the benefits of enhancing meat flavor and texture by using injected brines and marinades which bring added value recognized by consumers, while also improving sensory properties and shelf life. Meat processing industry uses frozen meat as raw material and applies post-thawing processing, thus working with lower quality grade meat, when compared to using fresh, unfrozen meat.

Aims: As brine injection is known to enable the retaining of more moisture during cooking, we aimed to evaluate whether brine injection before freezing raw meat, has any effect on the quality of the meat products obtained from previously injected thawed meat.

Materials and Methods: Boneless pork loin samples (*Longissimus dorsi*) were subjected to freezing in two groups: fresh meat (control) and brine injected meat (test). After two weeks, they were thawed and further processed to cooked ham in a meat processing facility. Only control meat was subjected to brine injection after thawing. The resulted ham was refrigerated for 2 weeks and subjected to quality evaluation, by histological assessment of product structure. Also, the shelf life was evaluated by monitoring moisture content, pH and aerobic plate count (APC).

Results: Histological evaluation of structure revealed higher quality for ham made of test meat. Moisture content was higher but revealed no significant variation during monitoring cold storage period. The pH and APC followed improved shifts during storage, for test meat, compared to control, as revealed by testing at days 1, 3, 6, 9, 14 of refrigeration.

Conclusion: This study suggests that injecting pork meat prior to freezing might be correlated with higher quality processed products, which tend to have improved shelf life. Further study of higher pool of samples is needed for statistical significance and including sensory evaluation of final product may enhance the quality evaluation precision.

Keywords: *brine injecting, freezing, pork ham, quality.*

BACTERIOLOGIC ANALYSIS OF INFECTED DOG AND CAT BITES AT THE MEDICAL VETERINARY STAFF

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Introduction: Bite wounds, from human and animal origin, can lead to significant complications if appropriate therapy is not undertaken timeously. The major risk of these aggressions is given by the possibility of systemic propagation of the bacteria involved in the wound and the appearance of complications such as osteomyelitis, septic arthritis, bacterial endocarditis, etc. (Oehler *et al.*, 2009). A basic knowledge of the microbiological flora is essential for each clinical setting in order to be able to facilitate appropriate empiric antibiotic therapy (Visser, 2012).

Aims: The wounds produced as a result of the bite of the pets are treated superficially. Frequently, it is applied to antibiotic therapy without knowing the microbial etiology and without performing an antibiogram. Under these conditions, the therapeutic failure occurs more and more often. The identification of pathogenic germs and the sensitivity test for antibiotics were aimed at the targeted administration of antibiotic therapy and to prevent the spread of infection in the deep tissues

Materials and Methods: There were evaluated 25 biological samples taken from various pests produced by the bites of dogs and cats in the veterinary personnel during the medical examination. The samples were processed according to the classical stages of the microbiological examination. Isolated bacterial strains were identified based on morphocultural and biochemical characteristics. The sensitivity profile of the isolated bacterial strains was performed, as the case may be, on pure cultures or mixed cultures, on a panel of 9-12 antibiotics with a broad spectrum of action.

Results: The aerobic pathogenic bacteria and conditional pathogenic bacteria were isolate: (*Staphylococcus aureus*, *Staphylococcus pseudointermedius*, *Staphylococcus epidermidis*, *Streptococcus beta hemolytic*, *Trueperella pyogenes*, *Corynebacterium*, *Enterococcus faecalis*, *Escherichia coli*, *Pseudomonas aeruginosa*) and anaerobic bacteria (*Nocardia asteroides*, *Clostridium perfringens*). The bacterial sensitivity was fluctuating, observing the variations influenced by the natural resistance and the acquired resistance of the tested bacterial species.

Conclusion: The microbiota isolated from the wounds produced by the bite, largely reflects the microbiota of the oral cavity of the aggressor animals, to which are added the commensal microorganisms on the surface of the affected skin. The wounds produced by the bites of dogs and cats have aerobic and anaerobic polymicrobial etiology.

Keywords: *bacteriologic analysis, infected bites*

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HISTOLOGICAL ASPECTS OF THE ESOPHAGUS IN GUINEA PIGS

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Introduction: A lot of species of mammals have striated muscles cells in the muscularis externa. Due to the fact that both types of muscle cells exist in the structure of the esophagus, this organ is used in numerous studies of physiology and pharmacodynamics. The three types of neurokinin receptors are homologous in guinea pigs and human, consequently a lot of pharmacological studies are made on guinea pigs.

Aims: The aim of this study is the detailed description of the esophageal microscopic structure in guinea pigs.

Materials and Methods: In this study, deaths bodies of 3 male guinea pigs were used. We harvested transversal fragments from the cervical, thoracic and abdominal segments of the esophagus. The fragments were processed for classical paraffin embedding.

Results: In guinea pigs, the diameter of the esophagus is comparable throughout its entire length. The mucosa is formed by epithelium, lamina propria and muscularis mucosae. In the cervical segment of the esophagus the muscularis externa is formed by striated muscles cells. The external layer is formed by cells with longitudinal orientation. In the middle layer the cells have a circular disposition. In the internal layer, the cells have a longitudinal arrangement. The thoracic segment of the esophagus is similar with the cervical area. The structure of the abdominal segment of the esophagus is similar to the other segments but we observe some differences in the muscularis externa. In some areas of the esophagus' circumference, we find 3 layers and in other regions, we find 4 layers.

Conclusion: The esophagus in guinea pigs is lined by keratinized stratified squamous epithelium and there are no glands in the lamina propria and the submucosa. The muscularis mucosae is formed by smooth muscle cells disposed longitudinally. The muscularis externa is formed by striated muscle cells disposed on 3 layers in the first 2 thirds of the esophagus, while in some regions of the abdominal segment's circumference, the cells form 4 layers.

Keywords: *esophagus, guinea pigs, structure.*

ERYTHROPHAGOCYTOSIS IN THE LIVER OF A BABOON FROM A ZOOLOGICAL GARDEN

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Introduction: Erythrophagocytosis is defined as the phagocytic destruction of red blood cells, especially by macrophages, normally taking place in the spleen. This process can also emerge in different pathological situations and the liver is a common organ where we can observe erythrophagocytosis. The removal of erythrocytes happens when they are deformed, thus they will be mechanically retained or when the erythrocytes send distress signals.

Aims: We chose to report this finding due to the fact that baboons are sometimes used as animal models for medical research, making the description of any symptoms and signs emerging in both humans and baboons easier to understand.

Materials and Methods: The 23 years old baboon was brought to the Department of Necropsy Diagnosis at the University of Agricultural Sciences and Veterinary Medicine in Cluj-Napoca shortly after death. The animal had right-sided heart failure, accompanied by stasis. During the morphopathological examination, we harvested a liver sample for histological assessment. We applied the paraffin-embedding technique for processing the tissue sample and contrasted it with Goldner's trichrome staining procedure.

Results: Upon examination, we observed that the architecture of the liver was preserved, presenting hepatocyte cords, converging towards the centrilobular vein. Nonetheless, we noticed some areas presenting mild congestion, especially in the periportal zone. In the hepatic sinusoids, various macrophages were present, with or without engulfed red blood cells. The number of ingested erythrocytes was different, from 1 up to 4-6. The presence of erythrophagocytosis in the liver shows that the erythrocytes were showing signs of stress or were damaged, indicting a potential medical condition. This aspect led to the recruitment of macrophages, arrived here to engulf the modified erythrocytes and to recycle iron.

Conclusion: The baboon taken into our study presented mild erythrophagocytosis in the liver, without any other major structural and functional impairment, so that the condition that determined erythrophagocytosis did not induce any clinical manifestation.

Keywords: *baboon, erythrophagocytosis, liver, macrophage*

THE OUTCOME OF POTASSIUM DICHROMATE EXPOSURE ON HISTOLOGICAL STRUCTURE OF MALE RAT SEXUAL ORGANS IN SUCKLING PERIOD

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Introduction: Chromium is found in many compounds of the Earth's crust. It exists in several oxidation states, but Cr III and Cr VI species are the most stable and common forms. Chromium III is essential for human and animal diet, it is poor soluble with little or no toxicity. In its hexavalent form chromium is 100 to 1000 times more toxic than the most trivalent compounds. Effluents from workplaces and industries contaminate the environment affecting man and animals living in those areas.

Aims: The aim of this study was the evaluation of integrity biomarkers of reproductive toxicity: histoarchitecture of genital organs (testis and epididymis) and sexual accessory glands (prostate, seminal vesicles and bulbo-urethral glands) at sexual maturity after exposure to potassium dichromate (Cr VI) in suckling period.

Materials and Methods: First phase of the study was carried out on 8 white Wistar female rats. During mating, gestation and lactation females didn't receive hexavalent chromium. After weaning, 28 pups were separated from mothers and divided in four groups: three experimental and one control (E₁ - 25 ppm Cr VI (LOAEL); E₂ - 50 ppm Cr VI; E₃ - 75 ppm Cr VI, C – tap water). At sexual maturity all individuals were sacrificed samples from genital organs and sexual accessory glands were collected for histological examination.

Results:

Consequent to the exposure of male rat pups to hexavalent chromium during suckling period structural changes appeared in genital organs and sexual accessory glands, such as: basal membrane and epithelial desintegration, interstitial edema, wavy basal membrane due to a reduction in tubule diameter, Leydig cell necrosis; epithelial smoothing, epithelial necrosis; epithelial cells desquamation and falling in lumen.

Conclusion: Exposure to potassium dichromate (Cr VI) during suckling period produced severe congestive and degenerative lesions in genital organs and sexual accessory glands.

Keywords: *chromium VI, histology, male, rat*

ANTITUMOR ACTIVITY OF TWO NEW COPPER (II) COMPLEXES WITH N-SULFONAMIDE LIGAND

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Aims. The purpose of our research is to discover a new antitumor drug. In this aim, two new Cu(II) complexes, [Cu(L)₂(py)₂(H₂O)₂](C1) and [Cu(L)₂(phen)](C2) with a new ligand, N-(5-trifluoromethyl-[1,3,4]-thiadiazole-2-yl)-benzensulfonamide(HL) were synthesized.

Materials and Methods. The complexes were characterized by elemental analysis, spectral and magnetic determinations. The nuclease activity studies of the complexes confirm their capacity to cleavage the DNA molecule. Both complexes were tested for *in vitro* antioxidant activity DPPH, FRAP methods, by using xanthine /xanthine oxidase system, and *S. cerevisiae* SOD mimetic activity. The antitumor effect was investigated using MTT assay on two carcinoma cell lines (HeLa and WM35) compared to fibroblasts (HDFa).

Results. Both complexes have antioxidant activity and SOD mimetic activity. On cells, MTT assay indicate that both complexes have antitumor activity, but (C2) has a superior activity compared with (C1) and with Cisplatin. On normal fibroblast, (C1) showed toxicity comparable with Cisplatin, but (C2) showed a lower one.

Conclusion. These findings suggest that both complexes have biologic activity but (C2) is much more active.

Keywords: DNA cleavage, SOD mimetic activity, anticancer, cytotoxicity, MTT

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DISTINCTIVE FEATURES OF THE ANATOMICAL CROWN OF THE TEETH IN GOLDEN JACKAL (*Canis aureus moreoticus*)

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Introduction: The jackal is a wild, carnivorous mammal that belongs to the *Canidae* family, with a strong adaptability to different areas and nutritional resources. Due to the recent expansion of this species on the Romanian territory, it is important to know the distinctive anatomical features (Stan, 2016a).

Aims: The aim of this study was to describe the anatomical particularities of the anatomical crown of the teeth in the golden jackal, useful both for the identification and advanced morphological research related to the biology of the jackal.

Materials and Methods: The anatomical crowns of the teeth from the upper and lower arcades belonging to the twelve golden jackals were examined.

Results: The complete dental formula for permanent dentition in the golden jackal is I3/3 C1/1 PM4 /4 M2 /3 x2=42 teeth. The inferior dental arch is anisognathic, narrower and shorter than the upper one. The superior incisors are located slightly rostral from the inferior incisors. Their size increases from the central to the lateral incisors. Their crown shows a prominent cingulum, bordered by three visible tubers. The canines teeth have a simple crown and the similar length and shape on both arches. The first premolar shows a unique, small distal tuber. The upper carnassial tooth is the fourth upper premolar and has three distinct lobes: paracone, metacone and protocone. The lower carnassials tooth is formed by the lower first molar, being the strongest tooth on both arches having a three-lobe pattern. The upper molars have a short, wide, and very rough anatomical crown, while the lower molars are smaller compared to the upper ones (Stan, 2016b)

Conclusion: The anatomical distinctive features of dentition are related to the the anizognat, heterodont and difiodont type of dentition.

Keywords: *Golden Jackal, dentition, anatomical crown*

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NUTRITIONAL ADAPTATIVE FEATURES OF STOMACH MORPHOLOGY IN EASTERN GREY KANGAROO (*Macropodidae* family)

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Introduction: In all mammal species, the morphology of the digestive system is the adaptive response due to the mechanical and chemical characteristics of the specific diet, being the main system involved in maintaining the balance between the nutritional intake and the energy demand required for the vital processes, growth and reproduction (Stan, 2015).

Aims: The objective of the present research is to perform a detailed anatomical description of the stomach morphology in kangaroo and to reveal the anatomical particularities directly involved in the process of digestion.

Materials and Methods: Gross dissection of three subjects was performed

Results: The most developed compartment of digestive system in kangaroo is the stomach (*Gaster*). Composed of two compartments, anterior and posterior, the general aspect is elongated, similar to the colon, aspect reinforced by the presence of folds that determine the appearance of the stomach. The anterior compartment is divided into two other sections, one tubular and the other sacular, separated by a ventral fold. The sacular compartment, with storage role, underwent a slight reduction. The tubular compartment is involved in microbial fermentation, but nevertheless the fermentation takes place in both previous compartments. The posterior stomach is the secretory stomach of HCl and pepsinogen, similar to the typical monogastric stomach.

Another distinctive features of the kangaroos stomach is the presence of the muscular bands and its associated haustra, which are formed by the special arrangement of the longitudinal and circular folds.

Conclusion: Marsupials and ruminants have the same type of digestion, namely foregut fermentation compared to non-ruminant herbivores. In addition, the stomach exhibits significant morphological differences compared to ruminant herbivores

Keywords: *anatomy, kangaroo, stomach*

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BLOOD COMPATIBILITY ASSESSMENT IN A GROUP OF LIPIZZAN BREED HORSES

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Introduction The blood groups of the horses depend on a combination of factors, which is why it is more appropriate to call them "blood group systems". The type of blood groups depends on one major factor: antigens or agglutinogens that are on the surface of erythrocytes. There are over 30 blood groups in horses, of which only 8 are major systems.

Aims: The main objectives of the study were the following: blood compatibility assessment for horses; establishing a compatibility analysis model within a bloodline taking into account the degree of kinship; assessing the number of horses that have manifested plasmatic agglutination (haemagglutination); streamlining the Crossmatch test used for screening horse blood incompatibility.

Materials and Methods The blood samples were collected from Lipizzan horses at Beclean Stables, Bistrița-Năsăud County and were processed at the Physiology Department of FMV Cluj. A total of 32 Lipizzan horses were included in the study, with ages ranging from 8 to 11 and with a varying degree of kinship. The compatibility assessment was done using the major and minor Crossmatch test.

Results The obtained results were based on a total number of 101 blood compatibility assessments between possible donors and receivers (n=32) and a total of 202 Crossmatch reactions analyzed macro and microscopically. A total of 30 Crossmatch reactions came out positive, representing 18,81% out of the total reactions analyzed. The procentual distribution of the positive reactions varies depending on the bloodline, with the highest showing in Maestoso – 22,72%, followed by Neapolitano – 19,23%, Siglavy-Capriola with 7,14% and Incitato with 6,66%. The positive reactions percentages are as follows: 66% minor Crossmatch, 29% major Crossmatch, with only 5% being showing agglutination for both tests.

Conclusion The high level of positivity recorded in the minor crossmatch test reveals the existence of an increased level of plasma antibodies in the population of horses analyzed.

Keywords: *blood compatibility, horses, lipizzan, crossmatch*

MILK PROTEIN PROFILE EVALUATION WITH CAPILLARY GEL ELECTROPHORESIS (CGE) ON-A CHIP WITH LASER INDUCED FLUORESCENCE METHOD

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Introduction: GCE on-a chip with laser induced fluorescence method is a widely used method in protein profile characterization in different biological matrices.

Aims: In this paper, we present a protocol development and validation for milk protein profile evaluation in cattle, sheep and goat milk.

Materials and Methods: Samples of cow, sheep and goat milk were harvested from local farms. The 2100 Bioanalyzer and Agilent Protein 80 kit were purchased from Agilent Technologies.

Molecular weight, concentration, and % of total of the individual proteins in the sample were automatically determined by data analysis using the Agilent 2100 Expert software. This work was conducted in Antioxidants Systems Laboratory and Molecular Genetic Laboratory parts of Horia Cernescu Research Unit of Banat's University of Agricultural Sciences and Veterinary Medicine „King Michael I of Romania”, Timisoara, Romania. Financed by UEFISCDI in the frame of project Bioeconomic approach to antimicrobial agents - use and resistance PN-III-P1-1.2-PCCDI-2017-0361.

Results: The main milk proteins are identified: α -lactalbumin, β -lactoglobulin, κ -casein, β -casein, α s1-casein, α s2-casein. The electrophoretic pattern derived from goat and sheep milk is fairly similar, but the results for cow milk show a significantly different protein pattern. Two additional prominent peaks are observed in cow milk two additional peaks were noticed, at approx. 38 kDa and 45 kDa, which in other two species represent only minor components, the results being similar with data described in SDS PAGE method.

Conclusion: The data thus demonstrate that the Protein 80 assay kit for the 2100 Bioanalyzer is suitable for the analysis of the five major proteins present in milk. It provides a fast and standardized tool for milk protein analysis.

Keywords: *chip electrophoresis, milk, cow, goat, sheep*

BACTERIAN SPECIES IDENTIFICATION FROM RAW COW MILK SAMPLE – A CASE STUDY

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Introduction: The raw milk can support a wide variety of microorganisms that can become from a variety of sources and in farm animals some of them can cause serious damage by infecting the mammary glands and causing mastitis. The mastitis milk is an important source of disease among the young calves. The pathogenic bacteria which populate cattle farms are also a danger because of their ability to disseminate and contaminate the environment. Fighting these bacteria is done by using multiple and unselective antibiotic treatment but most of the time, they are used as a prophylactic treatment which is one of the reasons why antibiotic-resistant bacteria are now a real scourge of our days.

Aims: In this paper, we present a protocol development and a study case of pathogenic bacteria identification by DNA based methods from raw milk samples that were collected from farm cows with severe recurrent mastitis.

Materials and Methods: The laboratory procedure consisted of isolation of DNA from raw cow milk samples, PCR based identification of pathogenic bacteria, followed by bacterial identification by DNA sequencing. Data collected from sequencing experiment were uploaded in a Data Base and aligned against reference sequences from bacterial strains.

Results: For those particular milk samples it was find that one of the pathogenic bacteria species that are causing infectious diseases is *Pseudomonas aeruginosa*, bacteria that are known to cause mastitis in less than 1% of cows and rarely more than 3%.

Conclusion: In the present research work, we were able to develop a procedure for rapid and accurate identification of pathogenic bacterial strains from mastitic milk samples. The DNA based methods proved to be very helpful in establishing a clinical diagnosis. Besides, the molecular marker-based identification method was efficient and precise for the identification of *P. aeruginosa* strais in the samples.

Keywords: *DNA sequencing, pathogenic bacteria, mastitis.*

CHROMAGAR ORIENTATION FOR PRESUMPTIVE IDENTIFICATION OF ENTEROCOCCI AND CHARACTERIZATION OF ANTIMICROBIAL RESISTANCE OF THE ISOLATES

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Introduction: Enterococci are natural inhabitants of the human and animal gastro intestinal tract. Their role in opportunistic and nosocomial infections has increased significantly in recent years. Added to this, they have the ability to acquire genes of resistance to several antibiotics, which compromise the choice of therapy. Hence the need for rapid identification of enterococci. CHROMagar Orientation claims to facilitate and expedite the identification of commonly isolated gram-negative bacteria and some gram-positive bacteria such as *Enterococcus* spp, on the basis of different contrasted colony colors produced by reactions of genus or species specific enzymes with a proprietary chromogenic substrate.

Aims: This study was conducted to evaluate the use of CHROMagar Orientation for isolation of enterococci and to characterize the antimicrobial resistance of the isolates.

Materials and Methods: CHROMagar Orientation was used for presumptive identification of *Enterococcus* spp. from broiler chickens. The appurtenance to the genus and species level of the isolates were confirmed by bile aesculin reactions, Gram's stain, catalase test and by biochemical tests using API Strep (bio Merieux). The antibiotic susceptibility was determined by disk diffusion methods.

Results: Strains identification with conventional methods allowed confirmation of *Enterococcus* genus membership of 96% of isolates on CHROMagar orientation. All identified strains were *E.faecalis*.

The most prevalent antibiotic resistances were tetracycline and bacitracin, followed by erythromycin. Resistance to high level of aminoglycoside was not detected. Also, all strains were sensitive to Vancomycin, Chloramphenicol, Nitrofurantoin and Ampicillin. The only predominant multidrug-resistant phenotypic pattern was (Bacitracin, Tetracycline and Erythromycin).

Conclusion: CHROMagar Orientation appears to be a medium well suited for the isolation of enterococci, and the antimicrobial resistances detected are to antibiotics widely used in farms.

Keywords: *Antimicrobial resistance, CHROMagar Orientation, Enterococcus.*

RESEARCH REGARDING THE EFFECT OF VITAMIN E ON SOME HEMATOLOGICAL PARAMETERS IN TOXIC STRESS CONDITIONS IN RATS

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Introduction: Cadmium can be found in the environment as a result of human activity such as the use of fossil fuels or the burning and destruction of metallic wastes, the use of Cd as a pigment in the dye industry, etc. (Goran, 2018). The most important source of cadmium in daily life is cigarette smoke. Exposure to Cd is associated with kidney disease, atherosclerosis, hypertension, cardiovascular disease. Once it enters the body, it is very easily stored by it, which means it accumulates throughout a lifetime (Gajaila, 2002). Cadmium's mechanism of toxicity is manifested by its fixation in mitochondria, inhibition of cellular respiration and oxidative phosphorylation (Crivineanu, 2000). Research to date suggests that vitamin E could act as a protective factor against the harmful effect of Cadmium intoxication. Our research refers to this.

Materials and methods: In our experiment we used 18 Whistar rats, female, with body weights ranging from 120-170 g. The experimental animals were divided into 3 experimental groups of 6 rats. The experiment lasted for 9 days. On days 5 to 7 of the experiment, rats in group 3 received Vitamin E in food at a dose of 10 IU / day. On day 7 of the experiment, rats from lots 2 and 3 received oral cadmium chloride in dose of 3 mg / kg. On the 9th day of the experiment, the rats in all 3 experimental groups were subjected to the blood sampling operation. Blood samples collected were used to determine hematocrit, hemoglobin concentration, and blood erythrocytes and leukocytes count. In parallel, the three derived RBCs (red blood cell), MCV (mean corpuscular volume), MCH (mean corpuscular hemoglobin) and MCHC (mean corpuscular hemoglobin concentration), were calculated according to the standard methodology.

Results and discussions: Our results indicate a low level of erythrocytes, hematocrit and hemoglobin in group 3 (Cd treated rats) compared to group 1 (control). This statistically significant difference is 7.40% (in the case of red blood cells), 9.90% (in the case of hematocrit) and 7.20% (in the case of hemoglobin). These results indicate an obvious anemic effect of cadmium intoxication. Between lots 1 and 2 there are no significant differences, a sign that vitamin E exerted an effective protective role. We also found a significant increase in white blood cell count and neutrophil count in group 3 (rats treated with Cd) compared to group 1 (control). This increase is 6.77%. These results indicate an obvious toxic stress induced by the experiments we have imagined. Between lots 1 and 2 there are no significant differences, a sign that vitamin E has annihilated the cadmium-induced specific effect. Our results indicate insignificant differences of MCV, MCH and MCHC in the three experimental groups.

Conclusions: In the case of cadmium poisoned rats, we found a significant decrease in the number of red blood cells, the hematocrit and hemoglobin level, but also a significant increase in the number of white blood cells. The MCV, MCH and MCHC parameters were not influenced by the experimental conditions imposed by us. If rats were treated with cadmium and vitamin E, there were not significant differences from the control group. Vitamin E use has a proven counteractive effect on the negative action of cadmium intoxication in rats

Keywords: *Cadmium, hemoglobin, toxic stress, vitamin E.*

SESSION 9: VETERINARY MEDICINE - CLINICAL SCIENCES

POST-EPIDEMIC OCCURRENCE OF BLUETONGUE VIRUS VECTORS (*CULICOIDES* SPECIES) ÎN IAȘI COUNTY

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Introduction. *Culicoides* is a genus of biting midges in the family *Ceratopogonidae*. Biting midges of the genus *Culicoides* play a big threat role, giving that several species serve as biological vectors of pathogens of veterinary importance. Among these, bluetongue virus (BTV) has been highlighted as one of the most relevant disease transmitted exclusively by females of certain species of *Culicoides*.

Materials and Methods. Biting midges were collected during 2015-2016, once a week, from April to December. The capture was made using a modified CDC trap placed on the meadow, 1.8 m above the ground and in front of the stable. Livestock-associated *Culicoides* species were morphologically identified based on wing pattern and palpi. Identification was performed with stereoscopic microscope, following the appropriate taxonomical keys.

Results. A total of 2782 *Culicoides* specimens were collected during 35 consecutive weeks each year (2015 and 2016). In the first year, 2617 BTV vector specimens were collected and identified as *Culicoides obsoletus* (41.2%), *Culicoides pulicaris* (58%) and *Culicoides nubeculosus* (0.80%). In the second year, 165 BTV vector specimens were collected and identified as *Culicoides obsoletus* (44.25%), *Culicoides pulicaris* (50.3%), *Culicoides dewulfi* (4.84%) and *Culicoides nubeculosus* (0.61%).

Conclusion: BTV distribution and persistence is thought to be almost entirely dependent upon the presence or absence of *Culicoides* adults vector. Thus, our data on post-epidemic occurrence and composition of BTV vector species in the studied area will facilitate a better understanding of *Culicoides* vectors distribution and the possible role in virus overwintering.

Keywords: biting midges, *Culicoides*, Iași County, vectors

HABITAT INFLUENCE ON ZINC LEVELS IN CATS AND DOGS

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Introduction: Zinc is an essential trace element for animals. Being the second most abundant trace metal in the organism (after iron), zinc plays a role in the metabolism of DNA and RNA, is part of all enzyme classes, and regulates apoptosis. It also contributes to functional regulation of the central nervous system.

Aims: The aim of this study was to assess zinc concentrations in cats and dogs based on their habitat (whether they lived indoors or outdoors), also taking into consideration their gender and age.

Materials and Methods: Samples were taken from clinically healthy animals. 23 dogs (11 living indoors, 12 living outdoors) and 19 cats (10 living indoors, 9 living outdoors) were included in the study. Hair samples were taken from each animal, digested with HNO₃ and HCl, and analyzed using the ICP-MS; One-Way ANOVA was used to perform statistical analyses.

Results: Zinc was found to be 146.21 mg·kg⁻¹ in dogs and 183.11 mg·kg⁻¹ in cats. Dogs that lived indoors registered a mean zinc level of 194.27 mg·kg⁻¹, compared to dogs that lived outdoors, who registered 102.15 mg·kg⁻¹. Cats that lived indoors registered a mean zinc level of 197.6 mg·kg⁻¹, compared to cats that lived outdoors, who registered 167.02 mg·kg⁻¹. In the case of both species, animals that lived indoors registered higher zinc levels, however having no statistical significance. No statistical differences were either found between males or females in either specie, nor when taking into consideration their age.

Conclusion: Although there were higher levels of zinc in animals living indoors, no statistical significance was found.

Key words: *cats, dogs, habitat, hair, zinc.*

STUDY OF THE INCIDENCE AND TREATMENT OF COW OVARIAN HYPOTROPHY

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Introduction: Ovarian hypotrophy in cow it's one of the most important components of the anestrus syndrome. Anestrus was broadly classified into physiologic and pathologic (clinical) types, with the following representing the pathologic type: inactive ovaries; silent ovulation; ovarian hypo function; cystic ovarian disease; persistent CL (Mwaanga, 2000).

Aims: The purpose of this research was to establish the incidence and to compare the efficiency of two products used for the treatment of ovarian hypotrophy.

Materials and Methods: The study was carried out between April 2018 to September 2018 in two private farms from Cluj county, Romania. In April 2018 in each farm were performed gynaecological investigations. The animals with ovarian hypotrophy (middle finger pulp or smaller) were divided in 2 equal groups depending on the treatment applied: Prid Delta (CEVA) and Dehydroxyprogesterone 10% (prepared at the Faculty of Veterinary Medicine Cluj-Napoca).

In case of group 1 the treatment was performed with Prid Delta (CEVA), vaginal use, 1.55 g of progesterone/animal for 7 days. For the animals of group 2 the treatment was performed with Dehydroxyprogesterone, subcutaneous injection, 1,50 g of dehydroxyprogesterone/animal for 7 days. For each group were followed: the estrus response, the interval of estrus apparition, the number of gestation obtained after the first artificial insemination.

Results: Gynaecological investigation revealed a number of 48 cows with ovarian hypotrophy (in farm A – 21 cases and in farm B – 27 cases). In group 1 at 91.66% of animals the estrus signs were observed and in 83% of cases all the animals were pregnant after the first estrus cycle. The interval of estrus apparition had an average of 54 hours with values between 44 to 93 hours. Regarding group 2 in 87.5% of cases the estrus signs were observed and 79.16% of the animals were pregnant after the first artificial insemination. The interval of estrus apparition had an average of 72 hours with limits between 52 to 112 hours.

Conclusion: Both products used in this study have a good efficiency in the treatment of the ovarian hypotrophy. The product Dehydroxyprogesterone 10% is a good choice in the treatment of ovarian hypotrophy.

Keywords: *estrus, ovarian hypotrophy, treatment*

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PREVALENCE OF WOUNDS IN DOGS AND CATS ATTENDING A PRIMARY-CARE VETERINARY PRACTICE IN ROMANIA

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Introduction: Wounds in dogs and cats are common injuries in the routine of veterinary clinics and mostly result from surgical interventions, bites from other animals or trauma. Wounds can be largely classified as being acute or chronic. The closure of aseptic surgical wounds by adhesion requires minimal intervention to allow the healing to progress rapidly and naturally. However, in a more severe traumatic lesion, the presence of devitalized tissue and contamination bacteria is likely to require long term therapy for healing to occur normally until final remodelling.

Aims: The aim of this study was to describe the incidence of wounds in cats and dogs and to determine the main causes of injuries. Also, a comparison among the chosen treatments was made.

Materials and Methods: The medical records between October 2016 and May 2018 were assessed for traumatic skin injuries in dogs and cats. Surgical injuries were not included. Potential risk factors included age (years), sex (male, female), breed (as reported in medical record), species (dog or cat) were analysed by descriptive statistics, Pearson correlations ($\alpha=95\%$) and linear regression using XLSTAT statistical software.

Results: For the surveyed period, most injuries occurred in spring (35.45%), generally in males (70%), with a higher occurrence in dogs (75.45%) compared to cats (24.55%). Bite wounds were the most common in dogs (33%) compared to cats in which the most frequent injury was complicated wounds (22.22%) and occurred in individuals aged between 1 to 3 years. Both in dogs and cats, the vast majority of wounds were treated by second intention healing (67%) compared to surgical wound closure (42%).

Conclusion: The most common wounds occurred in males, during spring, probably due to sexual behaviour. Usually wounds should be treated by second intention and therefore the best therapeutic approach should be found to increase efficacy and reduce the time and cost of these treatments.

Keywords: *cat, dog, incidence, wound*

USING PREDATORY FUNGI ON THE CONTROL OF GASTROINTESTINAL PARASITES IN ANIMALS – A SYSTEMATIC REVIEW

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Introduction: Gastrointestinal parasites have significant impacts on animal health, causing poor growth rates, diseases and even death. Traditional parasite control includes the use of anthelmintic drugs, however, these have been associated with drug resistance and ecotoxicity. In the last decade, biological control of parasites using predatory fungi has been increasingly studied, although systematic evidence of its efficacy is still lacking.

Aims: Our aim was to assess the evidence of efficacy of predatory fungi in the control of nematodes and other gastrointestinal parasites in different animal species.

Materials and Methods: We performed a systematic review applying the PICO method, searching for original papers published between January 2006 and December 2018, written in English, and indexed in PubMed/Medline. Mesh terms were used in the syntax. Papers were selected for detailed review based on title and abstract. Inclusion and exclusion criteria were applied and relevant data was collected from the remaining papers.

Results: The literature search retrieved 578 papers. Eighty-five were submitted to a detailed review. In the end, 52 papers were included in the analysis.

The studies were very heterogeneous, using different fungi, doses, frequency of administration, duration of treatment, host animals and target parasites. Considering the 52 papers, 43 studies (82.7% of the interventions) showed efficacy, with only 9 studies (17.3%) showing no significant differences when compared to control.

Conclusion: Considering the increasing hazards of drug resistance and ecotoxicity, biological control with predatory fungi stand out as a good tool for parasite management, whether as an alternative or complementary treatment to the standard parasite control.

Keywords: *Biological control, Duddingtonia flagrans, Gastrointestinal parasites, Predatory fungi, Systematic literature review.*

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ANTICOCCIDIAL EFFECT OF HERBATOP IN CHICKEN EXPERIMENTAL COCCIDIOSIS

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Introduction: Coccidiosis represents a serious threat for poultry industry, affecting the production performances, causing high morbidity, mortality and significant costs with treatment and prophylaxis. In feed anticoccidials have been used for decades for managing avian coccidiosis and were very effective until the drug resistance emerged. The use of natural remedies has become a promising alternative in combating coccidiosis in chickens.

Aims: The purpose of the present study was to assess the efficiency of a commercial herbal formula (H), as oral liquid preparations, in experimental chicken coccidiosis.

Materials and Methods: Two independent controlled battery experiments (BE) were designed and the product (HERBATOP) was tested in 3 different formulas (H1, H2 and H3): H1 contained a propylene glycol extract of *Allium sativum* and *Thymus serpyllum*, H2-*Origanum vulgare*, *Satureja hortensis* and *Chelidonium majus* and H3-*Allium sativum*, *Urtica dioica*, *Inula helenium*, *Glycyrrhiza glabra*, *Rosmarinus officinalis*, *Chelidonium majus*, *Thymus serpyllum*, *Tanacetum vulgare* and *Coriandrum sativum*. Chickens were divided into 5 groups: (i)negative control (NC), (ii)positive control (PC), (iii)Amprolium (A), and (iv-v)two groups infected and treated with 10 ml/l water H1 and H2 (first experiment), and 5 and 10 ml/l water H3 (second experiment). The chickens were challenged with 5.000 and 50.000 sporulated oocysts of *Eimeria* spp. (*E. acervulina*, *E. tenella* and *E. maxima*), respectively. The anticoccidial efficacy was assessed by recording: the oocysts output (OPG), the lesion score (LS), the weight gain (WG), the feed conversion ratio (FCR) and anticoccidial index (ACI).

Results: H1 and H2 reduced the WG, increased the FCR and OPG compared with controls. H1 reduced by 100% the duodenal lesions, whilst H2 reduced with 75% the caecal lesions, compared with control. H3 decreased the OPG of *Eimeria* spp., reduced with 50% the total lesion score and improved the performances.

Conclusion: According to ACI value only H3 had good to markedly anticoccidial effect. H3 is a promising natural anticoccidial and field trials are recommended in order to validate the obtained data.

Keywords: *Eimeria*, herbal extract, broiler chickens, anticoccidial effect.

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STUDY REGARDING COLOSTRUM IMMUNOGLOBULINS' PASSIVE TRANSFER FROM SHEEP TO LAMB

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Introduction: Neonatal care of small ruminants (like lambs and kids) is an important aspect because around 10-12% of lambs die within the first 72 hours of life without supervision. Late pregnancy nutrition is an essential part of antepartum females because more than 70% of newborns' body weight is gained during the last six weeks of pregnancy.

A good quality colostrum and a good timing of first colostrum feeding can increase the immunological status of lambs and, therefore, the future productivity of adult animals.

Aims: According to Romanian literature there are a few studies regarding passive transfer of colostrum immunoglobulins in small ruminants. That way, the purpose of this paper was to describe the level of immunoglobulins (Ig) ewes colostrum and the theirs passive transfer to lambs' blood serum several days after feeding.

Materials and Methods: For this research, there were used 10 ewes and theirs newborns. After lambing there were collected 10 samples of sheep colostrum and 10 samples of lambs' blood. Eight days later, another 10 samples of lambs' blood have been taken.

Colostrum quality has been tested using a Brix refractometer; serum protein and serum Ig G₁ levels of lambs were checked using a manual refractometer.

Results: After Brix refractometer determinations, ewes colostrum level were situated between 13 and 23.5 % (Bx). Using a standard values correlations, Brix degrades were transformed into mg/ml values. Regarding Ig G₁ levels, part of the samples presented a strong correlation to colostrum quality.

Conclusion: To predict good health status for lambs it is very important to have a right colostrum management. For this, probably the most important aspect is to see for the colostrum quality at the moment of lambing using simple and efficient methods.

Keywords: *colostrum, ewes, immunoglobulin G, lambs.*

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NEURONAL CEROID LIPOFUSCINOSIS IN AN AMERICAN STAFFORDSHIRE TERRIER – CASE REPORT

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Introduction. In humans, neuronal ceroid lipofuscinosis (NCL) is characterized as a neurodegenerative disorder with diverse neurological alteration and intracellular accumulation of autofluorescent storage material. NCL is the most common recognized progressive encephalopathy in children, therefore can appear with adult-onset form, also known as Kufs' disease. NCL in American Staffordshire Terrier (AST) dogs present with the adult onset form, with an age outbreak between 3 and 5 years (Nolte *et al.*, 2016). Clinically, rhythmic head movements, muscle weakness and ataxia will develop. Histopathologically, neuronal autofluorescent material suggestive of lipofuscin is accumulating (Abitbol *et al.*, 2010).

Aims. Although it was previously reported that AST dogs that suffers from locomotor ataxia are affected by a form of NCL, to the best of our knowledge there is no report of this disease from Romania.

Materials and Methods: A six years old intact male AST presented with a chronic progressive uncoordinated gait, difficulties to walk, progressive rhythmic head movements and impaired vision. Clinical examination, hematologic and biochemical examination, cerebrospinal fluid cytology and protein level, computed tomography imaging and genetic tests were done.

Results: The AST dog had a normal mentation, but absent menace and ataxia. Hematologic and biochemical examination were unremarkable. Cerebrospinal fluid workup revealed albumin-cytological dissociation. Computed tomography imaging showed no significant changes. Therefore genetic test showed detection of Arylsulfatase G mutation associated with neuronal ceroid lipofuscinosis.

Conclusion. NCL is a common disease in AST dogs which presents with late onset cerebellar ataxia. Although histopathology was preferred for the definitive diagnosis, genetic test are available now for more precise gene detection.

Keywords: NCL, cerebellar ataxia, American Staffordshire Terrier

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EVALUATION OF RECTAL AND SKIN TEMPERATURE VARIATIONS OF ANESTHETISED DOGS UNDERGOING MAGNETIC RESONANCE IMAGING DIAGNOSIS

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Introduction: General anesthesia produces different degrees of central nervous depression and changes in the peripheral circulation, therefore affecting the patient's thermoregulatory mechanism. Moreover, the lack of proper, specially designed equipment for magnetic resonance imaging (MRI) environment monitoring can represent a challenge for the anesthetist.

Aims: For the purpose of this study, we examined the temperature variations correlated with different anesthetic protocols in dogs that underwent general anesthesia in order to evaluate changes in rectal and distal extremities temperature, before and after anesthesia.

Materials and Methods: This study was conducted at the Faculty of Veterinary Medicine in Bucharest, on 21 patients that were divided in 3 groups depending on the anesthetic protocol used. First group (B) received Butorphanol (0.2 mg/kg, intravenously IV), second group (BK) had Butorphanol (0.2 mg/kg) and a low dose of Ketamine (2 mg/kg) IV, and group 3 (BM) was premedicated with Butorphanol (0.2 mg/kg) and Midazolam (0.2 mg/kg) IV. All patients were induced with propofol iv (3.24±0.68), intubated and maintained with Isoflurane in Oxygen. We determined rectal temperature before and right after the end of anesthesia with a digital thermometer and skin temperature of the limbs with the use of a thermal imaging camera attached to a smartphone.

Results: There was no significant difference between the rectal temperature before and after anesthesia within the 3 groups. Patients in group BK had a significant change in skin temperature at the end of anesthesia in all limbs (from 31⁰C to 29.8⁰C, p=0.008 and from 31⁰C to 29.7⁰C, p=0.009), respectively).

Conclusion: In all groups temperature variations presented before and at the end of anesthesia, especially at skin level. This study revealed that mobile thermal imaging represents a non-invasive technique that is helpful in assessing real time temperature changes in patients undergoing general anesthesia.

Keywords: *anesthesia, MRI, temperature, thermography*

SURGICAL TREATMENT OF CORNEAL ULCERS IN DOGS AND CATS

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Introduction: Corneal ulceration or ulcerative keratitis is one of the most common extraocular diseases identified in small animals. Corneal ulcer begins with a defect in the outermost layer of the cornea called epithelium that can progress to the stroma; in some complicated cases, surgery is the only available treatment.

Corneal surgery is an essential part of veterinary ophthalmology and ranges from simple procedures such as grid keratotomy and superficial keratoplasty, for indolent ulcers, to penetrating keratoplasty for restoring optical clarity.

Aim: To evaluate the efficacy of three surgical techniques in non-responsive corneal ulcers to conventional therapy.

Materials and Methods: Three techniques have been used: grid keratotomy and superficial keratectomy for the treatment of superficial ulcers and penetrating keratoplasty (PK) for deep complicated corneal ulcers. Five cases (three cats and two dogs) with superficial corneal ulcers underwent surgical treatment; a cat presented bilateral ulcer. Three corneal ulcers were treated by Grid keratotomy and three with superficial keratectomy. Penetrating keratoplasty was used in five dogs and two cats with severe corneal ulcers.

Results: The healing process was completed in an average of 11 days in the group treated with grid keratotomy and 16 days in the group of superficial keratectomy. In five of six cases healing occurred without persistent corneal scarring, one ulcer healed with a moderate corneal scar. In the group treated with penetrating keratoplasty, all seven cases presented translucent cornea at the 45 day post-surgery.

Conclusion: These surgical techniques can be successfully used in the treatment of corneal ulcers in small animals, when common therapy fails.

Keywords: *corneal ulcer, grid keratotomy, perforant keratoplasty, superficial keratectomy*

***ANAPLASMA MARGINALE* – CASE REPORT**

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Introduction: *Anaplasma marginale* is one of the most important tick-borne bacteria of veterinary and public health significance in the family *Anaplasmataceae*. Bovine anaplasmosis is globally distributed tick-borne disease of livestock with great economic importance in cattle industry. The infection in domestic animals is generally referred as tick-borne fever. All age of cattle are susceptible, but the prevalence increases with age.

Aims: The aim of this paper is to show the symptoms, use of blood smears, hematological and biochemical parameters in diagnostic, as well as the treatment of diseased cattle.

Materials and Methods: A herd of milk cattle on mount Beljanica in eastern Serbia. Blood smears from peripheral blood circulation, stained by Giemsa. Hematological and biochemical parameters were determined by automatic analyzers.

Results: The owner noticed reluctance and absence of appetite in some cattle. Visible parts of the skin and mucous membranes were icteric. The colour of the urine has not been altered. The body temperature was slightly elevated (in the interval from 39 to 40°C). *Anaplasma marginale* was visible in blood smears stained by Giemsa (magnification 1000×). The leukocyte formula was shifted to the right (the numbers of lymphocytes and monocytes were slightly increased and the number of neutrophils declined). The number of platelets was also slightly lower. The level of Aspartate amino-transferase (AST) was increased in a blood serum samples.

Therapy was done by *Imidocarb* and *Oxytetracycline* (parenteral administration at the recommended doses). The therapy has led to the healing of cattle and disappearance of symptoms of the disease.

Conclusion: The examined cattle's are seasonal moved on a mountain pasture. In favorable weather conditions (high humidity and temperature) occurs a high reproduction of hematofagic arthropods (transmitters of *Anaplasmae marginale*). In such conditions, the probability of anaplasmosis occurrence in cattle's on pasture is high. Timely diagnosis and therapy leads to rapid healing. Making blood smears from peripheral blood and staining by Giemsa is inexpensive, easy and fast way to get accurate diagnosis.

Keywords: *Anaplasma marginale*, cattle.

CURRENT ASPECTS REGARDING THE CLINICAL RELEVANCE OF ELECTROACUPUNCTURE IN DOGS WITH SPINAL INJURY

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Introduction. Electroacupuncture is a specific acupuncture technique that involves electrical stimulation of acupuncture needles and has been recommended for treatment of various painful conditions, neurologic deficits, muscular weaknesses and muscle spasms (Ulett *et al.*, 1998, Hab *et al.*, 1992). Thoracolumbar intervertebral disc herniation (IVDH) is one of the most common problems in canine neurologic disease (Coates, 2000). Electroacupuncture beside the fact it confers excellent analgesia, lessens the time needed to regain normal neurologic function, prevents relapse of clinical signs with minimal invasiveness and economical advantage, it is a reasonable option for a conservative treatment prior surgery.

Aims. The purpose of this review is to bring scientific evidence and support for the current state and perspectives regarding the clinical relevance of using electroacupuncture in dogs with spinal injury.

Conclusions. Electroacupuncture is a complex intervention that requires perfect training. The advantages are that it is practical, safe, less expensive, and fewer side effects when compared with conventional pharmaceutical management of pain. Many studies shown that a combination of electroacupuncture and medical treatment provides faster recovery and improvement of ambulation and deep pain perception, compared with results for medical treatment alone (Hayashi *et al.*, 2007). The disadvantages are that a specific knowledge of the subject is necessary and that the response among individuals may vary. The next important step in electroacupuncture research is to have a better understanding of the neurochemical mechanism to increase its therapeutic efficacy. Furthermore, it is also necessary to standardize the procedure so that there are clear data about the place, frequency, intensity, duration and time of stimulation that can be recommended for the treatment of each disease.

Keywords: *dogs, disk disease, electroacupuncture*

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EFFECTS OF REFRIGERATION AND FREEZING ON THE VIABILITY OF GERMS ISOLATED FROM SUBCLINICAL BOVINE MASTITIS

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Introduction: In mastitis, samples should be taken just before milking. When it is difficult to perform the microbiological analyses the same day, the choice of sample preservation method should allow the viability of the microorganisms so that they can be detected.

Aims: The aim of this preliminary study was to evaluate the effects of refrigeration and freezing on cow's milk in order to choose the most appropriate method for isolating the germs of interest.

Materials and Methods: Twenty milk samples were collected from five cows with subclinical mastitis, not treated with antibiotics during the three weeks before sampling. The samples were sent to the laboratory where one part was analyzed the next morning after refrigeration at +4 °C, while the other part was frozen at -20 °C and analyzed 32 days later.

Results: The results showed that unlike Gram⁻ bacilli, which disappeared after freezing, Gram⁺ bacilli were better evidenced. Micrococci and streptococci isolated after refrigeration were found at the same number after freezing. The frequency of coagulase-negative staphylococci increased 1.42 times, while coagulase positive staphylococci were twice as well isolated after freezing.

Conclusion: This preliminary study showed that freezing was a good way of preserving germs responsible of bovine mastitis in particular staphylococci, Gram⁺ bacilli and streptococci.

Keywords: *Freezing, germs, mastitis, refrigeration, viability.*

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ONLINE LEARNING RESOURCE FOR PRACTICING EVIDENCE-BASED VETERINARY MEDICINE

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Introduction: The practise of Evidence-based Veterinary Medicine (EBVM) is the use of best available scientific evidence, in conjunction with clinical expertise and consideration of owner and patient factors, to make the best clinical decisions for patients. The first EBVM Learning project was developed by an international team and consists of online modules describing the stages of EBVM.

Aims: The aim of the project is to review, update and further develop the EBVM Learning resource to ensure its continued relevance and usefulness to a wide range of stakeholder groups and to further promote its use internationally.

Materials and Methods: Feedback is gathered from a range of stakeholders through the website's feedback form, a survey for students and practitioners, and semi-structured interviews with curriculum providers and volunteers identified from the surveys. The findings will be used to plan updates of the existing materials and to identify areas for development including new topics and innovative approaches to promote learning.

Results: The EBVM Learning II project is reviewing the EBVM Learning resource based on the feedback gathered from stakeholders.

Conclusion: The update of EBVM Learning will extend its use and value and continue to support the current and next generation of practitioners and researchers in their pursuit of EBVM.

Keywords: *Evidence-based Veterinary Medicine*

STUDY OF THE IMPACT OF HATCHERY VACCINATION AGAINST GUMBORO DISEASE ON ZOOTECHNICAL AND SEROLOGICAL PERFORMANCE IN BROILER CHICKEN IN ALGERIA

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Introduction: Gumboro disease represents a threat to poultry farms, particularly in broiler chickens. It causes immunosuppression that causes considerable economic losses. Vaccine protection depends on maternal antibody titers, hence the need to know the immune status of chicks at day 0.

Aims: In this context we set ourselves the objective of comparing two methods of vaccination against infectious bursal disease in broiler chickens by the study of zootechnical and serological performances.

Materials and Methods: Sixteen thousand (16000) 1-day-old chicks of ISA HUBBARD strain from the same hatchery are divided into two groups: a batch Vaccinated with an immune complex vaccine at the hatchery (Vc), and a batch vaccinated with an intermediate vaccine at the farm building (Vb). The two batches are homogeneous in terms of birth weight. Each batch contains 8000 chicks. Blood samples were taken at day 0, 14, 28, 35 for serological analysis by ELISA techniques.

Results: In our experimental conditions, the hatchery vaccination reduced the mortality rate by 4%, significantly modified the average live weight of the chickens at 49 days of age ($2007g \pm 37g$ against $1790 \pm 24g$ for the vaccinated in the building $P < 0.05$). Similarly, the hatchery-vaccinated batch significantly reduced feed consumption (-4%, $P < 0.05$) and consequently the consumption index was significantly reduced (-3%, $P < 0.05$). The serological analysis confirms the presence of protective antibody levels of the vaccinated batch at the hatchery compared to the vaccinated batch at the breeding building.

Conclusion: The serological analysis confirms the presence of protective antibody levels at the level of the vaccinated batch at the hatchery compared to the vaccinated batch at the level of the breeding building. Our results reveal a definite impact of the hatchery vaccination with an immune complex vaccine on zootechnical and serological performances.

Keywords: *Broiler chickens, Gumboro, Immune complex, Vaccination.*

THE FIRST EVIDENCE OF A NEW GENOTYPE OF NEPHROPATHOGENIC INFECTIOUS BRONCHITIS VIRUS CIRCULATING IN ALGERIAN BROILER FLOCKS

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Introduction: Avian infectious bronchitis virus (IBV) is recognized as causing one of the most frequently diseases of broilers in the world and leads to severe economic losses to the poultry industry (Cavanagh and Gelb, 2008; Awad *et al*, 2014). It frequently affects the kidneys and causes their damages (Siham *et al.*, 2015).

Aims: Investigate the presence of IBV and its possible involvement in kidney damages of Algerian broiler flocks.

Materials and methods: fourteen clinical diseased broiler flocks from western and central Algeria were sampled. The organs sampled were analyzed by RT-PCR followed by sequencing and phylogenic analysis of positive samples.

Results: The molecular detection of avian infectious bronchitis virus by RT-PCR showed that six samples were positive; only two isolates were typable by sequencing. Among these positive samples, one genotype was identified (IBDZ13a) and showed 93% nucleotide sequence identity to partial-S1 sequence acquired from IB 4/91 commercial vaccine strain. Sequencing analysis characterized this virus as a novel and divergent IB 4/91 field virus with eight amino acid substitutions different from the known IB 4/91 vaccine vial reference strain that might lead to the changes of its immunogenicity.

Conclusion: The isolation of a new IBV strain (IBDZ13a) from vaccinated broiler flocks may explain the failure to adapt the vaccination programs to the infectious bronchitis virus field strains circulating in the farms. Also, based on the RT-PCR results it is clear that kidney damages outbreaks of broilers are related to IB 4/91 infectious bronchitis virus strain (IBDZ13a).

Key words: *Avian infectious bronchitis virus, broilers, kidney damages, RT-PCR, IBDZ13a.*

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GASTROINTESTINAL PARASITES OF FREE-RANGE CHICKEN: A WORLDWIDE ISSUE

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Introduction: Gastrointestinal parasites with direct and/or indirect life cycles, namely *Eimeria* spp., *Ascaridia galli*, *Heterakis gallinarum* and *Capillaria* spp., are responsible for the most economic losses in poultry industry.

Aims: The current review aimed to collect the main information about gastrointestinal parasites affecting poultry, as well as preview research studies regarding parasitic diseases in free-range chicken production.

Materials and Methods: Twenty-six references were used in this study and eight were from research studies correlating prevalence of gastrointestinal parasites in free-range chickens and influencing factors, such as the type of production system, age and animal density, hygienic conditions and the weather.

Results: Coccidiosis is the main parasitic disease of poultry, responsible for the major economic losses and health issues in farms. Diseases have different clinical signs and result in variable impacts on animals. Parasite control programs include mainly vaccination, anti-coccidia and anti-helminthic drugs, as well as, house cleaning and disinfection.

Conclusion: This review concluded that coccidia and gastrointestinal helminths are a global threat to free-range poultry production. More research in this area is necessary in order to understand the major factors influencing the prevalence of parasitic diseases in this type of poultry production, as well as the search for new control strategies, which must be a priority, mainly when using natural antiparasitic compounds and biological control.

Keywords: *Coccidia, Free-Range Chicken, Gastrointestinal Parasites, Helminths, World*

COMPARISON STUDY BETWEEN FOUR COPROLOGICAL METHODS AND TWO FLOTATION SOLUTIONS IN SORRAIA HORSE (*EQUUS FERUS CABALLUS*) – PRELIMINARY RESULTS

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Introduction: Anthelmintic resistance in horses' gastrointestinal parasites has been continuously described in the last three decades. In order to delay, or even prevent, its further development, a new deworming approach must be taken considering the diagnostic tools available nowadays. This study aims to pinpoint differences in performance of four commonly employed coprological methods, using two different flotation solutions, and make some practical recommendations on which method might be better-suited to face this emerging problem in horse management.

Materials and Methods: In this trial, 17 fecal samples of Sorraia horses were collected in April 2019 (12 females and five males) and submitted to coprological examination using simple flotation (SF), centrifuged flotation (CF), McMaster (McM) and Mini-FLOTAC (MF) methods. Each method was performed with a salt (specific-gravity - SPG=1.20) and a sugar solution (SPG=1.28). Each sample was analyzed in triplicates for SF and CF and in duplicates for McM and MF. As a semi-quantitative parameter in SF and CF, the number of eggs were counted in 10 fields of each slide and the arithmetic mean was obtained for each replicate. Pairwise comparisons were performed using parametric (non-paired T test) and non-parametric tests (Wilcoxon and Spearman correlation tests), all with a significance level of 0.05.

Results: Evidence of difference of eggs/field counts was found between SF and CF methods. CF presented the highest counts of eggs/field and higher coefficients of variation (CV) ($CV_{\text{salt}}/CV_{\text{sugar}} = 67\%/86\%$ vs. $43\%/52\%$). However, SF_{salt} was capable of detecting a higher prevalence of *Triodontophorus* spp. eggs (53%). McM (sensitivity of 50 eggs per gram - EPG) and MF (sensitivity of 5 EPG) were also statistically different in both solutions, with McM having the highest EPG and CVs ($CV_{\text{sugar}} = 54\%$ vs. 50%).

Conclusions: Although CF_{salt} obtained the highest fecal egg counts with lower CV, SF_{salt} has performed as the true best qualitative method as it detected a higher variety of eggs. Despite McM having the highest EPG, the recommendation for the quantitative method to use is MF with sugar, because of its lower variability. McM's higher multiplication factor and detection limit will probably inflate the real EPG, making it less accurate as a therapy decision-making method.

Keywords: coprological methods, horse, Mini-FLOTAC, sensitivity, strongyles.

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SURGICAL MANAGEMENT OF A PARAOESOPHAGEAL CYST OF UNKNOWN CAUSE IN A DOG – CASE REPORT

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Introduction: Oesophageal cysts are congenital or acquired malformations infrequently reported both in humans and domestic animals. Most often represent a duplication of the foregut wall containing epithelium and/or muscular layers. Affected patients usually experience local or general signs like recurrent dysphagia, regurgitation and dyspnea. In contrast to this, we report a case of paraoesophageal cyst with unknown underlying aetiology and unrelated clinical symptoms.

Aims: The aims of this study were to describe the presentation, diagnostic findings and surgical treatment of a paraoesophageal cyst in an adult dog.

Material and methods: A six-year-old intact male German Shepherd mix breed dog was presented with 3 weeks history of lethargy and progressive abdominal enlargement. Investigations included abdominal and thoracic ultrasonography, radiography and computed tomography imaging, CBC, serum biochemistry and cardiology examination. The surgical treatment consisted in thoracoscopy and lateral thoracotomy. Any other pathology was excluded.

Results: Ultrasound guided paracentesis removed 3 liters of ascitic fluid classified as modified transudate. Thoracic radiography revealed an 11x12 cm soft tissue lesion in the caudal mediastinum. On CT scan the structure appeared filled with fluid, thin walled, well circumscribed and attached to the oesophagus, but not accompanied by communication with its lumen, with no contrast enhancement within the mass. After evaluation by thoracoscopy, an 8th right intercostal space thoracotomy was used to partially resect the lesion. A ¾ cm window was resected from the cyst to allow drainage. Histopathological exam of the mass revealed a fibrous wall with granulation tissue, consistent with a cystic structure. Bacterial culture had no bacterial growth. The dog recovered uneventfully and no relapse was reported after 6 months follow-up.

Conclusion: Regardless of aetiopathogenesis, treatment of paraoesophageal cysts entails surgical resection for drainage. In our report, the excised tissue prevented the recurrence of the cyst, carrying a good intermediate-term outcome.

Keywords: *cyst, dog, mediastinum.*

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CONTRIBUTION TO THE STUDY OF THE THERAPEUTIC CHECKS OF BACTERIAL CATTLE CLINICAL MASTITIS IN THE CENTRAL REGION OF ALGERIA

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Introduction: One of the most important barriers to increased milk production is unquestionably mastitis. In addition, it represents the main cause of antibiotic use as a curative (lactating mastitis and dry) and preventive (dry). Very many micro-organisms are able to cross the barrier of the teat canal and to multiply in the udder: bacteria (*Streptococcus agalactiae*, *Staphylococcus aureus* ...), Viruses (Leucosis, foot-and-mouth disease), yeasts and algae may be the cause of breast infections. However, it is the bacteria that are responsible in about 90% of the cases of mastitis.

Aim: The objective of this study is twofold: Identify the germs responsible of clinical mastitis and assess the resistance of these bacteria to antibiotics by two methods (classic and quick kits), then performed a comparison between these methods.

Materials and Methods: 50 samples were analyzed at the Regional Veterinary Laboratory of Tizi-Ouzou, by two methods, a classical method (use of Chapman's medium, BEA, Hektoen followed by a biochemical identification and serotyping for *Streptococcus spp*), and a rapid diagnostic kit. At the same time, a questionnaire based on the issues raised was distributed to 150 veterinary practitioners.

Results: The 40 non-sterile samples were used to isolate 48 seeds; we found a predominance of *Staphylococcus aureus* with a frequency of 37.77%, *E. coli* represent 35.55% and *Streptococcus* non grouped ones 20%. The antibiogram revealed that 83.58% of the antibiotics tested were active on *E.coli*, the *staphylococci* 73.68% and 78.26% on *Streptococci*. 76% of veterinarians do not use the lab, which implies a lack of choice of molecules, 60% of treatments are carried out by farmers that imply disrespect of the antibiotics rule, added to the problem of bioavailability, and all this might explain this high rate of treatment failure.

Conclusion: The antibiotic resistance cannot alone explain the high rate of treatment failures detected by veterinarians questioned.

Keywords: Antimicrobial, Clinical mastitis, Dairy cow, Treatment failure.

TICK FAUNA OF SMALL RUMINANTS IN NORTH KOSOVO, SERBIA*

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Introduction: Today, small flocks of sheep and goats play an important role in providing animal protein for diet, especially for those people who live in village at mountains part of Serbia. Geographical conditions favor breeding small ruminants in northern Kosovo (Milutinović *et al.*, 1997; Pavlović *et al.*, 1995). Both, sheep and goats are milked and they produce the bulk milk supply, together with a large proportion of the meat that is consumed.

Aims: In pasture breed condition tick infestation are common especially during late spring and autumn months and aim of our examination are to established tick fauna at flocks of goats and sheeps in northern Kosovo.

Materials and Methods: During 2017 we examined 114 flocks of small ruminants from Zvečan and Leposavić district (villages Ceranja, Majdevo, Zemanica, Mure, Rudine, Žitkovac, Oraovica, Mošnica, Donji Krnjin, Belo brdo, Mioliće, Drenova and Beliče). Ticks were collected from sheep and goats by means lightly sprung forceps. The tick species were detected by morphometric characteristic (Kapustin, 1995).

Results: Ticks were found on 56.14% of examined sheep. Relative abundance analysis revealed that the species at sheep *I. ricinus* was absolutely dominant 44.91%, followed by *Dermacentor marginatus* (30.91%), *Rhipicephalus bursa* (15.22%), *R. sanguineus* (7.72%), *Haemaphysalis punctata* (3.21%) and *D. reticulatus* (2.17%). Ticks were found on 31.42% of examined goats. Relative abundance analysis revealed that the species at goats *I. ricinus* was absolutely dominant 54.42%, followed by *Rhipicephalus bursa* (18.22%), *R. sanguineus* (4.72%), *Haemaphysalis punctata* (4.22%) and *Dermacentor marginatus* (3.91%).

Conclusion: During study performed in 2017. we examined 114 flocks of small ruminants in northern Kosovo. Most abundant were *Ixodes ricinus*, followed by *Dermacentor marginatus*, *Rhipicephalus sanguineus*, *R. bursa*, *Haemaphysalis punctata* and *D. reticulatus*. These findings are of great epidemiological importance because these types of ticks transmit a multitude zoonoses like *Borellia burgdorferi*, *Erllichia spp.*, *Anaplasma spp.*, Tick-borne encephalitis, numerous haemorrhagic fever and etc.

* the status is in accordance with UNSCR 1244 and the Opinion of the International Court of Justice on the Kosovo Declaration of Independence

Keywords: North Kosovo, Serbia, small ruminants, ticks

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INTESTINAL PARASITES IN DOG SHELTERS AND DOG BREEDING KENNELS IN KRUŠEVAC, SERBIA

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Introduction: Due to the uncontrolled reproduction of dogs and cats and an increasing number of attacks on citizens, a Zoo hygiene service was established in Kruševac, with the goal of the humane capture and provision of care to stray dogs and cats. In addition to this service, the city also has a humanitarian, non-governmental, non-partisan and non-profit association of citizens who seek to promote the rights and protection of animals (Raicevic *et al.*, 2018; Raičević and Pavlović, 2019). The association has established shelters to address the problem of stray dogs and cats in a humane manner, where citizens can take home sterilized and vaccinated animals.

Aims: The study was carried out in early March 2019 in order to determine the frequency of gastrointestinal parasites in dog feces samples from two shelters and two dog breeding kennels in Kruševac.

Materials and Methods: A total of 71 specimens of dog feces were examined using the sedimentation method and the saturated ZnSO₄ flotation method. We determined the presence of parasitic eggs or cysts using morphometric methods (Euzéby, 1981).

Results: During the parasitological examination we have found that the total prevalence of parasites in the first shelter was 34.78% and 11.1% in the second. The presence of parasite was not found in the feces samples from the first breeding kennel, while in the second one the presence of the parasite it was at 5.56%. Of the total sample, the presence of *Giardia intestinalis* was at 5.63%, *Dypillidium caninum* at 4.22%, *Ancylostomidae sp* at 2.81%, *Tokocara canis* at 2.81% and *Taenia sp.* at 1.41%.

Conclusion: The obtained results indicate the presence of parasitic infections in a moderate degree, but with zoonotic parasites. This opens the real danger of contamination of public areas where they meet this animal and the potential health risk to humans.

Keywords: dogs, dogs shelters, Kruševac, parasites, zoonoses

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SEROLOGICAL SURVEY OF DOMINANT VIRAL DISEASES (NEWCASTLE DISEASE (ND), INFECTIOUS BRONCHITIS (IB) AND INFECTIOUS BURSAL DISEASE (IBD)), IN BROILERS FLOCKS IN NORTHERN ALGERIA

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Introduction: The sector of broiler poultry is the largest and the most efficient meat production industry in the world (Gupta *et al.*, 2014). Indeed, Algeria is one of the numerous countries where broiler production is threatened by a number of infectious diseases, especially viral, where the economic losses represent enormous bill with no reliable solution of any medication (Pradhan *et al.*, 2014). Newcastle disease (ND) is the most economically important disease in poultry - particularly in developing countries- due to high mortality, and associated sanitary measures in poultry farms or slaughters (Ban-Bo *et al.*, 2013)

Aims: This study was conducted to evaluate the epidemiological and serological status of dominant viral diseases (Newcastle disease (ND), infectious bronchitis (IB) and infectious bursal disease (IBD)) in broiler breeding in Northern Algeria and evaluate the influence of certain risk factors associated with each disease.

Materials and Methods: The experiment was carried on thirty (30) broiler flocks whose 1200 birds were sampled and which are serologically tested using indirect ELISA method.

Results: Our results show that: of all the farms studied, ND was the most widespread disease (63.33%); however, IB and IBD showed lower serological positivity (40% and 16.66% respectively). For ND, Cobb 500 farms were significantly more seropositive by 78% ($p = 0.025$) than the other strains. Nevertheless, farms with good hygiene were significantly less seropositive at ND by 26% ($p = 0.022$). For IB, the risk of seropositivity was significantly lower in the spring by 40% ($p = 0.036$). However, farms with a higher density or older than 30 days were more HIV by 47% ($p = 0.041$) and 45% ($p = 0.019$). Finally, when broilers did not make a booster vaccination against IBD, the farms appeared to be more seropositive by 48% ($p = 0.047$); in the spring of 45% ($p = 0.048$); even on farms with poor hygiene of 65% ($p = 0.004$); however, subjects older than 30 days were less positive by 30% ($p = 0.009$).

Conclusion: In conclusion, the serological survey conducted in this study provided an important frame work for viral diseases, which are dominant pathologies in broiler chickens. Thus, many factors are responsible for the onset of these diseases.

Keywords: Algeria, broilers, Infectious Bursal Infectious, Bronchitis; Disease, Newcastle Disease, serological.

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SESSION 10: GEODESY, GEOMATICS AND PROPERTY VALUATION

GEOSPATIAL DEVELOPMENT USING GIS SMART PLANNING

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Introduction: Zoning is the most effective public tool for controlling land use, reflecting the spatial separation of urban land use incompatibilities and influencing, consequently, the physical economic and social structure of cities. There are described the areas with specific uses of the land, depending on the intensities of use (eg individual or collective residential areas), types of commercial, industrial activities, etc. In the case of approving the construction of new objectives, it is important to use 2D GIS data integrated with 3D data, which allow the automatic introduction and check of the selected conditions, in accordance with the legislation in force and with the local urban planning regulations.

Aims: In this article we want to emphasize the possibilities and benefits of using dedicated GIS solutions for geospatial planning, integrating 3D and 2D data. At present, GIS provides complex tools dedicated to spatial planning analyzes, of which we chose a new Esri solution.

Materials and Methods: We used digital resources from an area in Bucharest, integrating them in ArcGIS Online, designing the workflow and scenario and also exploiting the results in the new dedicated urban software solution for smart cities, Esri ArcGIS Urban.

Results: The results consist of setting up the appropriate planning parameters, correlated with the local urban planning regulation and applying a coherent workflow in ArcGIS Urban for the GIS analysis of the reconfiguration of an area in Bucharest, as example.

Conclusion: We have demonstrated the advantages of using intelligent spatial planning products to verify the conditions provided in the local urban planning regulations. We highlighted the possibility to highlight by analyzing certain evolving indicators, such as population, degree of employability, etc. Obviously, as more relevant Romanian statistical data will be available in the online environment, such analyzes may increase as complexity level.

Keywords: *ArcGIS Urban, GIS, geospatial, smart city, smart planning*

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IMPLEMENTATION OF AERIAL MONITORING TECHNOLOGY IN PERMANENT GRASSLAND MANAGEMENT

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Introduction: With the integration of Romania into the European Union and the implantation of the system of surface or animal subsidy, in agricultural practice it was imposed the management of large and very different surfaces from those of the cadastral practice. In the management of the agricultural heritage of Romania, the management of the pastoral fund of about 5 million hectares is distinguished along with the pasture breeding, representing areas of major interest in the national economy (Samfira et al., 2011).

Aims: It was considered the design of a modern management of the use of permeable grasslands in the western part of Romania and especially the monitoring of its use with animals. It was desired to create an interdependence between the cadastral organization of the territory and the extraction of as much descriptive information by air flight with drone equipment. The image analysis drew the management design for a period of 10 years according to the methodology in force in Romania (Law 165/2013; OG 44/2013; Law 44/2018; Law of Zootechnics /2019).

Materials and Methods: The biological material was represented by the permanent vegetal associations specific to a reduced altitudinal deviation from the Western Plain of Romania in the form of permanent grasslands managed by the U.A.T. Denta county Timis. For the management design, namely the cadastral organization of the territory, the technique of processing the data taken from orthophotoplan images was used. The large-scale descriptive analysis was performed by Phantom 4 drone aerial flight followed by data processing using specific software.

Results: The management design for an area of 700 hectares of permanent grassland was realized starting from the cadastral organization of the territory generated by Law 165/2013 at the level of the U.A.T. Denta county Timis. In this context, with the help of the drone flight, detailed information on the state of the land and the works required during the rental period were extracted.

Conclusion: The data obtained shows that it is necessary to diversify the technical functions of the aerial flight systems and especially to orient their future development to strategic areas such as agricultural and agricultural.

Keywords: *Cadastru, Drone, Orthophotoplan, Phantom 4, Permanent pastures*

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MONITORING OF EXCAVATION WORKS USING MODERN MEASURING TECHNOLOGY

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Introduction: Modern technology has a fundamental role in the engineering activities maintained in open-pit, in order to obtain the necessary material for construction or to obtain certain useful material that is found near the surface.

Aims: The present article aims to test and evaluate the accuracy of forecast data for volumetric measurements of exploited material, using modern technology and specialized software based on topographic altitude. For this purpose, a proper surface exploitation was chosen, materializing by case study, referring to the Doman quarry, Caras Severin, in which we determined the volumes exploited during the activity period.

Materials and Methods: The determination of volumes in a mining surface is an autonomous procedure against other works of engineering character, it, in fact, represents an end in itself requiring the collection, processing and interpretation of geospatial data. One of the methods used for volumetric calculus is the prisms method, predominantly used, being the basis of the majority of computing software programs.

Results: Measurements were performed using the G.N.S.S. technology, revealing the location and geometrical shape of each existing operating front in the perimeter of the mining surface. The points of interest were for the working front, slope up, slope down, quota points for the upper part of the step, and for the lower part.

Conclusion: The quickest method for calculating volumes, easily programmable using the specialized software, which can perform volumes calculations for irregular and complex surfaces with high accuracy, is the method of prisms.

Keywords: *Engineering measurements, Leica GS08, Volumetric calculation*

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RESEARCH ON THE EFFECTS OF THE CURRENT GLOBAL WARMING, IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT, IN AGHIRESU AREA, CLUJ COUNTY

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Introduction: Recent studies have shown that previous climate change, are not comparable to the current global warming. The magnitude of these changes we all feel nowadays, and the effects most of the time with significant damage to both people and the environment, have recognized a significant increase.

Aims: It is well known that the rural environment is the area where people's food is produced, and that is why it is necessary to don't postpone at all, the protective measures against the effects of global warming. Protecting air, water and soil resources against pollution and degradation must be the number one priority for sustainable rural development.

Materials and Methods: collecting field data, through the direct observation of degraded land and polluted waters photographing, measuring and statistical processing of data as well as studying official documents made available in the archives of the study area.

Results: The study area, namely Aghiresu area, is located in Cluj County, Transylvania, Romania, and it is known for its preponderance activity in agriculture and mining. It brings attention, the situation of several limestone fields where the groundwater is strongly affected by the underground galleries. The principles of sustainable development especially of the rural environment, now more than ever, must take into account the quality of life, which depends on the protection of the environment and the existing resources.

Conclusion: Research results highlighted and have led to the conclusion that is necessary to implement, measures adapted to the specific area, for the most effective results for the protection of air, water and soil resources through area sustainable projects.

Keywords: *global warming, rural area, sustainable development*

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