





## NEW TRENDS IN THE ECOLOGICAL AND BIOLOGICAL RESEARCH

## International scientific conference

## **Book of Abstracts**

9. – 11. September, 2015

University of Prešov, Slovak republic

## Organizer:

University of Prešov Faculty of Humanities and Natural Sciences Greek-Catholic Theological Faculty Faculty of Orthodox Theology



The scientific event is financially supported by "Research Agency" as one of the outputs of the project "Acceleration of development of human resources in science and research, innovation and quality improvement of the education process" (ITMS: 26110230069)



Modern education for knowledge society. This project is supported by funds of European Union.

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#### ISBN 978-80-555-1354-6

### Foreword from the Project Manager

Dear Colleagues, dear Ladies and Gentlemen,

The scientific conference with international participation: "New Trends in Ecological and Biological Research" is part of the activity 2.3 the creation and development of resident scientific journal and organization of the scientific event within the project: "Acceleration of Development of Human Resources in Science and Research, Innovation and Quality Improvement of the Educational Process" (Operational programme: Education, ITMS: 26110230069).

University of Prešov, Slovakia, with their faculties significantly affects the provision and conditions of education, research and development in eastern Slovakia. Today, it is a modern dynamically developing research and educational institution equipped with modern information-communication systems. The promote quality improvement of education and development of human resources in research and development area in order to achieve continuous adaptation of the university to the current and perspective needs of the knowledge society.

In 2013, the implementation of the project: "Acceleration of Development of Human Resources in Science and Research. Innovation and Ouality Improvement of the Educational Process" started under its activities: 1.1 Creating and improving programs of study in natural sciences, social sciences and humanities, 1.2 Preparation and publication of university textbooks and college textbooks, 2.1 Strategy of management with an emphasis on improving the quality and the quantity of PhD. students and post-doctorands, 2.2 Increasing competence of creativity and publishing skills of university employees in scientific journals, 2.3 The creation and development of resident scientific journal and organization of the scientific event, 3.1 Development of associated department of the University and sections of research and development of private companies, and 3.2 Mobility university staff, post doctorands, PhD. students and students within the European area, as the fields of regional development and support to international cooperation, with non-repayable financial contribution 945,389.02 €. One of the main aim of this project was the creation of new laboratories at the Faculty of Humanities and Natural Sciences, University of Prešov in Prešov, Slovakia: 1. Laboratory of ecochemical disciplines, 2. The experimental chemical laboratory, 3. Laboratory and museum of evolutionary ecology and at the Greek Catholic Theological Faculty, University of Prešov in Prešov, Slovakia: 4. Socio-psychological laboratory and 5. Patristic-philological laboratory.

On behalf of the organizers I cordially invite you to the scientific conference with international participation: "New Trends in Ecological and Biological Research" and wish to you many pleasant scientific and social experiences at the Faculty of Humanities and Natural Sciences, University of Prešov in Prešov, Slovak Republic. I believe that in addition to obtaining scientific information and to experience exchange you can find the time to discover the beauty of the region Šariš.

Assoc. Prof. Ivan Šalamon Project Manager

## SPONSORS

International scientific conference "New trends in the ecological and biological research" and the Organization committee would like to thank the following sponsors for their support in making this successful international conference.











## SCIENTIFIC AND CULTURAL PROGRAMME

Wednesday, 9.9.2015

07:00 - 12:00	Registration of Participants
09:00- 09:15	<b>Opening ceremony</b> (Chairman: Assoc. Prof. Dr. Ivan Šalamon)
	<ul> <li>Prof. Dr. Peter Kónya</li> <li>Rector, University of Prešov in Prešov, Prešov, Slovakia</li> <li>Prof. Dr. René Matlovič</li> <li>Dean, Faculty of Humanities and Natural Sciences, University of Prešov in Prešov, Prešov, Slovakia</li> </ul>
09:15 - 10:00	<b>Plenary lecture</b> ( <i>Chairman: Prof. Dr. Jan Kisgeci</i> )
	<b>Prof. Dr. Lyle E. Craker</b> "Understanding the role of medicinal and aromatic plants in a trendy society" (University of Massachusetts, Amherst, MA, USA)
10:00 - 11:00	<b>Oral presentations</b> ( <i>Chairman: Prof. Dr. Jan Kisgeci</i> )
	<ul> <li>Prof. Dr. Volodymyr Masłyuk</li> <li>"Radionuclide monitoring in Transcarpathian region: the role of natural and anthropogenic factors" (Institute of Electron Physics, Uzhhorod, Ukraine)</li> <li>Dr. Marianna Molnárová</li> <li>"Se(VI) and its impact to selected physiological and biochemical parameters of Sinapis alba L. seedlings"</li> <li>(Comenius University, Bratislava, Slovakia)</li> <li>Dr. Oleg S. Glukh</li> <li>"The burning of dry vegetation as a source of heavy metals emissions into the atmosphere"</li> <li>(Uzhhorod National University, Uzhhorod, Ukraine)</li> <li>Monika Wesołowska, MSc, Eng.</li> <li>"The use of honey bees and honey as bioindicators of heavy metals in the environment"</li> <li>(University of Rzeszów, Rzeszów, Poland)</li> </ul>
11:00 - 11:30	Tea/Coffee break

11:30 – 12:30	Plenary lecture (Chairman: Prof. Dr. Lyle E. Craker)
	<b>Prof. Dr. Jan Kisgeci</b> "New trends in Hemp research in Serbia" (University of Novi Sad, Novi Sad, Serbia)
12:30 - 13:15	<b>Oral presentations</b> ( <i>Chairman: Prof. Dr. Lyle E. Craker</i> )
	Dr. Viera Peterková "Biodiversity of carabids (Coleoptera, Carabidae) around a pond in Pusté Úľany" (Trnava University in Trnava, Trnava, Slovakia) Dr. Nataliia Gudkova "New approaches to biodiversity conservation edu- cation in Ukraine" (State Ecological Academy of Postgraduate Educa- tion and Management, Kyiv, Ukraine) Assoc. Prof. Dr. Ivan Šalamon "The Success in the Medicinal Plant Research" (University of Prešov in Prešov, Prešov, Slovakia)
13:15 – 14:30	Lunch
14:30 - 15:30	Plenary lecture (Chairman: Dr. Janko Rode)
	Prof. Dr. Roman Volkov & Prof. Dr. Irina Panchuk "Abiotic stress in plants: dual role of hydrogen per- oxide" (Yuriy Fedkovych Chernivtsi University, Chernivtsi, Ukraine)
15:30 - 16:15	<b>Oral presentations</b> ( <i>Chairman: Dr. Janko Rode</i> )
	Iwona Kata, MSc. "Ethanol production from waste glycerol by meta- bolic engineering of Hansenula polymorpha" (University of Rzeszow, Rzeszow, Poland) Maksym Fizer, MSc. "Spectroscopic determination of bismuth with bis- thioureas as chelating agent" (Uzhhorod National University, Uzhhorod, Ukraine) Dr. Silvia Mudrončeková "Efficacy of different plant species essential oil in the control of the aphids (Rophalosiphum padi) on wheat" (University of Prešov in Prešov, Prešov, Slovakia)

16:15 - 16:45	Tea/Coffee break
16:45 - 18:30	Poster Section
	New University Book – Presentation "Praktikum a metódy využitia rastlín so sekundárnym metabolizmom" (in English: The Plants with Secondary Metabolism - Exercises and Methods of Using) Assoc. Prof. Ivan Šalamon & Prof. Dr. Lyle E. Craker

Thursday, 10.9.2015

09:00 - 10:00	Plenary lecture (Chairman: Assoc. Prof. Ruslan Mariychuk)
	<b>Prof. Dr. Nazim Şekeroğlu</b> "Potential clinically used pharmacological anti- cancer agents derived from the medicinal plants" (Kilis 7 Aralık University, Kilis, Turkey)
10:00 - 11:00	<b>Oral presentations</b> (Chairman: Assoc. Prof. Ruslan Mariychuk)
	<ul> <li>Prof. Dr. Volodymyr Pohrebennyk</li> <li>"Effect of Lviv landfill on the environment"</li> <li>(Lviv Polytechnic National University, Lviv, Ukraine)</li> <li>Dr. Sevgi Gezici</li> <li>"Proteomics technologies for discovery of candidate cancer biomarkers"</li> <li>(Gaziantep University, Gaziantep, Turkey)</li> <li>Dr. Regina Mišovičová</li> <li>"Evaluation of landscape changes usage of Low Tatras Mts. in Kráľova hoľa area"</li> <li>(Constantine the Philosopher University in Nitra, Nitra, Slovakia)</li> </ul>
11:00 - 11:30	Tea/Coffee break
11:30 - 12:15	Plenary lecture (Chairman: Prof. Dr. Irina Panchuk) Assoc. Prof. Dr. Ruslan Mariychuk "Green synthesis of silver and gold nanoparticles by using of plant extracts" (University of Prešov in Prešov, Prešov, Slovakia)

	(Chairman: Prof. Dr. Irina Panchuk)
	Assoc. Prof. Dr. Lyudmila Symochko "Microorganisms as soil quality indicators" (Uzhhorod National University, Uzhhorod, Ukraine) Assoc. Prof. Dr. Vitaliy Symochko "Biotic relationship between phytopathogenic bacte- ria and entomofauna in pear plantings" (Uzhhorod National University, Uzhhorod, Ukraine) Ing. Dr. Marek Barta "Pathogenicity of entomopathogenic fungi to pupae of horse-chestnut leaf miner, Cameraria ohridella (Lepidoptera: Gracillariidae), under laboratory conditions" (Mlyňany Arboretum, Institute of Forest Ecology SAS, Vieska nad Žitavou, Slovak Republic) Dr. Ivanna Chonka "The enzyme activity of the soil contamination at the surface" (Uzhhorod National University, Uzhhorod, Ukraine)
13:15 - 14:30	Lunch
14:30 - 15:00	Plenary lecture (Chairman: Dr. Peter Patlevič)
14:30 – 15:00	Plenary lecture (Chairman: Dr. Peter Patlevič) Ing. Silvester Sališ "R & D results and Technology transfer in Slovakia: Dissemination and commercialization of R & D re- sults in the frame of Natinonal technology transfer support system" (Slovak centre of scientific and technical infor- mation, Bratislava, Slovakia)
14:30 - 15:00 15:00 - 16:00	<ul> <li>Plenary lecture (Chairman: Dr. Peter Patlevič)</li> <li>Ing. Silvester Sališ "R &amp; D results and Technology transfer in Slovakia: Dissemination and commercialization of R &amp; D re- sults in the frame of Natinonal technology transfer support system" (Slovak centre of scientific and technical infor- mation, Bratislava, Slovakia)</li> <li>Oral presentations (Chairman: Dr. Peter Patlevič)</li> </ul>

	Oksana Labinska, MSc. "Development of environmental education and train- ing in the world and Slovakia" (Uzhhorod National University, Uzhhorod, Ukraine) Dr. Vitaliy Gerasimov "Ecological safety of staff working in greenhouse" (Mukachevo State University, Mukachevo, Ukraine)
16:00 - 16:15	Closing session
	Assoc. Prof. Dr. Ivan Šalamon Project manager University of Prešov in Prešov, Prešov, Slovakia
16:15	Excursion to Medicproduct, Ltd. Lipany, Slovakia
	Medicproduct, Ltd. is a manufacturing company, which has established its know-how on the produc- tion of dry injections.Production and quality control are situated in modern premises complying with the EU GMP. Production facilities and testing laborato- ries are declared GMP certificate or appropriate cer- tificates according to applicable national and EU legislation in the production of medicines, medical devices and dietary supplements. At present, the products have already established on the European market as a recognized pharmaceutical producer of dry injections, liquid injections, and special infusion solutions.
18:00 - 21:00	Conference dinner (Restaurant Trója, Lipany, Slovakia)
Friday, 11.9.2015	

### 08:30 – 09:00 Excursion – the Excellence Centre of Animal and Human Ecology, University of Prešov, Prešov, Slovakia

Excellence Centre of Animal and Human Ecology will include several laboratories: Laboratory for Animal and Plant Eco-physiology, Laboratory for Molecular Animal and Bio-diversity Ecology, Laboratory for Molecular Human ecology etc.. Creation of the Centre of Excellence will establish conditions for immediate cooperation between research and socialeconomic practice, thus making effective transfer of scientific knowledge into practice.

## Excursion – the Bardejov Spa, Bardejov, Slovakia

The Bardejov Spa has a long history, with the first record of the spa stretching back to 1247 to the reign of Hungarian King Béla IV. In the 15th century, the spa began to be used for regular treatment. Thanks to its location, microclimate, mineral waters and the natural scenery of the picturesque valley surrounded by woods, the spa has all the conditions to provide appropriate treatment for ailments of the respiratory system, circulation conditions, digestive tract and disorders resulting from both physical and mental fatigue. The biggest treasure of the spa is its natural mineral waters. Their composition ensures their place among the most important mineral waters in Europe. The springs in Bardejov are classified as hydrocarbonic, chloride, sodium, carbonic hypotonic with medium mineralization and relatively rich in boric acid.

09:00 - 13:00

**Plenary sessions** 

## Green synthesis of silver and gold nanoparticles by using of plant extracts

Ruslan Mariychuk<sup>1</sup> & Viktória Birknerová<sup>1</sup>

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#### Abstract

The green syntheses of metallic and metal oxide nanoparticles are in focus of researchers because of low price, toxicity of reagents and final products. Aqueous dispersions with high concentrations of silver as well as gold nanoparticles were synthesised by green route by direct interaction of Ag<sup>+</sup> and Au<sup>3+</sup> ions with aqueous extracts of Melissa officialis L., Menta piperita and Calendula officialis L. as a reducing and capping agents. The formation of silver and gold nanoparticles was characterized using UV-visible absorption spectroscopy. The effect of Ag<sup>+</sup> and Au<sup>3+</sup> ions concentration, extract concentration, pH variations on optical and plasmonic properties of metal nanoparticles were studies. The morphology of nanoparticles was studies by transmission electron spectroscopy. The analysis of UVvisible spectra have confirmed the presence of silver and gold nanoparticles by obtaining of surface resonance (SPR) peaks at 434 and 530 nm, respectively. The formation of second SPR peak in blue region is the result of formation of anisotropic gold nanoparticles. The effect oxidized polyphenolics on the formation of spherical and non-spherical metal nanoparticles, their growth and aggregation is discussed. The green synthesis provides a fast and non-toxic preparation of silver and gold nanoparticles can be used for biomedical applications.

Keywords: biosynthesis, anisotropic, polyphenolics, Au NPs, Ag NPs

Acknowledgement: The presented work was partially supported by the Agency of Ministry of Education, Science, Research and Sport of the Slovak Republic, the project ITMS: 26110230119.

#### New Trends in Hemp Research in Serbia

Jan Kisgeci<sup>1</sup> & Vladimir Sikora<sup>2</sup>

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#### Abstract

Northern part of Serbia – Vojvodina, during  $19^{th}$  century has become unique region as source of hemp fibres used to make twines, ropes and clothes. High yields of quality fibre were achieved in these regions due to favourable agroclimatic conditions for growing hemp. Over 200 factories and workshops for processing hemp stem and fibres production were built. Stock market formed here at the end of  $19^{th}$  century, witnesses the importance of this region. It was used to establish the price of hemp fibre that was valid in the whole world.

Decrease in hemp production all around the world marked the second half of  $20^{\text{th}}$  century, which referred to the area decrease also in this region. Hemp production in Serbia has never been sanctioned by law, even more. Experimental Station for hemp and hop research was established in Backi Petrovac (town where Slovaks live) in 1952, which gave the scientific support to hemp production. With the introduction of new technological processes in hemp cultivation, and within the work of the Station, a rich collection of genetic material containing local landraces was collected from the wider environment. The first cycle result of hemp research work was newly created cultivar "Novosadska konoplja", which was present on fields until the end of the  $20^{\text{th}}$  century.

With the change of researcher generations, work on developing hemp production continued within the Institute of Field and Vegetable Crops Novi Sad, and the Station in Patrovac, became part of it as Institute of Field and Vegetable Crops Novi Sad. International conference "Hemp Renaissance" was organised in 1996, and rich genetic material was collected from gene banks all over the world. In addition, prototypes of machines for hemp harvest were developed. Work on hemp breeding culminated at the beginning of 21<sup>st</sup> century when two cultivars were released: dioecious cultivar "Marina", intended for stem production with high fibres content, and monoecious cultivar "Helena" intended for biomass and grain production. Dual-purpose cultivar "Helena" is nowadays grown in Serbia on over 100 ha, and achieves yields of over 10 t/ha of stem dry weight and 1 t/ha of grain in optimal conditions.

Keywords: hemp, cultivars, Serbia

## Potential clinically used pharmacological anticancer agents derived from the medicinal plants

Sevgi Gezici<sup>1</sup> & Nazim Sekeroglu<sup>2</sup>

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#### Abstract

Cancer is one of the most critical public health problem that leads the cause of death all over the world. According to American Cancer Society estimates on cancer incidence, mortality and survival; the total number of death is 585,720 from different types of cancer almost 1,600 people per day and approximately 1.665,540 new cancer cases are diagnosed except carcinoma (noninvasive cancer) in 2014, and also new deaths and cancer cases will occur increasingly in the current year. Several approaches have been developed to treat cancer such as chemotherapy, immune therapy, radiation, hormone therapy, targeted therapy and surgery but they have a low rate of success and not very effective in prevention the death from cancers, because most of these approaches have acute or chronic toxic side effects; new, more effective, potent, selective and less toxic alternative treatment approaches are needed not only for prevention of cancer but also treatment of cancer as anticancer agents 'herbal therapies'. Although there are so many natural products, compounds and molecules isolated from medicinal plants, lots of them have no use as anticancer agent for cancer therapy, only a small number of them have use for oncology therapy for instance the vinca alkaloids, the epipodophyllotoxin lignans the taxane diterpenoids and the camptothecin quinolone alkaloid derivates additionally some of them are under trial currently for example vinflunine ditartrate, anhydrovinblastine, NK-611, tafluposide, DHA-paclitaxel, paclitaxel poliglumex, combretastatins, salvicine, curcumin, indirubin, triptolide, homoharringtonine etc. Vinblastine, vincristine, podophyllotoxin, paclitaxel (taxol), camptothecin are antitumor agents which have been tested clinically through laboratory studies as use for the treatment of cancer. In conclusion, it can be said that medicinal plants have played important roles as natural anti-cancer agents, and also they will continue to be a key source of antitumor agent clinically in modern anticancer therapy in the future.

Keywords: medicinal plants, anti-cancer agent, natural products

## Understanding the role of medicinal and aromatic plants in a trendy society

Lyle E. Craker<sup>1</sup>, Emad Mady<sup>1</sup> & Zohre Emami<sup>1</sup>

<sup>1</sup>Medicinal Plant Program, University of Massachusetts, Amherst, USA, Email: craker@umass.edu

#### Abstract

An increased appreciation and application of medicinal and aromatic plants during the past several years has heightened expectations and demand for these plant materials and their extracts. Such demands have led to more exploration for new plants, enhanced cultivation of traditional species, and development of new accessions with magnified medicinal and flavor value. Concurrently, domestication has become necessary to limit over-collection of desired species and genotypes that can cause plant extinction. Recognizing the role of medicinal and aromatic plants as valuable resources challenges all of us to advance equitable and sustainable production, while promoting species conservation and quality crops, to meet consumer demand for ethically produced plants.

As the use of herbal medicines becomes more prevalent in Westernized nations, regulatory authorities are seeking to ensure that the public will receive safe and healthy remedies. Researchers and growers are encouraged to develop and produce clean herbal plant material that contains bioactive compounds. Independent, non-government grower and consumer organizations are creating certifications to promote equitable and sustainable production, meeting consumer demand for ethically produced products. While questionable, government regulations have limited and restricted the use of some plant materials to protect societal values, but also preventing studies on the potential health benefits.

Keywords: demand, government, medicinal plants, production

**Oral sessions** 

## Biodiversity of carabids (Coleoptera, Carabidae) around a pond in Pusté Úl'any

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#### Abstract

The aim of the study was to evaluate the change of diversity epigeic groups of animals, focusing on the family Carabidae (Coleoptera, Carabidae) around the ponds Pusté Úl'any after habitat degradation by anthropogenic activities.

The monitored area in which coleopterology research was conducted is located in the immediate vicinity of ponds near the village of Pusté Úl'any (Galanta, Database of Fauna of Slovakia 7771, 48  $^{\circ}$  13 'N, 34  $^{\circ}$  18' E). Ponds are part of the protected bird area Úl'any wetlands belongs under the category N (nationally significant ponds).

Beetles were obtained by the collection using pitfall traps on four research areas extensively farmed grassland habitats depending on the topical and climatic factors, from 2009 to 2014. In the first three years of entomological research, we found by analyses the occurrence on individual surfaces and their comparison, that there is no of the area being examined, which constitute a stable habitat for the preservation of significant alluvial carabids fauna and study sites serving rather as a reservoir for keeping them on that territory. After degradation of habitat due authorization and execution of peat and gravel, as well as bodies of water treatment pond, especially on the south side of the monitored sites, since 2012, we found that the significance of this area, and in this regard is questionable. Occurrence of carabids is currently limited, respectively in more samples absent. Occurrence of carabids is currently limited, respectively in more samples absent. The implementation of additional research will monitor the progress of the process of succession as well as a possible overall renaturation of this locality.

Keywords: carabidae, biodiversity, ponds, biodegradation, succession

## Biotic relationship between phytopathogenic bacteria and entomofauna in pear plantings

Vitaliy Symochko1

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#### Abstract

Plant diseases in the garden are very important and can be a significant source of frustration and loss to the gardener. Biotic diseases occur when a host plant is invaded by living organisms. Most of these organisms are microbes, and can also be referred to as parasites which attack plants. The investigation is devoted to study of biotic relationship between activators of bacteriosis and insects of pears plantings. Bacteriological analysis of insects showed that in nature 7 pest species (*Anthonomus pyri, Stephanitis pyri, Psylla pyri, Dysaphis reaumuri, Hyphanthria cunea, Laspeyresia pomonella* L., *Laspeyresia pyrivora Danil.*) are vectors of the causative agent of crust necrosis.

The transfer of phytopathogenic bacteria on trophic chain "the struck plants→insects-phytophages→insects-entomophages" was analysed. All pests (Aphis pomi), which eat infected plants, were hosts of *Erwinia amylovora*, and *Pseudomonas syringae pv. syringae*. After eating herbivores, from 40% of entomophages (*Coccinella septempunctata*) were isolated pathogens of fire blight. It noted the ability of *Erwinia amylovora* to cause mortality of larvae *Psylla pyri*. On 12 day in experiment, 100% of the insects died out, despite the fact that in the control at the same time mortality of psyllites was approximately 31%. Also some effect on larval mortality *Psylla pyri* had *Pseudomonas syringae pv. syringae* (44% on day 12). Analyse of morphological, cultural, physiological, biochemical and serological properties of pathogenic bacterial strains isolated from insects, shown that they are identical to collection strains. It was established that isolates of *Erwinia amylovora* and *Pseudomonas syringae pv. syringae* from various insects have a high degree of aggression and pathogenicity to plants-hosts.

Keywords: biotic relationship, phytopathogenic bacteries, phytophages, entomophages

## Development of environmental education and training in the world and Slovakia

Oksana Labinska<sup>1</sup> & Volodymyr Starosta<sup>1</sup>

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#### Abstract

The relationship between man and nature has always existed. During the lifetime of mankind human activity changes the natural circulation of elements and substances. But if before the influence was not threatening to the environment, the relationship man - nature has become a critical problem ever since man began to apply advanced methods of economic management. This resulted in various negative changes in the environment. This implies the need for measures to make society aware that further harmonious development is not possible without environmental education, ecological culture and consciousness, informing people about the state of the world's environment and their immediate surroundings. Environmental education and training are critical elements of environmental protection; they are designed to form an active position of a man in environmental issues.

The article highlights the history of environmental education and training development in the world since the UNESCO Intergovernmental Conference on Sustainable use and protection of the biosphere resources which took place in Paris in 1968 till the UNESCO Conference on Environment which took place in Rio de Janeiro in 1992 and where 198 countries adopted the International Partnership Programme of activities within XXI century - "Agenda – 21". The founders of the Environmental education and training in Slovakia were mentioned. The role of schools in environmental education of the younger generation was analysed not in the destructive tradition of using the gifts of nature, but in their respect to the environment, as well as the targets of environmental education of pupils of the primary and secondary schools. Legislative acts are being considered with target to elevate environmental training and education as the basis of human culture. The proposition is made to support the introduction of a separate school subject that would synthesize knowledge to a common view of the ecological foundations of environmental protection.

Keywords: environmental issues, environmental protection, primary and secondary school, natural environment

## Ecological safety of staff working in greenhouse

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#### Abstract

The work is devoted to research of productive environmental conditions of greenhouse workers and forming means of their protection against agrochemicals.

It was found that the level of incidence is higher among greenhouse workers compared with other workers of the agricultural sector. The data indicate that this index is 5 times higher than in the cases of their colleagues who work with the same chemicals in open ground, and 10 times higher than in people who do not have any contact with pesticides and fertilizers.

As a result of this work, topographical areas of the human body were identified which are affected by the influence of dangerous productive factors. A set of remedies is offered. It differs from existing ones in the market with a specially designed vest and a hood with a special construction.

There is also a suggestion to install a portable electronic system, which includes a number of sensors. They make possible to record temperature and humidity of the internal and external environment. This system will also record the time spent working in a production environment and if necessary signal exceeding the corresponding normalized parameters. This application will enable to increase the effectiveness of the protection as a whole.

A number of factors which increase the negative impact of agrochemicals on the workers were identified, including - low air velocity in the greenhouse, high temperature, the presence of condensate, particularities in the organism of employees, time and intensity of work, concentration and characteristic properties of agrochemicals.

Recommendations are systematized for optimal constructive-technological solutions of special clothing for the workers of the agricultural sector, working with agrochemicals.

Keywords: greenhouse, environmental conditions, safety of staff

## Efficacy of different plant species essential oil in the control of the aphids (*Rophalosiphum padi*) on wheat

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#### Abstract

Rophalosiphum padi is nearly cosmopolitan in distribution and prefers grasses, cereals and sedges. This aphid is one of the most agricultural pests causing decrease growth, shrivelling of the leaves and the death of various tissues. It is also hazardous because it acts as a vector for the transport of plant viruses and various mosaic viruses to many other food crops. An individual can reproduce twelve days after being born and there may be twenty generations over the course of a year in warmer areas. Although insecticides are used to control it, aphids became resistant. Many of its natural enemies can be used as biological control agents in certain crops, such as ladybirds (Coccinellidae) or wasp Diaeretiella rapae. Essential oil of various plant species have been evaluated for their repellent or insecticidal activity. The aim of our study was to evaluate the effectiveness of some natural safe essential oils in control of aphids spread on the wheat. 6 different EO were used in 5 different concentrations for testing their repellent activity against the green peach aphid occurred on wheat. Variability in EO composition and its concentration caused different effect. Attractant as well as repellent activity was observed.

Keywords: active components, aphid, biocontrol, food crop, Rophalosiphum padi

### Enterprises' management of wastewater

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#### Abstract

The main problem of the plants of the brewing industry is using a lot of water and formation of the wastewater polluted by various substances. The research purpose is modernization wastewater control system on the basis of calculation of substances' mass balance. Process of formation of wastewater of the enterprise is chosen as scope of the research.

The modern wastewater control system in Ukraine consists in periodic sampling, carrying out the laboratory analysis of their structure and informing the enterprise on the conducted research. However the prospect of achievement of a sustainable development is possible when not simple measurement of composition of sewage is taken, and there is a control of their structure at each production phase. Such system allows presenting better influence of the plant on environment, to estimate a contribution of each division to the general influence, to control process of sewage formation and to operate production for the purpose of reduction of impact on environment. There is a possibility of forecasting of qualitative and quantitative composition of sewage for any period on all divisions of the enterprise, being essential addition to laboratory methods of the analysis which not always are indicative, demand time, not all attendees of substance can define.

This system has a number of functions: illustrative; controlling; predicting; management; informative. The proposed system is not intended to replace laboratory analysis, it is the additional effective instrument of wastewater control, it is possible to adapt for any other production. When local treatment facilities of biological type works, there is a need of exact control of qualitative and quantitative composition of the wastewater arriving on cleaning, therefore the given control system is adapted for daily calculations of concentration of the pollutants in sewage. This lets you make quick decisions on the treatment of specific wastewater, which significantly reduce the negative impact on the environment.

Keywords: wastewater, pollutants, material balance, control, management, food industry

## Ethanol production from waste glycerol by metabolic engineering of *Hansenula polymorpha*

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#### Abstract

Biodiesel is produced by a transesterification reaction using vegetable oils or animal fats and an alcohol. This process inevitably generates large amounts of glycerol as a by-product. The availability of crude glycerol is predicted to increase in the next years because of the tremendous growth in the production of biodiesel worldwide. To maximize the full economic potential of the biodiesel process, it is important to convert crude glycerol into useful chemicals, e.g. ethanol. There are few microorganisms that are capable of converting glycerol to ethanol. Therefore, the tools of metabolic engineering along with classical selection should be used for construction of the recombinant strains with improved of ethanol production.

Thermotolerant methylotrophic yeast *Hansenula polymorpha* is able to convert glycerol as well as glucose and xylose, to ethanol. However, the yield of ethanol from glycerol by wild type strain is too low to and need for substantial improvement before introduction of those strains for production of ethanol on industrial scale.

The aim of this work was to improve production of ethanol from glycerol using thermotolerant methylotrophic yeast *H. polymorpha*. According to published data, overexpression of *PDC1* (encodes pyruvate decarboxylase) gene improved the production of ethanol from glucose. In addition, it was show that the strain with overexpress of *ADH1* (encodes alcohol dehydrogenase) gene produces slightly higher amount of ethanol from glycerol. In this study, vectors for multicopy integration of both *PDC1* and *ADH1* genes under control of strong constitutive promoter have been constructed. Recombinant *H. polymorpha* strains revealed increased specific activities of both Pdc1 and Adh1 and increased ethanol production. The newest data of glycerol conversion to ethanol by recombinant strains will be provided and discussed.

Keywords: fuel ethanol, glycerol, biodiesel, alcohol dehydrogenase, pyruvate decarboxylase

### Evaluation of landscape changes usage of Low Tatras Mts. in Kráľova hoľa area

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#### Abstract

Kráľova hoľa area is very attractive in term of ecological and environmental aspects. Therefore is important to evaluate and propose appropriate ecological framework for present land use by ecological principles.

The main base of this evaluation is secondary landscape structure changes analyses by LANDEP methodology. For comparison of quality and quantity land use changes was selected Šumiac municipality. To determinate the trend changes was used two time horizons. In 1995 was secondary landscape structure formed by 32 landscape elements with surface predominance of forest elements (60,2 %) and pasture elements (35,5 %). In 2015 was secondary landscape structure formed by 33 landscape elements with surface predominance of forest elements (62,3 %) and pasture elements (32,7 %) too.

Based on these analysis in selected time periods can be compared the landscape structure changes and specified the main factors of these changes by CEBE-CAUEROVÁ (2007) methodology as follows: 1 - urbanisation, 2 - agriculture intensification, 3 - afforestation, 4 - deforestation. Territory without changes is marked as 0. The largest area is without changes (88,68 %). The most significant territorial factors of land use changes are afforestation (6,9 % of research area) which is expressed as overgrowing of meadows pastures and deforestation (3,0 % of research area). Agriculture intensification (1,4 % of research area) is linked to urban surrounding of Šumiac municipality. Urbanisation is the smallest territorial factor (0,02 %).

The present land use is oriented on agriculture and forestry and in particular tourism. The way of land use of research area is not according to tradition and landscape potential at present. The planning activities that promote the tourism and accepted in urban territorial plan are very disturbing.

Keywords: landscape structure, land use, landscape trends changes, Šumiac municipality

## Main themes of environmental education provided by the Slovak Museum of nature protection and speleology in Liptovský Mikuláš

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#### Abstract

Natural history museums can have an important role in the system of environmental education following the main museum forms such as temporary exhibitions and permanent exhibitions as well as supplementary forms such as discussions, lectures, films, and publications. By this manner there is possible to attract the visitors, from which there are even 80 % of pupils and students in unconventional surroundings. The Slovak Museum of Nature Protection and Speleology as an only all-Slovak Museum specialized on nature protection has an important position in the system of environmental education. We have focused on the fields that are presented by following main themes: 1) molecule biology and genetics. exhibitions Genetically Modified Organisms - Hope or Threat of the 21st century?, and Endangered Life with attendant lectures; 2) ecology of plants and animals, exhibitions Interesting Facts from Life of Hymenoptera, Bionics, and Poison in Nature with attendant discussions and lectures: 3) environmental science. exhibitions Waste, and Snow Avalanches - in the Mountains We Must to Live also with Them with attendant lectures, discussions and workshops; 4) ecosystem services, exhibition Ecosystem Services of Wetlands realized in cooperation with the State Nature Protection of the Slovak Republic; 5) ecology and bioethics, exhibition Life from a Tube with attendant lectures and discussions; 6) ecophysiology of plants, lectures and discussions on the theme Photosynthesis as One of the Biggest Miracles of Life.

**Keywords**: molecular biology, genetics, environmental science, bioethics, ecophysiology, ecosystem services

### Microorganisms as soil quality indicators

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#### Abstract

Soil microorganisms are potential early indicators of changes in soil quality. They are more sensitive than a soil's chemical and physical properties. Two different approaches to establishing reference criteria for soil quality assessments have been used: study of native, undisturbed soils under climax vegetation (primeval forest) and the soils capable of maintaining a high level of productivity and environmental performance (agroecosystems). Results of the study of different type's ecosystems have shown that the most appropriate to use such indicators of soil quality as: the number of different ecological-trophic groups of microorganisms, respiration, direction and intensity of microbiological processes, enzymatic activity, phytotoxic activity.

Measurement of soil respiration is one of the most used techniques for quantification of microbial activities in soil. Soil respiration is positively correlated with soil organic matter content, with microbial biomass and microbial activity. The highest level of the biological activity was in the virgin forest's ecosystems. The intensity of emission of CO2 ranged from 89-74 mg /kg.soil/day, it indicates about favourable environmental conditions for the soil microorganisms. The most sensitive to the presence of pollutants in soil were nitrogen-fixing bacteria, their number decreased by three times in comparison with the control. Soil enzyme activities are closely related to soil organic matter, biomass and change much sooner than other parameters, thus providing early indications of changes in soil quality. In addition, soil enzyme activities are used as measures of microbial activity, soil productivity, and inhibiting effects of pollutants. Disturbance of the soil microbial activity, as shown by changes in levels of metabolic enzymes, can serve as an estimate of ecological conditions in biogeocenosis.

Soil microorganisms are very suitable and sensitive indicators of soil quality. But, unfortunately, measurements relating to early changes in biological and microbial attributes are among the least monitored parameters.

Keywords: microorganisms, soil, indicators, ecosystems, quality

## New approaches to biodiversity conservation education in Ukraine

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#### Abstract

The Ukrainian Environmental Club (Ukraine) together with Center for Biodiversity and Conservation (CBC) at the American Museum of Natural History in New York (United States) collaborated on a project "Building Capacity for Biodiversity Conservation in Ukraine: Network and Training Support" (2012-2014). The overall goal of the project was to assist Ukraine in fulfillment of its obligations under the Convention on Biodiversity, especially Articles 12 and 13 on setting educational programmes which was achieved in full extent. The project facilitated development and dissemination a comprehensive set of teaching and learning materials in biodiversity levels, for protected areas staff, and for the business sector. Education and conservation practitioners became acquainted with international experience of nature interpretation, teaching of conservation biology and interactive teaching techniques.

As a result of communication strategy project implied development of Ukrainian Network of Conservation Educators and Practitioners. Moreover, in order to invite people to join the network and also in order to find successful practices in Ukraine in biodiversity conservation a National case study competition was held. All the practitioners got an access to the international network in order to share knowledge and experience in biodiversity conservation, teaching and nature interpretation. Project activities were highly evaluated by the Ministry of Ecology and Natural Resources of Ukraine.

**Keywords**: environmental education, biodiversity, conservation, nature interpretation, capacity building, network

## Parmelia perlata as a perspective agent for treatment of upper respiratory tract infections

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#### Abstract

Showing the features of both – fungi and alga – a dual organism *Parmelia perlata* is a perspective source for obtaining new drugs of natural origin. Being spread worldwide, parmelia gives the ecological reflection of environmental conditions of the territory where it is collected. The lichen is a prospective raw material for study as for its large resource base.

The study of *Parmelia perlata* qualitative composition and quantitative content was conducted by high-performance liquid chromatography method with coupled diode array detection – mass spectrometry with electrospray ionization mode. Mass spectra data were collected in scan ions mode. As the result of this research, such dominant compounds as usnic acid, salazinic acid, chloroatranorin as well as their mass fractions were determined.

Some previous researches prove *Parmelia perlata* to be an effective remedy with antioxidant, antidiabetic, antifungal and antitussive properties. The obtained results of our study show us a further wide perspective of parmelia application as a drug for treatment of upper respiratory tract infections. The further proof of efficacy and safety of *Parmelia perlata* can be a reason for including this lichen's raw material to Pharmacopoeia of different countries. Still, not only chemical content detection but also more pharmacological studies are needed to be performed.

Keywords: Parmelia, usnic acid, HPLC, respiratory tract infections

## Pathogenicity of entomopathogenic fungi to pupae of the horse-chestnut leaf miner, *Cameraria ohridella* (Lepidoptera: *Gracillariidae*), under laboratory conditions

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#### Abstract

Cameraria ohridella is the most serious pest of horse-chestnut trees that has undergone a rapid expansion in Europe during last decades. An integrated management is required to control this pest effectively, within which a biocontrol strategy plays an important role. In this regard, efficacy of five species of entomopathogenic fungi has been evaluated on C. ohridella pupae. Ten isolates of three fungal species, isolated from spontaneously infected pupae, Beauveria pseudobassiana, Isaria fumosorosea and I. farinosa, and three isolates of non-insect origin of two other fungal species, B. bassiana and Metarhizium anisopliae, were tested to study their effect on pupal viability. The pupae demonstrated vulnerability to all fungal species irrespective of isolate origin. Their efficacy varied significantly among isolates and the greatest mortality of pupae was observed for I. fumosorosea isolates. The median lethal concentration, as estimated by probit analysis, of the most effective I. fumosorosea isolate reached  $0.09 \times 104$ spores/ml. No correlation between a spore yield of isolates and a fungal virulence was observed, but a moderately strong relationship was detected between a virulence and a mycelial growth of isolates. Natural prevalence of entomopathogenic fungi in populations of hibernating pupae was also monitored in two localities and a mean mortality of pupae due to fungal infection reached 4.20%; however, it varied depending upon collecting date, locality, year, and fungus.

The results on fungal efficacy show the potential of *I. fumosorosea* to be used for a control of C. *ohridella*, if a practical application method of fungal inocula will be adopted in the urban environment.

Keywords: Beauveria, Isaria, Metarhizium, virulence, survival analysis, biological control

## Proteomics technologies for discovery of candidate cancer biomarkers

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#### Abstract

Cancer is one of the most widespread disease, causes of death all around the world, and defined as a multifactorial disease that occurs from change of gene based and protein based alterations. These alterations result in change of the levels of proteins (quantitatively and/or qualitatively) and their functions. Proteomics, a set of technologies that focuses on all protein forms expressed in a cell, organ or organism as a function of time, age, state and external factors, and plays crucial roles as a bridge between genomics and biology. Current proteomic technologies such as two dimensional electrophoresis (2DE), differential in-gel electrophoresis (DIGE), fluorescence 2D difference gel electrophoresis (2D-DIGE), laser capture microdissection (LCM), mass spectrometry-based methods (MALDI-TOF-matrix assisted laser desorption ionization time of flight, SELDI-TOF-surface enhanced laser desorption ionization time of flight, ESI-TOF-electrospray ionization time of flight, tandem mass spectroscopy etc.), protein microarray (forward phase arrays-FPA and reverse phase arrays-RPA), tissue microarray, isotope-coded affinity tag (ICAT), stable isotope labeling with amino acids in cell culture (SILAC), isobaric tagging for relative and absolute quantitation (iTRAO) etc. allow detailed proteome analysis (e.g. proteome profiling, protein mining, protein network mapping, comparative proteome analysis, identification of posttranscriptional modifications and protein-protein interactions), and provide powerful biological information to detect candidate tumor biomarkers, and potentially offer solutions for early detection of cancer. Tumor biomarkers, produced by cells and their levels may increase or decrease depend on cancerous conditions, therefore they are useful for detect cancer early. Although many of tumor biomarker discovered, few of them (e.g. PSA-prostate specific antigen, CEA-carcinoembryonic antigen, CA-125carbohydrate antigen-125, CA19-9- carbohydrate antigen19-9, AFP-alpha feto protein) can be used as clinically, because of their limitations that need to be overcome to increase sensitivity and specify, and reduce the complexity of proteins. In summary, proteomic technologies and their applications for discovery of tumor biomarkers, if validated in clinical trials, will likely provide efficient cancer screening tools for successful clinical therapy by reducing the increasing cancer related mortalities in the future.

Keywords: proteomic technology, biomarker, cancer

## Radionuclide monitoring in Transcarpathian region: the role of natural and anthropogenic factors

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#### Abstract

Transcarpathia is a region important from the point of view of the water resources formation and wind flows of Eastern and Central Europe. It is known that the mountain ridges effectively accumulate heavy chemical elements transferred by the wind flows from places with developed industry. Therefore, it is very important to investigate their accumulation and distribution. In this case, the monitoring of the Carpathian mountain area, an accumulation of heavy elements in lowland and highland (mountain) ecosystems and a way of self-purification of the system are attracting enormous attention. Such monitoring can be made by using an appropriate choice of sampling procedure and investigation of the specially selected sets of markers, e.g. radionuclide, which can be referred to both natural (or geochemical) characteristics of the region and intensity of anthropogenic activities in the neighbouring territories.

We present the results of the low-background  $\gamma$ -spectrometric measurements of soils and mountain rivers sediments and soils from the protected mountain areas of the Tranthcarpatian, Ukraine. The radionuclide methods has greater scope of application, particularly, for the diagnostic of the state of environment, biota, intensity and specificity of technological processes at different areas, the geochemical characteristics of the regions, geodynamic factors. This is achieved by studying of the accumulation and distribution of certain natural/ technogenic radionuclides that serve as markers of these processes and phenomena. The main principles and backgrounds of proposed methodology of the environment include: a role definition of the ecologic, anthropogenic and global factors in the formation of the consequences of the changing of the levels of natural radioactivity in environment; the selection of sets of the radionuclides as markers for the environmental monitoring; the presentability of the environmental sampling procedure. The radionuclide method is important for developing standards of radionuclide content of soils of Carpathian region.

Keywords: Transcarpathia, mountains, radionuclide diagnosis, environment

## Se(VI) and its impact to selected physiological and biochemical parameters of *Sinapis alba* L. seedlings

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#### Abstract

Selenium is not considered as essential for plants. In lower concentrations improve the growth but in higher concentration is phytotoxic. We studied toxicity of Se(VI) to Sinapis alba L. seedlings on physiological (root and shoot growth, fresh and dry biomass, water content) and on biochemical parameters (Se accumulation, photosynthetic pigments, proteins thiol groups and TBARS). Se(VI) was more toxic to root (IC50=23.6 mg, $l^{-1}$ ) than to shoot growth (IC50=461.4 mg, $l^{-1}$ ). Contents of chlorophyll a and chlorophyll b were inhibited more than total carotenoids. While the highest Se(VI) accumulation in the shoots was observed at 20 mg.1<sup>-1</sup>, for roots Se(VI) accumulation increased proportionally. TBARS was slightly increased in Se presence and protein thiol groups decreased in the shoots. Water content (WC) was lower in the shoots (to 41.46%) than in the roots (57.71%) at 31 mg Se(VI).1<sup>-1</sup> compared with control. Statistically positive correlation was observed among both chlorophylls and total carotenoids. Negative correlation was obtained between chlorophyll b, resp. total carotenoids and Se content in the roots. Positive correlation was acquired also for root fresh mass, resp. water content in roots and water content in shoots (r = 0.912; p < 0.01; resp. r = 0.820; p < 0.05).

Keywords: inhibition of roots and shoots, fresh and dry mass, water content, Se accumulation, photosynthetic pigments, protein thiol groups

## Spectroscopic determination of Bismuth with bisthioureas as chelating agent

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#### Abstract

In recent years, bismuth has been promoted as a "green element" and is used in the treatment of several gastrointestinal diseases, as a substitute for the toxic lead in ammunition and for multiple industrial purposes. Untoward effects of bismuth include anemia, which could, in theory, result from suicidal erythrocyte death or eryptosis. Bi<sup>3+</sup> reduces creatine kinase activity in human sperm, and can play a role in male infertility.

We developed a simple, accurate, sensitive and reliable method for the selective determination of Bi(III), which is based on spectrophotometric measurement of water soluble yellow bismuth-ligand complexes. The linear calibration ranges and limit of detection for the proposed method was  $1.00 \times 10^{-6} - 1.00 \times 10^{-3}$  and  $2.00 \times 10^{-8}$  mol/L, respectively. The complexes were prepared due to simple mixing of probe with the organic-solvent solution of chelating agent. The influence of the amount of organic solvent was studied.

Chelating agent were firstly synthesized though the reaction of thiosemicarbazides with aroyl isothiocyanates. The mentioned ligands are bisthioureas with Sulfur, Nitrogen and Oxygen donor atoms.

A spectrophotometer Shimadzu UV-2600 was used in this work. Measurement of the absorbance of the solution was made at 380 nm. The structure of lignds and Bi-complex was determined based on NMR <sup>1</sup>H, <sup>13</sup>C studies and IR-spectroscopy. For detailed understanding of the complex formation reaction for these compounds was carried out quantum-chemical calculations with program MOPAC2012.

#### Keywords: Spectroscopy, Bismuth, Bis-thiourea

Acknowledgement: The authors would like to acknowledge the financial support provided by the International Visegrad Fund (ID 51501563).

#### Study of organic acids in peach leaves

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#### Abstract

The role of organic acids in the plant is varied. They maintain the pH at a particular level, are involved in breathing (Krebs cycle), bind the excess cations in soil salinity, and finally may play a biological role of protecting the plant against insects.

Aim of our research was investigation of qualitative composition and quantitative determination of organic acids in peach (Prunus persica) leaves which were collected in Crimea, in August 2012, dried and grinded. The study was carried out by gas chromatography mas-spectrometry. For determination organic acids content, internal standard (50 µg of tridecane in hexane) was added to 50 mg of dried plant material in 2 ml vial and filled up with 1.0 ml of methylating agent (14 % BCl3 in methanol, Supelco 3-3033). For extraction of methyl esters of acids 0.2 ml dichloromethane was filled up, and then obtained methyl esters extract was chromatographed. Content of organic acids were determined on Agilent Technologies 6890 chromatograph with mass spectrometric detector 5973. For components identification, library of mass spectra NIST05 and WILEY 2007 in conjunction with AMDIS and NIST programs were used. Presence of 31 organic acids was established in peach leaves and their quantitative values were determined. Overall, plant raw material contained 1.74% of the organic acids, including (%) – 0.23% ketoacids (levulinic acid); 0.51 phenol carboxylic; 0.86 di- and three carboxylic; 0.13 fatty acids. Among the carboxylic acids, oxalic and malic acid were the largest with- 6099.85 and 1424.40 mg/kg, respectively. Linoleic acid dominated among the fatty acids, with the content as 292.02 mg/kg. Among phenol carboxylic acids, the largest content was defined for  $\alpha$ -hydroxyphenylacetic acid, it was 4005.43 mg/kg.

Keywords: peach, leaves, gas chromatography, organic acids
## The burning of dry vegetation as a source of heavy metals emissions into the atmosphere

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#### Abstract

The deterioration of air quality is relevant both for Ukraine and the world. One of the reasons is the seasonal burning of dry vegetation, especially along the highways. Products of burning of dry grass and leaves contain a large number of organic and inorganic compounds which can cause allergy and cancer.

Dry vegetation is a good adsorbent of toxic compounds, including compounds released with exhaust fumes of cars. So, burning of dry vegetation near the highways is a source of emissions of harmful to human health substances into the atmosphere.

The specific emission of some heavy metals during combustion of dry vegetation along the road Uzhgorod-Chop have been investigated. Samples of dry grass were selected from both sides of the road at different distances from it. Purified and dried samples of dry vegetation were burned in a laboratory plant, and gaseous products of combustion were absorbed with concentrated nitric acid. The obtained solutions were analyzed for content of heavy metals (Pb, Zn, Cd, Cu) using atomic absorption method.

Specific and total emissions of heavy metals during combustion of dry vegetation have been calculated. The concentration fields of heavy metals in the products of burning along the road Uzhgorod-Chop were constructed. The burning of large areas of dry vegetation and favorable weather conditions in the same time lead to direct threat for the health of citizens of the surrounding areas.

Keywords: dry vegetation, highways, burning, heavy metals

## The enzyme activity of the soil contamination at the surface

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#### Abstract

It is known that the enzyme activity of soil is one of reliable indicators of speed at the molecular level of the intensity vital activity of microorganisms in natural conditions and in conditions of anthropogenic load. We studied series of integrated dependencies functional activity of soil enzymes upon specific soil factors.

The results showed that the domestic waste cause a significant reduction in activity of cellulases, phosphatases and invertase. In particular, the level of enzyme activity in soils waste dumps depended primarily on the composition of the waste, the total number of microbial soil, the content in him soluble heavy metals and substances which include phosphorus and nitrogen.

Exceeding the maximum permissible concentration of gross copper content in soils of the floodplain of the river Tisza in 1,3 times does not lead to inactivation of the enzyme, but rather stimulate it. A close positive correlation between cellulases activity and soil phosphatases (r = 0,74) was established and a slight positive correlation between the activity of cellulases and invertase (r = 0,26), phosphatase and invertase (r = 0,24). The opposite is dependence between character activity cellulases and mobile compounds containing zinc in soil (r = -0,8). The presence of a strong direct correlation between the activity of invertase waste dumps soils and content of ammonium ions (r = 0,6) was estimated. With regard of splitting speed of glycopolymers, it was inverse proportion of content mobile forms of lead compounds (r = -0,5). The activity of phosphatases and cellulases was linearly proportional to the content in the soil phosphate ions and soluble copper compounds. At least (and inverse proportional), this activity is related to the content of lead compounds and nitrate (r = -0,45 and -0.46 respectively).

Keywords: enzyme activity, soil, cellulases, phosphatases, invertase

## The occurrence of selected polymorphisms in TCF7L2 gene in the Slovak Roma and majority population

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#### Abstract

Polymorphisms rs7903146, rs12255372 and rs1196205 within the TCF7L2 gene show the strongest association with the incidence of type 2 diabetes described so far. This association was replicated in a number of the world's populations, but the strength of association and the frequency of risk alleles vary between populations. Since there have been no data on the frequency of risk alleles of these three polymorphisms of TCF7L2 gene in the Slovak population, the aim of this study was to provide the first comprehensive information on their occurrence in the Slovak majority and Roma population. The analyzed sample consisted of 263 individuals of Slovak majority population and 132 individuals of the Slovak Roma population. The risk allele frequencies of polymorphisms rs7903146, rs12255372 and rs1196205 were 0.29, 0.27 and 0.47 in the majority population and 0,13, 0,14 and 0,36 in the Roma population, respectively. The frequencies in the majority population fell into the European scale, and showed only a slight deviation from neighbouring countries. The frequencies in the Roma sample, however, were significantly lower than frequencies in the majority population (p < 0.05) and did not fall into European scale. Risk allele frequencies of both rs7903146 and rs12255372 polymorphism in the Roma population were the lowest frequencies ever recorded in Europe. These unique frequencies of polymorphisms associated with type 2 diabetes are evidence of the very specific gene pool of Roma ethnic group. The probable cause of the different allele frequencies is specific history and population structure of Roma, influenced by genetic drift and founder effect

Keywords: TCF7L2 gene, polymorphism, the Roma population, the majority population

## The use of honey bees and honey as bioindicators of heavy metals in the environment

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## Abstract

In the last decades the interest of using bioindicators for evaluation of the environmental contaminants had fastly increased. Bees and bee products have great potential for detecting and monitoring environmental pollution, as the way of life of those insects exposes them directly and indirectly to the impact of pollution and the material is easily available. Due to, there is a good correlation between the level of heavy metals accumulation is soil and plants and their content in bee's body and bee products.

The aim of this study was to use honey bee and honey to control the environmental pollution by heavy metals in Podkarpacie region.

Samples of honey bee and honey were collected directly from beekeepers (n=28) localized in Podkarpacie region. For determination of heavy metals the ICP-OEC method with prior microvave mineralization was used.

Cadmium content in the tested honey samples ranged from 0 to 0.010 mg/kg, whilst the content of lead was within the range of 0- 0.141 mg/kg. In the case of cadmium 7 samples were free of this polutant while lead was detected in 35% of the samples. Content of cadmium in bodies of honey bees ranged from 0.078 mg/kg to 0.521 mg/kg, which was few times higher than in honey.

Results indicate that honeys from Podkarpacie region contain heavy metals in concentrations well below allowable levels and are safe for human consumption. Moreover, conducted test confirm that bees works as a filters for dangerous heavy metals. The observed low level of heavy metal contamination confirms ecological value of Podkarpacie region which create good conditions for the beekeeping development.

Keywords: honey, Podkarpacie region, heavy metals, ICP-OES

## Upgrading of pharmacological gene bank of medicinal and aromatic plants in Georgia

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#### Abstract

A rich and unique phytogenetic fund of Georgia represents a natural-historic treasure calling for permanent monitoring, conservation-rehabilitation, as it progressively exterminates or changes under the influence of various natural disasters or anthropological impact. In Georgia those unique medicinal and aromatic plants are spread which can't be found anywhere in the world. Due to their current state, most of these plants are on the verge of extinction. Based on the aforementioned, it is critical to preserve a biodiversity through ensuring in-situ and ex-situ/on farmer's. For the purposes of further consumption, raising awareness in conservation of genetic and varietal diversity and rational use of the unique Georgian flora is gaining the most importance. This can be observed along with intensification and sustainable use of ethnobotanical traditions and promotion of phytoproduction based on the rights acquired from the convention on biodiversity Georgia is accessed to, through integration of the benefits distribution principles.

Project's novelty, specialty and singularity are conditioned by the research and cataloguing of genetic resources of the medicinal and aromatic plants are unified in a single complex model, monitoring, including unique plants and those on the verge of extinction, ex-situ and in-situ/on farmer's conservation; diagnostics of the indigenous-endemic and collection material for the purposes of selection of the plants distinguished for their pharmacological and farming peculiarities; enrichment of seed bank and its inclusion into the international exchange programs; study of the present ethnopharmacological peculiarities; establishment of the data base for the purposes of sustainable use and conservation of the aforementioned plants in certain regions of Georgia with different ecosystems.

Keywords: biodiversity, gene bank, medicinal, aromatic, plant

**Poster sessions** 

## Acidity, colour and texture profile of milk beverages fermented by thermophilic microflora depending on the dose of magnesium fortification

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#### Abstract

Magnesium deficiency in an everyday diet of person results in the fact that this topic is increasingly dealt with both in prophylaxis as well as in therapeutics. The aim of the study was to determine the dynamics of the process of process of fermentation of cow's milk fortified with various doses, fermented by *Streptococcus thermophilus*, *Lactrobacillus delbrueckii* subsp. *bulgaricus*.

The study material was the pasteurised cow's milk with a fat content of 2% (Piątnica), skimmed milk powder (SM Gostyń), starter cultures YC-X16 (Chr. Hansen) and magnesium bisglycinate (Olimp Labs, Nagawczyna, Poland). Milk was concentrated with 3% milk powder, fortified with magnesium by the planned arrangement of the experiment, i.e. 0mg (control), 10mg, 20mg magnesium/100g milk in the form of a suitable dose of magnesium bisglycinate calculated from the molecular weight. Incubation was conducted at 43°C for 4.5 hours. Milk fermentation was controlled by determining: pH and total acidity immediately after adding the leaven, and then after 1 hr., 2, 3 and 4 hours of fermentation. After 24 hours of cold storage the following were determined in yoghurts: syneresis, colour, and texture.

The addition of magnesium in a dose of 20mg Mg/100g to the processing milk in the form of bisglycinate caused, prior to the fermentation, an increase in pH of milk by 0.11 as compared to the unfortified milk. The fortification of processing milk with magnesium bisglycinate in an amount of 20mg Mg/100g of the milk speeds up the souring, resulting in total acidity after 4 hours of fermentation at the level of 38.0°SH. Significant correlations have been found between the amount of magnesium introduced and a total acidity and active acidity during fermentation. The fortification of yoghurts with magnesium reduces syneresis. Full negative correlation has been found between the amount of magnesium introduced and the syneresis of yoghurts. The fact of adding magnesium in an amount of 10mg resulted in lightening of the colour of yoghurt. The hardness, adhesiveness and Springiness of yoghurts were significantly affected by the amount of magnesium introduced in the form of bisglycinate that caused an increase in these parameters.

Keywords: yogurt, magnesium, syneresis, texture

## Acid whey fermentation by using wine yeast Bayanus G995 and the physicochemical properties of the whey drink naturally saturated with CO<sub>2</sub>

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#### Abstract

Whey is rich in numerous valuable nutrients, but is characterized by unattractive taste, excessive acidity (especially whey made from acidic cheeses). Products that are currently manufactured or that can potentially be produced from whey are: animal feed, microbial biomass and other fermented edible products, baking yeast, organic acids, amino acids, enzymes, flavourings, dyes, microbial gums and polysaccharides. However, each of these ways of using whey involves high costs in infrastructure incurred by the plant. It is therefore necessary to search for new, efficient technologies and implement them enabling management and disposal of whey.

The aim of the study was to analyse selected parameters during the fermentation of whey sweetened with sucrose by using wine yeast Bayanus G995 and to evaluate physical, chemical and organoleptic properties of the whey drink naturally saturated with  $CO_2$ .

The research material was the acidic whey that was initially pasteurised (95°C, 30min) and pre-filtered with a composition of: fat - 0.41%, protein - 0.30%, lactose - 4.31% and total acidity 34.67oSH, pH 4.81. After cooling to ambient temperature, whey has been sweetened with sucrose (200 g/51) and yeasts Bayanus G995 (*Saccharomyces cerevisiae bayanus*) were added. Fermentation was carried out at 200C for 4 weeks, once a week adding sucrose (200 g/51). After fermentation, the drink was sweetened with sucrose (20g/1) and poured into plastic bottles. Whey was pre-stored at 250C for three days, then cooled to 5oC. The following have been marked: active acidity (pH/Elmetron CPC-505), total acidity (oSH), alcohol content and chemical composition (Bentley-150). To perform the organoleptic evaluation the sensory profiling methods have been used. A 20-person, appropriately trained consumer panel evaluated the coded samples in terms of intensity of the characteristics present (1-9 pts.).

After sweetening with sucrose, yeast Bayanus G995 fermented well the acidic whey at room temperature. After 28 days of fermentation in the beverage there was found 7.6% of alcohol and pH=3.90 and a total acidity was 46.20oSH. The whey drink was well saturated with CO<sub>2</sub>, it had good colour and appearance, lactic-alcoholic aroma of fermentation and a slightly acidic taste with a distinct bitterness.

Keywords: whey, fermentation, saccharomyces bayanus

## Age-dependent haemocyte composition of honey bee (*Apis mellifera* L.)

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#### Abstract

Haemocytes represent an important component of immune system in insects: the success of the immune response depends on the number and the types of haemocytes. Composition of haemocytes is not constant varying depending on age, health status of bees and season. Accordingly, the aim of our study was to evaluate the cellular composition of haemolymph of worker bees depending on age.

The autumn generation of Carpathian honeybee's hybrid was used for the experiment. The age of bees selected for our experiments was 50-55 and 90-95 days. Composition of haemocytes was evaluated after Giemsa staining. It has been found that the haemolymph of studied bees contains prohaemocytes, oval plasmatocytes, spindle-shaped plasmatocytes, permeabilized cells (amebocytes), plasmatocytes with filopodia and oenocytoids.

In the haemolymph of 50-55 days old worker bees, oenocytoids, which were not found in all tested probes, represent the smallest cellular fraction. The content of prohaemocytes, permeabilized cells and plasmatocytes with filopodia amounts to 5.2, 4.9 and 4.0%, respectively. Oval (45.8%) and spindle-shaped plasmatocytes (37.6%) were the most numerous. A significant difference in cellular composition of hemolymph was found between 50-55 and 90-95 days old bees. In particular, in the hemolymph of 90 days old bees the spindle-shaped plasmatocytes were the most numerous, exceeding the same indicator of 50-55 days old bees by 65%. The content of oval plasmocytes, permeabilized cells and plasmatocytes with filopodia decreased with age. In addition, in the majority of probes obtained from 90-95 days old bees we have found clusters of microorganisms (Nosema intestinal parasites). Respectively, it could be proposed that the significant increase in relative content of spindle-shaped plasmatocytes in 90-95 days old bees represents a protecting reaction against nozematose.

Keywords: working honey bees, Apis mellifera, haemocytes

## Agroecological knowledge - assessing and transmitting traditional knowledge of rural areas

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#### Abstract

In centuries of coexistence with nature farmers accumulated many skills. They learned to observe nature and adapt to it. They produced respecting the characteristics of the local soil, climate, water and coexistence with neighbours and nature. This way they got sufficient amount of quality food, feed, seeds and other products. At the same time they didn't overexploit the nature. Industrialization of farming has pushed this knowledge aside.

In seeking to resolve dilemmas of modern intensive agriculture and cope with challenges of climate changes, different approaches have been developed as organic farming and biodynamics. But there are knowledge and traditional approaches of farming which ensure sustainability of agriculture on local level. Collecting and learning those skills, especially in South America, enabled local communities to have resumed farming by traditional systems. This approach is called agroecology. It introduces an old traditional knowledge into management of agricultural space and rural communities. Previously evaluated by experts and updated agroecological knowledge is a set of different skills adapted for use in local environments for the most sustainably-oriented farming. Approach does not preclude a sustainability-oriented innovation or the transfer of knowledge from one another environments. Holders of this knowledge and users are primarily small farmers.

In the past agroecological knowledge was transferred from generation to generation through personal contact in the family. Because this way of transfer often doesn't exist anymore, various educational institutions should help in transmission. Important is that the enriched agroecological knowledge is passed on to the young future farmers.

Project SAGITER was started under the Leonardo da Vinci program. "Agroecological knowledge and ingenuity of rural areas" brings together ten partner institutions from seven European countries. Project will enable better understanding of agroecology, methods of gathering and evaluation. Results will be also formation of educational modules and introduction into educational processes.

**Keywords**: agroecologycal knowledge, traditional skills, knowledge transfer, environmental education, rural development, sustainable agriculture

## Amaranthus cruentus L. - a potencial hyperaccumulator of Pb in contaminated soil

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#### Abstract

Heavy metal such as lead (Pb) is among the contaminants in the environment and has harmful effect on biological system and does not undergo biodegradation. Pb accumulates in the upper 8 inches of the soil and is highly immobile, contamination is long-term and without remedial action, high soil lead levels will never return to normal. Phytoremediation uses plants to extract, sequester, and/or detoxify pollutants and has been reported to be an effective, non-intrusive and inexpensive accepted environmental biotechnology to remediate polluted soils. Many species of plants have been successful in absorbing heavy metals. There are indications in the literature that amaranth plant species may accumulate heavy metals in their organs. The aim of our study was to examine the accumulation of Pb in root system of Amaranthus cruentus L. after intoxication of Pb. We used Amaranthus cruentus L., new registered variety in the Slovak Republic under the name Pribina. Amaranthus cruentus L. was pre-cultivated in external environmental conditions and then whole plants with root system were collected and put into phyto chamber with standard setting condition. Amaranth was contaminated with lead-once in different concentrations (0.1M, 0.01M, 0.001M). There were significant increased levels of Pb concentrations in root system of Amaranthus cruentus L. in all experimental groups against control groups after one week of intoxication. This pilot study suggested that new registered variety - Amaranthus cruentus L. should be a potencial hyperaccumulator of Pb in contaminated soil.

Keywords: Amaranthus cruentus L., Pb intoxication, root system, phytoremediation

Acknowledgement: This study was supported by VEGA grant 2/0066/13: "The use of modern biotechnology in the breeding program of amaranth" and European Community project no 26220220180: Building Research Centre "AgroBioTech".

## Amine-functionalized carbons obtained from natural recourses as prospective adsorbents for remediation of metals from waste waters

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## Abstract

Heavy metals removal from an environment is one of the major tasks of wastewater treatment industries. Efficient technologies of the water purification are based on selective heavy metals adsorption with activated carbon adsorbents. Despite an extensive use of separation/purification processes, commercial activated carbons are quite expensive. That is why; the preparation of their low-cost substitutes becomes prospective. Therefore, inexpensive activated carbon adsorbents were prepared from agricultural back-products, such as renewable source of lignocellulose, fruit stones of P. armeniaca, functionalized with amines to increase the selectivity of action, and examined for the removal of heavy metals. The preliminary sorption tests were performed with solutions that imitate the real waste waters and it was shown that prepared adsorbents can be successfully used for the removal of heavy metals within a concentration range of 10-120 mg/L and also, by using real wastewater it was shown that depending on grafted amine residue the carbons effectively removes a sum of Co(II), Cu(II) and Cr (VI). Investigation of the selectivity of adsorption, isolation of products of the surface complexing reactions, determining of their composition and thermodestruction analysis of amine-functionalized carbons before and after complexing were also performed for understanding the mechanism of the adsorbent action.

Keywords: activated carbons, adsorption, water purification, surface functionalization, amines

## Anaerobic digestion potential to reduce livestock waste environmental impact: a case study in Basilicata Region (Italy)

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#### Abstract

In recent years, following the European regulations on the production of electricity and heat from biogas, initiatives aimed at creating anaerobic digestion plants using agricultural and livestock wastes are increasing. There are many advantages associated with the production of biogas, among those the decrease of environmental pollution due to animal wastes and reducing odours associated with them. Then from anaerobic treatment of waste derives digested biomass that could be directly used for fertilization.

In this paper, authors, focusing their attention on a small area suitable for livestock production, show the results, in terms of both electricity and thermal energy, deriving from the exploitation of cow waste in a biogas production plant. The study area is located in the north part of Basilicata Region (South Italy), and considers about 500 livestock units for a daily production of about 28 cubic meters of manure and 16 cubic meters of sewage.

Results show that from biogas is possible to obtain an electrical power equal to 86 kWe, and a thermal power equal to 110 kWt.

Furthermore, digestate from biogas plants is rich in plant nutrients and has excellent fertiliser qualities so it could be used as a sustainable alternative to mineral fertilisers.

Keywords: biogas, manure, sewage, digestate, fertiliser

## Analysis of modern safe methods of drinking water disinfection

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## Abstract

Since water is the factor without which human life is impossible, its high quality must be a priority of every state. This is especially true for quality by sanitaryhygienic indicators, which are provided by disinfection. The deviation from limit values of such indicators can cause serious outbreaks of infectious and intestinal diseases. However, one may not ignore the sanitary-chemical indicators, which can also have a negative impact on human health.

There are many methods of drinking water disinfection, but a lot of them have great disadvantages. For example, the usage of chlorine, sodium hypochlorite or chloramine is accompanied by the formation of toxic and carcinogenic by-products – organochlorine compounds. Ozonation requires extremely high investment and is accompanied by the formation of mutagenic and toxic products as well. Ultraviolet is ineffective against some viruses. Besides, ozonation, ultraviolet light and ultrasound do not provide aftereffect. This may result in recontamination during the water supplying to the consumer. The usage of silver can cause its accumulation in the human body and some diseases as heavy metal. Moreover, it is proved that the silver ions do not affect on spore-forming bacteria. Thus, such alternative methods of drinking water disinfection as the usage of chlorine dioxide or oxidants mixtures recently started to be implemented in the world. Consequently, their thorough analysis is the aim of this study.

Such alternative methods of drinking water disinfection as the usage of chlorine dioxide or oxidants mixtures can be recommended for the safe water treatment. Their main advantages are much fewer or no formation of toxic and carcinogenic by-products (trihalomethanes and haloacetic acids), removal of biofilms from water supply pipes, stronger disinfectant properties and availability, and safety of necessary substances (salt for oxidants mixture producing, and sodium chlorite and hydrochloric acid for chlorine dioxide producing). However, before usage of chlorine dioxide one should research the methods of by-products extracting (chlorates and chlorites) from drinking water.

Keywords: disinfection, organochlorine compounds, chlorine dioxide, a mixture of oxidants, biofilm

## Apigenin flavonoids of common juniper

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#### Abstract

Common juniper (*Juniperus communis* L.) is a dioecious woody plant widely distributed throughout Northern Hemisphere. In Slovakia, it grows from lowland to submontane level, mostly on pastures and forest edges of limestone bedrock. It is characterized by a high morphological variability. Mature fleshy female seed cones – galbulae – are used as a spice, and for preparation of special spirit beverages for a long time.

In phytotherapy, juniper is used as diuretic, metabolic, antineuralgic, and antirheumatic preparations. It is also known for its antiinflammatory, antimicrobial, and antidiabetic properties. Its biological activity results from the presence of specific secondary metabolites, mainly terpenes from the essential oil, catechins, and flavonoids.

The aim of this work was to examine an accumulation of apigenin flavonoids in galbulae of 19 individual plants from 6 sites in Prešov Region. In the methanolic extracts, the amount of apigenin, apigenin-7-O-glucoside, and 6 compounds of biapigenin type were determined by HPLC/DAD method. The average total apigenine flavonoids content in extracts was 1.5 mg/g dry mass. More than one half was represented by biapigenins with the predominance of amentoflavone. While the profile of metabolites was the same in all juniper plants, the total amount as well as the proportion of individual compounds varied. Significant differences were found among the plants from different locations, as well as the plants from the same site. The observed variability could be caused simultaneously by genetic, ontogenetic, and environmental factors. Our data present an introductory study on phytochemical properties of the East Slovakia juniper populations and they will be extended by an evaluation of the material collected in the next years.

Keywords: common juniper, Juniperus communis, apigenin, flavonoids, HPLC

Acknowledgement: The work was financially supported by the Agency of Ministry of Education, Science, Research and Sport of the Slovak Republic, the projects VEGA 1/0882/12 and OP R&D-2008/2.1/01-SORO ITMS: 26220120023.

## Application of methods of biomonitoring in determining roadside area quality

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#### Abstract

Autotransport system (a complex of highway and vehicles moving on it) pose significant dangers among a large number of sources of environmental pollution. Environmentally destructive impact of autotransport systems is a large-scale because of the length and branching network of Ukraine highways and high mobility of traffic with the growing number of vehicles. Autotransport systems affect on all components of the ecosystem (air, soil, hydrosphere and biota) at its functioning.

Actual and promising line of research is to conduct rapid assessment of the quality of roadside area which has developed during the whole period of exploitation the highway, by methods of biological monitoring established in the article. It is well known that the total environmental impact of such impacts can be assessed only on the basis of response of ecosystems roadside area, by the reaction biota and ecosystems in general. Kharkiv region (industrial and agricultural) was selected as the research area, because an essential factor in the deterioration of environmental quality which is the autotransport system.

To assess the quality of roadside area that has developed since the start motor system, 3 were selected representative samples of highway M-03 Kyiv-Kharkiv-Dovzhanskiy on the territory of Kharkiv district, Kharkiv region. During the investigation of roadside area selected road sections were used biomonitoring methods (lichen indication and phyto-testing), because they are able to provide the desired result quality evaluation environment.

Results of the research indicate different levels of environmental safety of roadside area road sections of research. This is may be due both to the different conditions of their exploitation and their design features.

Keywords: autotransport system, roadside area, the quality of the environment, methods of biomonitoring

## Archetypes of Spiš's landscape

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## Abstract

Landscape of Spiš region represents various unique landscape units which are formed in significant historical period determined development social factors. The forming of secondary landscape structure mostly participated the phases of Germaine and Wallachian colonization, mining development and trade, and mountain forms of agriculture expansion. At the same time the landscape forming was influenced by natural conditions and factors which limited each human activities and determined development opportunities.

Present knowledge about Spiš region enables to define several landscape archetypes with unique composition of landscape elements arranged in geometric landscape textures and patterns. Most of them correspond to the positional properties of georelief, morphogenesis of territory and not the least to dynamic processes on the slopes and valleys of watercourses.

The meaning of knowledge these arranged landscape units corresponds to effort to integrate the Landscape Convention into the territorial planning documents and legislative norms.

**Keywords**: landscape archetypes, secondary landscape structure, development opportunities, Landscape Convention, Spiš region

## Assessment of irrigation water quality of Dukagjin Plain in Kosovo

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#### Abstract

The Dukagjin Plain is the most important agricultural region of Kosovo. In this study, some significant physio-chemical parameters of surface water of Dukagjin Plain were evaluated for the criteria of irrigation water quality. Twenty four water samples were collected in the peak dry season from sampling points in July 2014. The contents of the samples have been analysed. Furthermore, these results were compared with the water quality criterias. The study revealed that temperature, pH, electrical conductivity (EC), total dissolved solids (TDS), sodium adsorption ratio (SAR), soluble sodium percentage (SSP), residual sodium carbonate (RSC), of the waters were found within the permissible limits for irrigation purposes. Any initiative regarding surface water development for planned irrigation practices is highly encouraged.

Keywords: irrigation water, quality, Dukagjin Plain

## Balanced Mineral Composition as an Indicator of Drinking Water Quality

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## Abstract

The hygienic aspect of drinking water safety and quality can be defined by the indices of epidemic safety, sanitary, chemical and radiation indices, as well as the optimal content of mineral substances, i.e. a mineral composition adequate to the physiological need of a human organism. According to the sanitary rules and regulations, which have been in force in Ukraine since 2010, namely 'Hygienic Requirements for Drinking Water Intended for Human Consumption', the drinking water quality indices are the following: total hardness, total alkalinity, the content of iodine, potassium, calcium, magnesium, sodium, solid residual and fluorine. The paper provides the data on optimal content of the mineral substances in the drinking water taken from the surface and ground water supply sources within the Odessa agglomeration. The centralized drinking water supply of the agglomeration is based on surface waters (the Dniester River). The alternative source is artesian water from Upper Sarmatia Miocene aquifer, which lies on the 120-130 m depths and is exploited at 15 pump-room complexes located mainly in the southern parts of the agglomeration area.

Based on the conducted research the following conclusions are made: the indices of balanced mineral composition of drinking water, obtained after treatment of the Dniester water, mainly meet the normative requirements, but the sodium content is higher and the fluorine content is substantially lower than the optimal value. The values of almost all indices defining the balanced mineral composition deviate from optimal value range in ground water. The concentrations of calcium, magnesium and sodium ions in the ground water decrease by 40-50% after purification in pump-room, which further leads to the development of diseases due to deficiency of the essential cations. Fluorine deficiency in drinking water, both from surface and ground sources of water-supply in the agglomeration, requires the fluorination as a means of prevention of caries among public at large. Longterm consumption of drinking water with an imbalance of essential mineral components can be one of the negative impacts on public health at the Odessa agglomeration, so there is a need for further special studies.

Keywords: mineral substances, optimal content, balance of water composition

## Bioindicator - black maple (*Rhytisma acerinum*) and black spot (*Rhytisma punctatum*) at selected locations in eastern Slovakia

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#### Abstract

Black maple leaf spot is caused by parasitic fungus black maple. We chose research sites, which were likely to have different incidence of the pathogen: Bukovské and Slanské vrchy, Budimír. An object of observation was sycamore and Norway maple, as well as hedge maple. We observed the influence of factors: purity of the environment, kind of maple, elevation, age of tree, distance from a watercourse and wind. We evaluated the proportion of infested trees and leaves, the rate of the bounded spots, the number of spots and the average size of spots. Presence of the fungus was confirmed even after its microscopic observations. The sycamore leaf blade was infected earlier, progress was faster and spread on a larger area than Norway maple. With Norway maple there was a higher incidence of spots in Bukovské vrchy, while the sycamore in Slánske vrchy. We found out that sycamore had more spots, which were smaller, while the Norway maple had less spots, but they were larger. The factors affecting infection rates of maple trees are air purity, species of maple tree, altitude.

Keywords: Rhytisma acerinum, Rhytisma punctatum, Acer, occurrence, bioindicator

## **Biological activity of invasive Solidago species**

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### Abstract

The aim of our study is evaluate the stimulatory/inhibitory allelopatic effect of secondary metabolites produced by species of *Solidago gigantea* and *Solidago canadensis*. We focus our research on essential oil produced by aerial parts of these two plant species. The plant material was collected from five peripherals localities of Prešov - Šalgovík, Ľubotice, Solivar, Vyšná Šebastová and Rúrky.

After previous identification based on morphological characteristics, we confirmed the affiliation of a plant species by a simple method of TLC – thin layer chromatography. We extracted the essential oil, which the composition was evaluated by gas chromatography (GC / MS) and then we applied it in different concentrations to the seeds of model plants (*Raphanus sativus* L. and *Lepidium sativum* L.). After that we put in Petri dishes to phytochamber for 120 hour and after that we evaluated our results based on measurements of radical elogonation.

Allelopatic influence of different concentrations of essential oils was statistical confirmed. Inhibitory effect on seed germination was recorded as impact of secondary metabolites extracted from sample Solivar on *Raphanus sativus* L. in concentration 0,062  $\mu$ g/ml and on *Lepidium sativum* L. in each concentration except 1.125  $\mu$ g/ml. Stimulatory effect was noted in other samples in different concentrations.

Keywords: Solidago spp. invasion, stimulatory/inhibitory effect, essential oil, secondary metabolites

## Biological activity of the secondary metabolites of selected plant species

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#### Abstract

Allelopathy presents the influence of one plant to another with the production of specific chemical components (secondary metabolites) created in the flowers, leaves, seeds or fruits. The chemicals have stimulation or inhibition effect on plant grows.

The aim of this work was to study the biological activity of the essential oils (EO) of selected plant species. We evaluated EO extracted from three different plant species (tarragon, basil and oregano) grew in three different conditions (Variant 1 - in commercially purchased soil substrate, Variant 2 - in soil substrate without organic components and Vatrian 3 – soil substrate with additions of my-corrhizal fungi). Potential phytotoxic effect of the EO was experimentally tested on four different plant species - cress (*Lepidium sativum* L), lettuce (*Lactuca sativa* L.), radish (*Raphanus sativus* L.) and white mustard (*Sinapis alba* L).

The effect was different in different EO and tested plant species. Some of them had inhibition effect, some of them had stimulation effect. Inhibitory effect was observed in EO extracted from the growing variant 2 and stimulatory effect mostly in variant 1. Both effect was noted in EO from variant 3. Similar experiemnts are important to recognize phytotoxic activity of natural products, which could be used in biocontrol instead of the dangerous synthetic chemicals.

Keywords: Artemisia dracunculus, essential oil, Ocimum basilicum, Origanum vulgare, phytotoxic effect

# Biomonitoring of quality of water of Šebastovka creek using selected biomarkers

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#### Abstract

In everyday life, we are regularly in contact with water, as it is essential for the life of organisms. Aquatic ecosystems are the environmental habitat for a huge number of different microorganisms. Assessment of a human impact on aquatic biota has been performed for more than 100 years. During September 2014 we executed 3 sample pickings from Šebastovka creek at three different sampling sites. We assumed different results in the establishment of a generic representation and abundance of selected microorganisms, since we selected delivery points in front of the district, behind Nižná Šebastová and in the industrial part Širpo. We assessed quality of water and degree of pollution on the basis of results gained from evaluation of three selected groups of biomarkers: bacteria, cyanobacteria and algae and small animals. We evaluated three groups of bacteria: coliform, thermotolerant coliforms and intestinal enterococci. Tests were carried out in RÚVZ in Prešov by cultivation on the lactose differentiating medium. Cyanobacteria and algae, mainly diatoms and tiny aquatic animals have been identified in the school laboratory using trinocular microscope and consulting experts. the hypothesis was confirmed as in the industrial area a number of selected bacteria, cyanobacteria and algae, which tolerate pollution as well as tubifex living mainly in polluted waters have proved the greatest pollution. After completion of work and subsequent evaluation of the results we concluded that our assumption was correct. In the near future we would like to deal with the deformation of diatoms resulting from increased heavy metal content. In the final phase of the project we will try to improve the quality of the objective watercourse executing design and implementation of measures. We will also try to use zeolit as a bioacumulator of the heavy metal pollution.

Keywords: biomarker, bacteria, cyanobacteria, algae, pollution, zeolite

## **Biophysical monitoring of forest ecosystems**

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#### Abstract

The strategy of balanced nature management, preservation of landscape and biological variety provides of using modern methods of environmental monitoring.

The purpose of the paper is development of techniques for complex monitoring of forest ecosystems that is based on information intensive environmental indicators.

The research methodology provides complex laboratory and field measurement morphophysiological parameters of plants, forming a database with using the technologies of remote sensing of Earth and geographic information systems. Mathematical models of kinetics fluorescence of chlorophyll schedules are made in Excel with using the program «Graph2Digit». Field reconnaissance vegetation survey is made in conservation, recreational and economic zones in Shatsky NNP, which is one of the cross-border component of Ukrainian-Polish-Belarusian Biosphere Reserve "Western Polissya". The object of monitoring is selected one of the main forest plantation in Western Polissya - Betula pendula.

Results of work are linking objects of terrestrial vegetation areas to optical spectral characteristics of processed satellite images and their correlation with morphological parameters of plants. Correlations of content of pigments in habitat conditions have identified functional adaptation of woody plants to environmental stress factors. Fluctuations of content of pigments and their ratio in assimilation organs of trees have confirmed the adverse effects of the environment but substantial weakening of the photosynthetic apparatus in plants in general is not fixed. Based on experimental measurements the fluorescence mathematical models that reflect gas exchange functioning of the photosynthetic apparatus are fulfilled.

The comparative characteristics of photosynthetic content of pigments provides clarification adaptation patterns of woody plants to different types of habitat conditions for functional changes in their assimilation system and describes the main forest species for their using as environmentally information capacitive indicators of forest ecosystems.

Keywords: monitoring, fluorescence, chlorophyll, photosynthetic apparatus

## Classification of danger compound of solid municipal waste as a management system

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#### Abstract

Classification of danger compound of solid municipal waste (the electricity sources, batteries, pressure pack, medical waste and etc.) has been produced. This system can transform the most of the waste into secondary raw materials. The classifications of medical and electricity waste have been prepared separately. These systems are the basic elements for creation of management system.

Medical waste is produced in veterinary clinics, medical institutions and the domestic sector. The waste of veterinary clinics has been allocated in separate category because it can be infected by specific strains of microorganisms containing toxins and poisons. Medical waste from veterinary clinics as well as the waste from medical institutions is classified into 5 classes: A - epidemiological Safety, B - epidemiologically dangerous, C - an extremely dangerous epidemiologically, D - toxicological hazard, E – nuclear waste. Municipal waste is classified with some differences into same classes (except of nuclear waste) A, B, C, D. The significant part of the medical waste is destroyed on the dumping place for municipal solid waste. In the case of danger composition, it must be separated from the common municipal waste. Management methods (destruction, disposal after disinfection, industrial processing) were also proposed depending on epidemiological waste.

Electronic waste is divided according the level of chemical hazard (Hg, As, Cr, Cd, Be, Ni, Pb - items) and physical (CRT) properties; hardware components (screens, panels, circuits, storage media and other components of electronic equipment, which is not out of order and ready for re-use), metals (black, non-ferrous, precious, rare earth and others), glass (silica, lead, barium, strontium, sodium), polymeric components of the equipment (polystyrene, acrylonitrile-butadiene-styrene, polypropylene, polyethylene, polyvinyl chloride and others). This waste must be industrially processed and/or it can be destroyed by decontamination.

Keywords: classification, municipal solid waste, danger waste

## Consortiums of ecotones of protective type to ensure the environmental safety on railway lines

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#### Abstract

Railway transport of Ukraine is part of integrated transport system designed to meet the needs of social production and population both in domestic and international traffic as well as to provide other transport services. A multi-factor analysis of the impact of the Lviv Railway transport on the environment takes into account the properties of natural systems: multiple connections, stability, commutability, additivity, invariability as well as multivariable correlation of nature components. One of the important steps towards ensuring environmental safety in the railway transport is the formation of ecologically balanced system of nature management on the basis of environmentally clean technologies. The main method to ensure continuity and permanency of nature-conservation, sanitary, healthcare and aesthetic functions of such system is the establishment and functioning of protective forest plantations on the railway lines. Since ecotones, as distinct from ordinary protective forest plantations, have specific autotrophic and heterotrophic blocks, edaphotope and climatope, it is possible to hypothesize that they should be viewed as border systems with inherent biotic cycles and flow of energy which are capable more efficiently than protective forest railway plantations to perform a variety of functions to ensure environmental safety. Ecotones of protective type are biogeocoenotic geochemical barriers which act not only as a means of increasing buffering capacity of the environment, but also as a means of bioconversion of areas that have already reached the agrochemical and agrophysical degradation threshold (or exceeded this level). According to the results of field studies, the protective ecotones can be classified on the grounds on their profile characteristics, that is the structure and composition of the stands and their origin. A fundamentally new model of environmental safety in railway transport is of great polyfunctional importance as this enables, on the basis of the landscape-ecological methods, to form consortiums of protective ecotones that will provide the maximum spatial-temporal efficacy.

Keywords: ecotone, heoekoton, railway, protective forest plantations

## Content of heavy metals in the heaps of waste material at the area of Zlatá Baňa village

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#### Abstract

Mining activities and mining related industries represented important progress of human civilization, but on the other hand caused a lot of environmental problems. Since the 13<sup>th</sup> century, mining activities were one of the main livelihoods for a lot of inhabitants in those times. Years of intensive mining and ore smelting resulted in irreversible changes in landscape structure and mining bodies' creations. At the beginning of the 19<sup>th</sup> century, when ore mining wasn't as profitable and rentable as before, mining activities were completed. Heaps of waste material, flotation ponds and mine areas, because of inadequate revitalization, stayed unchanged and become the source of undesirable substances – heavy metals. Activities in Zlatá Baňa village were focused to gold mining (since the 16<sup>th</sup> century) and opal mining (since the 17<sup>th</sup> century).

The aim of the study was determined the content of heavy metals (Hg, Cu, Zn, Pb) in samples of heaps of waste material and evaluate the influence of soil pollution to the biological (soil enzymes – urease, acid and alkaline phosphatase) and chemical soil properties (pH).

Extremely high and above the limit value of Hg and Pb were determined at all sampling sites. Soil enzymes proved their ability to reflect soil degradation and could be considered as a suitable indicator for soil pollution. We found a significant negative correlation between Hg and Pb themselves, and with soil enzymes. Increasing the content of heavy metals decreased the soil reaction. Soil reaction positively correlated with soil enzymes.

Keywords: mercury, lead, mining activities, enzymes activity

# Determination of bananas surface microflora by the new analytical method - MALDI-TOF MS Biotyper

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#### Abstract

Commercially available food is interesting source of different microorganisms. During, growth, transport, storage and sale all fruits can gain a lot of different microorganisms which authors decided to identify on example of banana. The main objective of the study was to identify the microorganism determinated on surface of commercially available banana by using MALDI-TOF MS Biotyper. Six bananas were bought in one of supermarkets in Nitra (Slovakia). They were taken in to two plastic bags from bottom of the box and middle of bunch for minimize risk of contamination by microflora from human hands. Next stage was transfer microorganisms from surface of banana to agar media under laminar flow chamber. For this there were used cotton swabs and three different medias: MRS media for lactic acid bacteria species, nutrient agar and malt extract agar for yeasts. After growth gained microorganisms were transplanted to fresh agar medias for their cleaning and incubated again. After growth of isolated cultures they were prepared for identification by MALDI-TOF MS Biotyper (Brucker Daltonics, Germany) and results of measuring were straight compared with database by software realtime classification v3.1. There were 18 different species of microorganisms isolated and identified: 15 bacteria's and tree yeast species. Among bacteria's 60% (50% of all microorganisms) was gram positive for example: Brachybacterium faecium, Bacillus pumilus, Microbacterium arborescens. It was found also gram negative bacteria's which was 40% of found bacteria's for example Burkholderia caledonica, Acinetobacter junii. Also some veast's species was found Candida krusei, Aureobasidium pullulans, Rhodotorula glutinis which was 16.6% of all microflora. Result of investigation shown how many species of microorganism and how wide spectrum of it we can find on commercially available food products. Also it have shown possibility of use new devices in laboratory work for reduction of work time.

Keywords: banana, bacteria, yeasts, identification, MALDI-TOF MS

## Determination of element composition of soil samples in the Lviv Landfill

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## Abstract

The problem of inconsistencies Landfill established norms contributes to the growth of chemical indicators of soil on site and around Landfill. Researches related to the study of contamination of soil and the definition of heavy metals in the field of waste disposal are relevant and binding in the assessment of environmental safety due to human life. The aim is to determine the elemental composition of soil samples taken in the Lviv landfill at different distances.

We selected 11 soil samples. The research process of elemental composition in selected soil samples was carried by Roentgen-analyzer «EXPERT-3L» in science environmental monitoring and examination of the National University "Lviv Polytechnic" laboratory. This analyzer is intended for measuring the mass fraction (%) of major chemical elements by roentgen analysis. It allows to determine the content of chemical elements ranging from Sodium to Uranium with high accuracy. The results of the explorations were found that selected samples of soil have the following elements: Aluminium, Silicon, Sulphur, Potassium, Calcium, Tellurium, Rubidium, and toxic metals: Zinc, which belongs to the first class of danger (very dangerous); Manganese, Iron and Strontium, which belong to the third class of danger (low-hazard).

Unequal distribution of parameters in selected soil samples are established at distance. On the initial distances the tendency from growth to reduction of pollution factors are observed. At farer distances explored the tendency from reduction to its growth. Therefore, this can be explained by the unpredictable process of distribution on sampling soils and non-effective implementation of the recultivation process by Lviv Communal enterprise "Zbyranka", which operates by Lviv Solid Waste Landfill.

Keywords: landfill, soil, waste, heavy metals, pollution, recultivation

## Diapriid wasps (Hymenoptera, Diaprioidea, Diapriidae) of the Ukrainian forest-steppe region

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#### Abstract

Diapriidae is one of the families of parasitic Hymenoptera, which develop into larvae (pupae /puparium) of other insects and, therefore, are of great practical importance. Today the diapriid wasp's fauna of the Ukrainian Carpathians is relatively good studied, whereas the other parts of the Ukrainian territory remain poorly explored. Accordingly, the aim of our research was a preliminary study of fauna and ecological characteristics of the diapriid wasps in forest-steppe zone of the South-West Ukraine.

The experimental material was collected during the spring and autumn of 2011-2013 in eight different plant formations within forest-steppe zone of Ukraine. Collection and laboratory processing of the material was performed by conventional hymenopterological methods. Relative species diversity was assessed by means of our own four-point scale: "0" - the species is absent; "1" – 0.1-0.9 specimen / sample; "2" - 1-1.9 specimens / sample; "3" - 2-2.9 specimens / sample; "4" - 3-4.5 specimens / sample.

Totally 100 species of diapriid wasps from 20 genera were found for the explored area. The highest number of species was detected in the apple orchard (47 species from 14 genera), whereas the smallest number of species was found in the monocultural forest.

*Belyta sanguinolenta* Nees ab Esenbeck and *Trichopria inermis* Kieffer were the most numerous and widespread species, registered in all plant formations in relative amounts of "3" and "4". Besides, each of four species, *Basalys abrupta* Thomson, *B. bifoveata* (Kieffer), *Trichopria aequata* Thomson, *Belyta depressa* Thomson and *Cinetus piceus* Thomson, were found in four plant associations. However, many species were observed only in one of plant associations analyzed.

In the studied region, the highest number of species -25, 18 and 9 – were observed for the genera *Trichopria* Ashmead, *Basalys* Westwood and *Belyta* Jurine, respectively. Species from these genera were recorded in all plant formations.

Keywords: Diapriidae, fauna, biodiversity, plant associations

## Does long-distance migration influence an avian genome size?

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#### Abstract

Positive correlation is known between size of red blood cells, nucleus and the genome among vertebrates. Larger cells exhibit lower surface area to volume ratio and are for that less efficient for gas exchange therefore animal species with high metabolic demands are constrained to small cells with smaller genome size. The flight ability is associated with high metabolic demands, so it is considered to be a strong evolutionary pressure on genome size. Thus, birds display smaller genomes among vertebrates. Flightless groups have larger genomes than volant groups. The long-distance migration requires higher rate of metabolism, so there is a question whether long-distance migration is one of the selective pressures resulting in smaller genome size in birds.

We examined an association between genome size and long-distance migration in birds. We used data from Animal genome size database (www.genomesize.com) for this purpose. We selected 39 long-distance migratory avian species which breed in Nearctic or Palaearctic region (mainly North America and Eurasian region) and winter in Neotropical or Afrotropical region (mainly equatorial South America and Africa) and 33 non-migratory species breeding and wintering in the same range of Nearctic or Palaearctic region.

Statistical difference wasn't found between long-distance migratory (1,37 pg) and non-migratory groups (1,35 pg) (unpaired Student's t-test, p = 0,713). If only order Passeriformes was assessed, migratory birds also showed higher average value of genome size (1,37 pg) compared to non-migratory birds (1,32) but the difference was not significant (p = 0,255).

Our results didn't confirm association between long-distance migration and genome size in birds. It seems long-distance migration itself is not a factor representing the selective pressure for small cells with reduced DNA content despite its high metabolic demands for organism. But we could not include numerous of avian species to the analysis due to a lack of data in Animal genome size database.

#### Keywords: genome size, bird, long-distance migration, metabolic demands

Acknowledgement The work was supported by the Research Agency of the Slovak Republic, the project ITMS: 26110230069.

## Ecological aspects of plant secondary metabolites

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## Abstract

Secondary metabolites are organic molecules that are not involved in the normal growth and development of an organism. They are produced at higest levels during a transition from active growth to stationary phase. Plant secondary metabolites (PSM) can no longer be considered to function simply as plant defences against their enemies. Essential oils are volatile natural complex compounds and are biosynthetised by aromatic plants as secondary metabolites. Many interactions between PSM and organisms expoliting plants are now known. Secondary compounds have evolved during evolution as a defence against microorganisms (viruses, bacteria, fungi), against herbivores (molluscs, arthropods, vertebrates) and against competing plants (allelopathy).

The aim of our work was theoretical study of the ecological effect of selected plants to another species. Determination and quantification of main components of *Helisrychum italicum* (Roth) Don ssp. *Italicum, Origanum vulgare* ssp. *Hirtum, Majorana hortensis* L., *Melissa officinalis* L., *Origanum vulgare* L., *Salvia officinalis* L., *Carum carvi* L., *Lavender officinalis, Melaleuca armillaris, Melaleuca acuminata, Melaleuca styphelioides* and *Mentha piperita* cv. Kristinka were done by authors. Phytotoxic effect was evaluated in laboratory test against 6 different species seeds - *Raphanus sativus, Lactuca sativa, Lepidium sativum, Sinapis arvensis, Triticum durum* and *Phalaris canariensis*. Composition of secondary metabolites played and important role and on the base of their determaination positive and negative effect was observed in different essential oils.

Keywords: essential oils, germination, phytochemicals, phytotoxicity, radicle elongation

## Effect of salt stress on proline content in Arabidopsis thaliana

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#### Abstact

Soil salinity is one of the major causes of productivity loss of plant communities. The objective of the study was to clarify the possible role of proline, a wellknown osmoprotector, in the response to stress induced by the rapid increase of sodium chloride concentration in the leaf tissues of wild type *Arabidopsis thaliana* (ecotype Columbia 0 - WT) and Catalase 2 knock-out mutant (*cat2*). Rosettes of 5 week old WT and *cat2* plants were treated with 50, 100 or 200 mM NaCl for 4 or 8 hours. Afterwards, proline content was estimated.

It was found that the treatment of cut leaves for 4 hours with 50 mM NaCl leads to increase of proline content in both investigated lines. This effect was more pronounced in WT: the proline content increased more than 2 times in leaves of WT and only by 58% in *cat2* compared to untreated controls. In contrast, application of 100 and 200 mM sodium chloride did not result in changes of proline content compared to the controls. In WT, prolongation of treatment with 50 mM NaCl up to 8 hours resulted in 1.5 fold increase of proline level, whereas after incubation with 200 mM NaCl the proline content decreased 3.3-fold. Another pattern was demonstrated by the *cat2* mutant: after incubation of leaf rosettes in the presence of 200 mM NaCl the proline content remained at the same level as in control samples. These data show that deficiency of catalase activity in *cat2* mutant results in changes of salt stress response in the mutant plants.

Keywords: salt stress, Arabidopsis, knockout mutant, proline

## Effect of summer feeding on catalase and ascorbate peroxidase activity in honey bee (*Apis mellifera* L.)

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#### Abstract

In the middle of summer (July) honey bees often do not obtain sufficient amount of food in nature and require additional feeding. However, the physiological and biochemical consequences of the feeding still remain poorly understood. Especially, little is known about the possible effects on the activity of antioxidative enzymes, e.g., catalase (CAT) and ascorbate peroxidase (APX), which are responsible for the scavenging of hydrogen peroxide and, therefore, are involved in the cell protection against different kinds of abiotic stress.

The aim of our study was to evaluate the effect of summer feeding on the activity of CAT and APX in forager bees. The experimental colonies received additional feeding with 60% sucrose solution for 3 days. The activity of CAT and APX was measured (i) before, (ii) at the 4th and (iii) at 11th day of the experiment. The enzyme activity was determined in tissues of the gut, head and thorax from forager bees.

It was found that the activity of CAT was about two orders of magnitude higher than the activity of APX. This indicates that in bees – like in other insects – CAT represents the main enzyme scavenging hydrogen peroxide whereas APX plays an additional and probably specific role in cell protection. It was also found that the activity of CAT did not change significantly during our experiment. In contrast, the APX activity significantly increased in the experimental group on the 4th day of additional feeding, whereas in the control group it remained unchanged in all body parts examined. Herein, the highest increase of APX activity was observed in the tissues of the head, and the lowest – in the tissues of the thorax. The lowest increase of the enzyme activity in the thoracic tissue may be explained by adverse weather conditions during our experiment that resulted in reduction of flying activity of the forager bees. The APX activity returned to its original level within a week after termination of summer feeding. Thus, APX may play an important role in limitation of oxidative damage in bees, which received additional feeding.

Keywords: Apis mellifera, catalase, ascorbate peroxidase

## Elderberry (Sambucus nigra L.) - R&D

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## Abstract

Elderberry (*Sambucus nigra* L.) was one such species of plant. Elderberry seeds have been found associated with human activity by archaeologists and assigned to the Stone and Bronze Age. In their writings, naturalists, healers and philosophers of Ancient Greece and Rome also referred to this mysterious healing plant. We have studied extraction of anthocyanins from Elderberry fruits. Totally, after three extractions we have obtained anthocyanins in amount of near 0.98 % of fresh plant weight (expected 0.664 - 1.816 % wt.). The aim of research was the optimization of a lyophilization process with acetone extracts of elderberry fruits. The acetone solvent was evaporated in vacuom after extracting all samples. The device GEA Lyophil SMART LYO 2 was used for the lyophilization. The work consists of two parts: optimizing the dilution of samples by deionized water after defrosting, and optimizing the lyophilization process.

#### Keywords: natural components, small fruits, new technology

Acknowledgement: The research was supported by the Ministry of Education, Science, Research and Sport, Slovak Republic in the project: *The Isolation of Plant Natural Components by Lyophilization Process and Modification of their Qualitative-Quantitative Properties* (No. 00162-0001 /MŠ SR-3634/2010-11/).

## Evaluation of antibacterial and antioxidant properties of *Rosa canina* L. extracts and its phenolic and ascorbic acid content

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#### Abstract

*Rosa canina* L. is a popular shrub widespread in Europe, Asia, the Middle East and North America. Rose hips are nowadays used in traditional European folk medicine as diuretic, laxative, for kidney and lower urinary tract disorders, arthritis, gout, fever, colds and for vitamin C deficiency.

The aim of this work was to determine antimicrobial and antioxidant properties as well as analyzing the content of phenolic compounds and ascorbic acid content in different water extracts of *Rosa canina* L. hips. All tested extracts exhibited antibacterial activities against gram positive (*Staphylococcus aureus* and *S. saprophyticus*) and gram negative (*Escherichia coli* and *Salmonella spp.*) bacteria. Among the microorganisms evaluated, *S. saprophyticus* and *E. coli* were completely inhibited by extracts with a concentration of 75 mg/ml. Lower inhibition of growth was observed for *Salmonella spp*. Among tested bacteria *S. aureus* was the most resistant to all extracts.

The highest antioxidant activities were detected for dry whole fruit extracts. The lowest antioxidant capacities were detected for fresh pulp. Content of phenolic compounds decreased in the following order: dry fruits, dry peel, fresh fruits, pulp and the weakest fresh peel. Vitamin C content varied from 3,98 mg/g to 8,4 mg/g for fresh pulp and dry whole fruit extracts, respectively. All antioxidant activity values were highly correlated with phenolic content and ascorbic acid content and high correlation between two methods of antioxidants determination was observed.

*Rosa canina* fruits possessing strong antibacterial activities could be potent new antimicrobial agents, to be used together with conventional antimicrobial agents such as antibiotics.

The rose hips display high antioxidant activities, phenolic and ascorbic acid content and can be a good source of antioxidants in our diet.

Keywords: Rosa canina L., antibacterial, antioxidant activity, phenolic content, ascorbic acid
# Evaluation of geographic distribution of Oregano (*Origanum vulgare* L.) accessions stored in Albanian Genebank

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#### Abstract

Oregano (*Origanum vulgaris* L.) is among the most widely spread herbs in Albania. Evaluation of geographic distribution of forty populations of oregano stored in Albanian GenBank was carried out. The geographic areas were separated into small grid square cells, and grid cells of 1 x 1 km, and 10 x 10 km was used to assess the geographic distribution, diversity indices, and richness estimators of oregano populations. Spatial analysis detects areas of high (alpha) diversity and comparisons of quantitative diversity variables as richness, ex situ and representative present points, show the areas with higher richness of oregano populations were Gjirokastra, Shkodra, and Dibra districts areas. There were full representativeness the samples of oregano populations selected in Vlora, Gjirokastra, Berat, Shkoder, Kukes and Diber districts. Cluster analysis method on correlation data show clearly similarity among Shkodra and Kukes districts, among Dibra and Gjirokastra, Fieri and Vlora, and Lezha and Tirana district areas (similarity index ranges from 0.73 to 0.89).

Keywords: populations, Origanum vulgare, geographic distribution, spatial analysis

# Evaluation of haematology parameters in mouflons during dormancy

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#### Abstract

In our research we investigated haematological parameters of mouflons in period of dormancy. Dormancy usually takes from early November to the end of March. The principal importance is in saving energy which helps the organism to survive adverse period. It can be determined genetically, and also influenced by external factors mainly due to adverse weather. Dormancy in plants is a precautionary halt of the growth during the winter time. It is a biological process by which an organism reacts to seasonal changes of temperature, photoperiod or low water precipitation. The composition of the forest mouflon food is very different and depends on the species composition of the forest ecosystem. Mouflons are mainly feeds with field plants, field crops, leaves and with dry grass during the wintertime. The experimental study included a total of 10 mouflons, they were 5 to 7 years old females with average live weight of 36.5 kg. All experimental animals were clinically healthy. Their food chain consisted from traditional feed intake characteristic for this type of game. Animal blood samples were examined using an automated haematology analyser (Beckman Coulter, USA). In our experiment, we obtained the following results: haematological profile was determined correlation coefficient as follows: haemoglobin (r=0.260), haematocrit (r=0.150), erythrocytes (r=0,780), lymphocytes (r=0,823).

Keywords: mouflon, blood, dormancy, erythrocytes, ecosystem, lymphocytes

Acknowledgement: This work was supported from the grant VEGA 1/0613/13.

# Folic acid determination in multivitamin preparations by microbiological method

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#### Abstract

Foliate and folic acids are forms of a water-soluble B vitamin. Foliate occurs naturally in food, and folic acid is the synthetic form of this vitamin. Deficiency states lead to impaired cell division manifested as megaloblastic anaemia and foetal development defects in humans. Folic acid is also used for other conditions commonly associated with folate deficiency, including ulcerative colitis, liver disease, alcoholism, and kidney dialysis. Women who are pregnant or might become pregnant take folic acid to prevent miscarriage and neural tube defects. Some people use folic acid to prevent colon cancer, memory loss, prevent heart disease, stroke or cervical cancer.

The aim of this work was to determine folic acid in multivitamin preparations, available on Polish market, by microbiological method. For this purpose ten different tablets were used. Tablets were crushed in a mortar, extracted with extraction buffer (0.1 M potassium dihydrogen phosphate -1% ascorbic acid, pH 6.0), filtered through a 0,45 mm filter and immediately used for analysis. The microbiological assay involves quantifying the growth response of a specific microorganism to the mixture of folates that is present in analyzed sample. Folic acid determination was done according to Difco<sup>TM</sup> procedure for folic acid assay with *Enterococcus hirae* ATCC<sup>TM</sup> 8043.

In two tested tablets folic acid concentration was similar to that declared by the producers. In 8 tablets, folic acid concentration was lower than declared. In one tablet it was lower by 7%, in two other preparations was lower by about 20%, in three preparations by about 50% and the lowest concentration was detected for one preparation, when folic acid concentration assayed by microbiological method was lower by about 70%.

It was shown that *E. hirae* can be used for folic acid determination in multivitamin preparations, but the procedure has to be optimized.

Keywords: folic acid, Enterococcus hirae, microbiological assay

## Genetic origin of *Apis mellifera* in West Ukraine: *CoxI* sequencing

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#### Abstract

The cultivated species *Apis mellifera* includes 26 subspecies, which originate from Europe, Africa or Asia, but are widely spread around the world today. The flow of genes between these subspecies was sometimes interrupted resulting in formation of geographical races, which are adapted to specific geographic areas. Due to high polymorphism of the existing races and subspecies of honeybee, their intraspecific taxonomy that relied only on morphological and anatomical data remained imperfect for several decades. Accordingly, application of molecular markers (e.g., sequencing of mitochondrial loci *CoxI*, *CoxII*, etc.) is required for reliable identification of subspecies and races.

It is accepted that the West Ukraine represents an area of natural spread of three subspecies of *Apis mellifera*, i.e. *mellifera*, *carnica* and *macedonica*. The modern diversity of honey bee can also be attributed by artificial introduction of other subspecies. In order to identify subspecies currently present on the territory of Chernivtsi region, we amplified by PCR and sequenced a fragment of *CoxI* from several individuals. The obtained data were compared with homologous sequences available in Genbank. It was found that the analyzed individuals occupy an isolated position on the dendrogram, demonstrating the highest similarity to *Apis mellifera ligustica*. Therefore, the data show that this subspecies could participate in formation of modern bee races distributed in West Ukraine. More sequence information from bees collected in different regions of Ukraine is required to describe their origin and evolution in more detail.

Keywords: Apis mellifera, molecular markers, CoxI

# German Chamomile, *Matricaria recutita* L., - the New Variety "LIANKA"

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#### Abstract

German Chamomile, Matricaria recutita L., is characterized by considerable variability of the amount of biologically active compounds in essential oil such as /-/- $\alpha$ -bisabolol oxide A, /-/- $\alpha$ -bisabolol oxide B, /-/- $\alpha$ -bisabolol, spiro ether and chamazulene. Pharmacological properties include anti-inflammatory, antiseptic, carminative, healing, sedative, and spasmolytic activity. The world market currently has chamomile drug of various origins and therapeutical values. In the 1970s, plant material was evaluated by the content of essential oil and the content of chamazulene. As good methods for determining drug constituents and effectiveness have been developed, the flower content of /-/- $\alpha$ -bisabolol has become an important indicator of flower quality and value. As a result, 4 basic chemical types of chamomile (A, B, C & D) are recognized, according to the qualitative and quantitative composition of essential oil. Countries which are the major suppliers of chamomile for the world market, Poland, Hungary, Germany, Argentina, Czech Republic and Slovakia, have recently initiated intensive plant improvement programs to produce plants with high levels of oils with a defined chemical composition. The recent breeding of diploid forms focused on a high content of /-/- $\alpha$ bisabolol and a low content of  $/-/-\alpha$ -bisabololoxides A and B. The emphasis was put on a high yield of flower inflorescences as well as the uniformity and stability of plant morphological characteristics. The methods of individual plant selection and "the middle seedbed" were used in breeding practice. Content of essential oil in the new bred chamomile variety LIANKA ranges 0.60 - 0.75 %. The amount of /-/- $\alpha$ -bisabolol reached 52 to 55 % (GC-FID) or 57 to 60 % (GC-MS). Chamazulene content ranges from 16 to 18 % (GC-MS) or from 18 to 20 % (GC-FID). Quantity of  $/-/-\alpha$ -bisabololoxides A and B decreased to 3 – 4 % (GC-FID, GC-MS). Control variety BONA contains lower amount of  $/-/-\alpha$ -bisabolol (38 – 40 %). Chamazulene reached 12 to 18 %. In this variety there has been higher content of /-/- $\alpha$ -bisabololoxide A 13 – 18 % and /-/- $\alpha$ -bisabololoxide B 6 – 8 %.

#### Keywords: breeding, essential oil, /-/-a bisabolol, inflorescences, chamomile, varieties

Acknowledgement: This contribution is the result of implementation of the project: "The Use of R&D for Breeding of Medicinal Plant New Cultivars" (ITMS: 26220220013) supported by the Agency for the Structural Funds of EU.

## Germination as an effective method of increasing the antioxidant activity of plant seeds

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#### Abstract

Germination is an inexpensive and an effective bioengineering process that can highly increases nutritional value of plant seeds by intensive synthesis of bioactive compounds and decreasing of anti-nutritional components.

The objective of this study was to determine influence of germination process on changes of antioxidant activity and phenolic compounds yield in seeds of buckwheat (*Fagopyrum esculentum*), sunflower (*Helianthus annuus*) and mustard (*Brassica juncea* L.).

Dry seeds were cleaned, disinfected, watered and steeped in distilled water and germinated in dark for 7 days at 20° C. The methanolic extracts of seeds and sprouts were prepared and assayed for phenolic content and antioxidant activity every day during period of germination. Total phenolic content was determined using Folin-Ciocalteu assay, free radical scavenging activity - by DPPH assay, capability to inhibition of linoleic acid peroxidation - according recommendations Kuo et al., 1999.

It has been found that all experimental indexes of seeds were significantly increased during period of germination. Maximum values of the indexes were determined at the time of the first sprouts emergence. The contents of total phenolic compounds determined in germinated seeds of buckwheat, mustard and sunflower were higher than the yield in ungerminated samples by 198, 241 and 115 % respectively. Antiradical activity of germinated seeds of buckwheat was increased by 167%, in mustard and sunflower seeds - by 187% and 156% respectively. Capability to inhibition of linoleic acid peroxidation of mustard, sunflower and buckwheat were increased by 246%, 201% and 142% respectively. Maximum values of antioxidant activity were determined when the roots of germinated seeds were 1-3 mm (for buckwheat and mustard), 2-5 mm (for sunflower) length.

The results were shown that germination process provides significant increase of the phenolic compounds content and antioxidant activity of seeds. Definitely, germinated seeds can be used as ingredients for functional foodstuffs and supplements for prevention of oxidation-associated diseases.

Keywords: germinated seeds, buckwheat, mustard, sunflower, antioxidant activity

## Guaiacol peroxidase activity in *cat2* mutant of *Arabidopsis thaliana* upon salt stress

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#### Abstract

Salt stress leads to generation of reactive oxygen species (ROS) in the plant cell, which cause oxidative damage of cellular components. Besides, many ROS, especially hydrogen peroxide play an important role in stress signaling. Several antioxidative enzymes such as catalase, ascorbate and guaiacol peroxidases scavenge hydrogen peroxide in the plant cell under normal and stress conditions and can be also involved in regulation of stress response.

The aim of the current work was to investigate presumptive changes of guaiacol peroxidase (POD) activity in the wild type *Arabidopsis thaliana* plants (WT: ecotype Columbia 0) and catalase 2 knockout mutant *cat2* under acute salt stress. Rosettes of WT and *cat2* plants were treated with 50, 100 or 200 mM NaCl for 4 or 8 hours under optimal light conditions. It was found that the activity of POD in leaves of *cat2* was the same as in WT. Treatment of the plants with NaCl for 4 hours did not lead to any significant changes in POD activity, both in WT and *cat2*. However, differences in POD activity between the two investigated lines were observed after 8 hours of incubation with NaCl. POD activity in WT remained unchanged in the presence of NaCl, whereas in the *cat2* mutant the activity increased by 34-35% after application of 100 and 200 mM NaCl. These data indicate that activation of POD can compensate the lack of catalase isoform 2 upon salt stress.

Keywords: reactive oxygen species, guaiacol peroxidae, salt stress, knock-out mutants, Arabidopsis thaliana

## Hemiparasitic *Euphrasia rostkoviana* Hayne – natural resource for the treatment eye diseases

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#### Abstract

Euphrasia rostkoviana (synonym Euphrasia officinalis), common names Eyebright, Eyewort, is a plant from the genus Euphrasia, in the family Orobanchaceae. Eyebright is an annual hemiparasite wild grows in mountain medows. In traditional medicine has different names as Aufraise, Augentrostkraut, Casse-Lunettes, Eufrasia, Euphraise, Euphrasia, Herbe d'Euphraise, Luminet, eyebright and other names. The leaf, the stem, and small pieces of the flowers are used for the treatment of eve diseases. Herbalists use evebright as a poultice with or without concurrent administration of a tea for the redness, swelling, and visual disturbances caused by blepharitis and conjunctivitis. The herb is also used for eyestrain and to relieve inflammation caused by colds, coughs, sinus infections, sore throats and hay fever. The principal compounds in the aerial parts were identified as iridoids, phenolic acids, phenylpropane-, and flavonoid-glycosides. The content of flavonoids, polyphenols, tannins and hydroxycinnamic derivatives were also determined. The antioxidant and antibacterial activity as well as imunomodulatory effect was performed. Despite its potential in treatment of eye diuseases, there are still less knowledge presented.

Keywords: antioxidant, antibacterial effect, aucubin, conjunctivitis, eyebright, iridoids

# Chemo biodiversity of juniper, *Juniperus communis* L., from marginal areas of north-eastern Slovakia

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#### Abstract

Our research was focused on the chemo biodiversity of juniper (Juniperus communis L.) in marginal localities of north-east Slovakia. Juniper berries from six localities: Vyrava – Zbojné, region Medzilaborce; Hôrka, part Kišovce, region Poprad; Mil'poš, region Sabinov; Kamienka, region Stará Ľubovňa; Lačnov, region Prešov; Spišský hrad, region S. N. Ves were collected during the years 2012 - 2014. We have evaluated the phytochemical characteristics of the berries content and composition of the essential oil. The differences in content and composition of the essential oil were observed. Average content of the essential oil ranged from 0.7 % ( $\pm$  0.1), (Lačnov) to 1.4 % ( $\pm$  0.6), (Vyrava – Zboiné). The content of essential oil was influenced by the factor of locality and the collection year. We have found statistical significant differences in content of essential oil between Vyrava - Zbojné locality and localities Hôrka - Kišovce, Lačnov and Spišský hrad. It was also found statistically significant difference between Hôrka -Kišovce locality and localities Milpoš and Lačnov (method LSD, 95%). The high difference was found between the year 2012 and year 2014. In the year 2014, essential oil was accumulated in two to three times more than in the year 2012. It was confirmed by statistical evaluation of the variance analysis method. The following components were determined in the essential oil:  $\alpha$ -pinene,  $\beta$ -pinene, sabinene, β-myrcene, limonene, terpinen-4-ol, borneol, bornyl acetate and βcaryophyllene. a-Pinene was found as the dominant component of the essential oil. Its content was detected in an amount from 33.5 % ( $\pm$  7.8) (Spišský hrad) to  $40.7 \% (\pm 7.6)$  (Mil'poš) and  $40.7 \% (\pm 8.4)$  (Lačnov), respectively. No statistically proved difference was in the content of  $\alpha$ -pinene for different localities. However, statistically significant difference was observed between years 2012 and 2014 (Method LSD, 95%).

Keywords: berries, biodiversity, essential oil, a pinene, Juniperus communis L.

Acknowledgement: This contribution is the result of implementation of the projects: VEGA 1/0882/12 "Evaluation of natural sources biodiversity of common juniper (*Juniperus communis* L.) with possibilities of their using in distilling industry" (2012-2014) and APVV 14-0843 "Research of possibilities of growing juniper (*Juniperus communis* L.) for the production of fruits" (2015-2019).

## Identification of erosion processes in agricultural land

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#### Abstract

Erosion processes in agricultural land caused by the intensification of agriculture can be considered an environmental hazard with a significant impact on the environment. Effective identification and elimination of erosion processes in the land will reduce the risk of eutrophication, soil contamination, fouling of water resources, conservation and production capacity of soils. Research on erosion processes is implemented in Slovakia for several decades. The problem is to determine the criteria to distinguish between eroded, potentially eroded soils and soils without erosion. A good identification tool as satellite images that can be used on areas with possibly resulting erosion. Importances are also currently used models. Their disadvantage is finding expression only potential erosion processes in the area.

The aim of the research is to identify the current state of erosion processes in the intensively agricultural upland land. The identification was made on the basis of confrontation and documentation available data and aerial images with surveys in the field in selected localities. Eroded soil appears under color differences between eroded soil and soil without erosion. Erosion processes are in aerial images bright oval or indented amoebic areas. During the survey we have also been used indirect factors of erosion soils monitoring e.g. identification of vegetation cover damage, potholes, areas without vegetation. Based on the findings of the current status the area with the real erosion will be selected. The next step of research will be the evaluation of the current land use with a focus on ecostabilizing elements of the landscape.

Keywords: erosion processes, agricultural land, identification of water erosion

Acknowledgement: The importance of identifying areas at risk of erosion is applied in spatialplanning practice of agricultural land. Fieldwork implementation and results so far have been developed with the support of KEGA 042 UKF-4 / 2014.

## Influence of rebaudioside A and isomaltulose on textural and sensory properties of goat yoghurt

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#### Abstract

The aim of this study was to investigate the effect of rebaudioside A and isomaltulose as sugar replacers on texture and sensory parameters of goat yoghurts during the cold storage. Five types of sweetened yoghurts were produced (8% of sucrose, 8% of isomaltulose, 0,04% of rebaudioside A, mix of 4% sucrose and 0,02% rebaudioside A, mix of 4% isomaltulose and 0,02% rebaudioside A). The acidity and textural properties of samples were analyzed on the 1<sup>st</sup>, 7<sup>th</sup>, 14<sup>th</sup> and 21<sup>st</sup> day of storage. Yoghurts were also assessed by sensory panel.

The addition of sweeteners did not impact on the pH of yoghurts, while the titratable acidity of yoghurts with rebaudioside A was higher than the general acidity of the other yoghurts during the whole period of cold storage. Moreover, it was showed a decrease of general acidity in samples with isomaltulose in comparison to yoghurts sweetened with sucrose. The weakest hardness, gumminess and springiness of yoghurt's curd was shown in the samples sweetened with isomaltulose, but the addition of steviol glycoside improved the texture of yoghurts. Similar texture values, as in samples sweetened with rebaudioside A, were shown in yoghurts with sucrose. The least wanted from the assessed yoghurts were fermented beverages sweetened with rebaudioside A, because of the most intensive sweetness, which seemed abnormal and unnatural. Yoghurts with isomaltulose were the least sweet but the sweetness was perceived as a natural.

Isomaltulose as a sweetener caused worse texture while the rebaudioside A caused worse taste of the goat yoghurts. Mixture of these sweeteners showed better texture and acceptability.

Keywords: rebaudioside A, isomaltulose, goat yoghurt, texture

# Influence of the dose of calcium bisglycinate on dynamic of the fermentation, syneresis, colour and texture of yoghurts

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#### Abstract

A priority element in process of fortification of milk fermented beverages a is a proper selection of compounds that are mineral carrier. The presence of lactose and lactic acid, which is produced in yoghurt fermentation, has also a positive effect on the improvement of absorption of calcium. Moreover, calcium bisglycinate is better absorbed by the body than inorganic forms of calcium. The aim of this study was to determine the influence of applied dose of calcium in the form chelate on the on dynamic of the fermentation, syneresis, colour and texture of yoghurts.

Milk was enriched in 0, 10 and 20 mg of calcium (for 100 g of milk), heated (45°C) and inoculated with FD-DVS YC-X16-Yo-Flex starter culture (Chr. Hansen, Netherlands). Fermentation was conducted in 45°C for 4 hours – milk enriched in calcium bisglycinate, and 5 hours – test samples. During the milk fermentation pH and general acidity was controlled in every 60 min. The assessment of the influence of addition of calcium bisglycinate on syneresis, texture and colour of yoghurts was conducted after finished fermentation and cooling down to 5°C.

The most intensive fermentation with thermophilic cultures was proceeded in milk fortificated in 20 mg of calcium (for 100 g of milk). Fortification of yoghurts in calcium bisglycinate increased whey leakage. Moreover, the dose of calcium substantially differentiated luminosity and chromaticity of colour parameters of fermented beverages. In test yoghurts the brightness L\* was 97.06, while in the yoghurts fortificated in 10 mg of calcium (for 100 g of milk) L\* =99.29, and in yoghurts enriched in 20 mg of Ca /100 g of milk brightness was 98.88. Colour a\* ranged from -4.62 in yoghurts without addition of calcium, to 4.68 in yoghurts fortificated in 20 mg Ca/100 g, and presented differences were significant (p≤0.05). Moreover, the yellow colour tone, defined by the parameter b\*, ranged from 12.90 in test sample to 13.48 in fermented beverage enriched in 20 mg of calcium (for 100 g of milk), and presented differences were significant (p ≤0.05). With increasing doses of calcium in yoghurts decreased hardness, adhesiveness, gumminess and chewiness.

Keywords: yoghurt, calcium, bisglycinate

## Lyophilisation technology for processing extracts of small fruits – the New Patent

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#### Abstract

Lyophilisation (freeze-drying) is done using a simple principle of physics called sublimation. This technology is important in pharmaceutical, food and cosmetic industries. The process of freeze-drying consists of the standard steps: freezing at atmospheric pressure and evacuation in reducing pressure. On a larger scale, freezing is usually done using a freeze-drying machine. In this step, it is important to cool the material below its triple point, the lowest temperature at which the solid and liquid phases of the material can coexist. This ensures that sublimation rather than melting will occur in the subsequent steps. Larger crystals are easier to freeze-dry. To produce larger crystals, the product should be frozen slowly or the temperature can be cycled up and down. The aim of the research studies is to use and optimize the lyophilization technology, as a fundamental procedure, for processing extracts of small fruits (bilberry, blueberry, elderberry, chokeberry, blackcurrant and grape vine) and isolation of pure anthocyanins (Patent No. 104/2012). By removing the water from the material and sealing the material in a vial, the material can be easily stored, shipped, and later reconstituted to its original form for injection. The research deals with an optimize extraction and freeze-drying procedures in order to the natural products. The cooperation is with the pharmaceutical company in Slovakia, which are used a freeze-drying technology to increase the shelf life of products, such as vaccines and other injectables As above the general isolation of natural preparations use the distillation and extraction methods. Both these ways are using various species of solvents and a higher temperature, which are effected directly to stability and decomposition of sensitive components. Method of freeze-drying is different and the isolation of natural components by freeze dryer produces a finished product in a freeze stage under vacuum. These conditions are given stabilization of natural preparations and minimize the oxidative and degradation processes.

Keywords: isolation, conditions, natural preparations, small fruits, technology

Acknowledgement: The research was supported by the Ministry of Education, Science, Research and Sport, Slovak Republic in the project: *The Isolation of Plant Natural Components by Lyophilization Process and Modification of their Qualitative-Quantitative Properties* (No. 00162-0001 /MŠ SR-3634/2010-11/).

## Multispectral control of water bodies for biological diversity with the index of phytoplankton

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#### Abstract

Water protection of natural water bodies are complex systems that include roses, committed by inorganic and organic matter, suspended particles of different origin, aquatic organisms and so on. When water pollution is making them matter or energy that changes the functioning of aquatic ecosystems, energy flows and materials, performance and number of bio-tech populations. Water pollution and complex human impact on water bodies leads to changes in the concentration of dissolved substances may exceed the maximum permissible value; changes in the concentrations of suspended particles and the ratio between the volume concentration of particles of certain types; changes in populations of aquatic organisms in aquatic ecosystems. In the result would change the properties of the water body and the risks to living resources and ecosystem health.

One of the integral parameters of water pollution is the volume concentration of part-NOC certain types and relationships between them, which describes the state of aquatic ecosystems. Investigation of optical-physical parameters of suspended particles could be based on the scattering indicatrix characterizing parameters averaged particle environment (when using deep mode) or separate particle parameters (using scanning flow cytometry); besides particle parameters may be defined by their images obtained by CCD-camera in running the measuring cell.

Improved mathematical models of population dynamics in aquatic ecosystems phytoplankton through a system of recurrent equations that allowed consideration of phytoplankton depends on temperature, light exposure, concentration of nutrients and toxic substances. A mathematical model to simulate the change ratio relative populations of phytoplankton in the water pollution and evaluate integrated pollution characteristics based on changes Simpson index and Shannon.

A new method of measuring television multispectral eco-logical control of water facilities for phytoplankton parameters that reliably assess the condition of the ecosystem water body.

Keywords: environmental monitoring, controlling, measuring control TV, water, phytoplankton

## New enzyme-chemical methods for determination of methanol and formaldehyde in the environment and food products

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#### Abstract

Formaldehyde and methanol are considered as the most important commercial chemicals due to their broad application in industrial synthesis of a large number of organic compounds. However, they are very toxic. Alcoholic beverages may contain the minimum allowable impurities of methanol; however, there are cases of poisoning including fatal when consuming beverages, acquired in the trade network. Therefore, it is important to define the content of these substances. The aim of this study was to develop new enzyme-chemical methods for determining methanol in alcoholic beverages and formaldehyde and methanol in waste waters. In the proposed approach, methanol is analyzed by monitoring formaldehyde (FA), produced in alcohol oxidase-catalyzed reaction, followed by formation of colored product in reaction of FA with Purpald with previous masking of FA in reaction with MBTH. Using the developed method, methanol content was determined in a variety of strong alcoholic beverages like cognacs, whiskeys, vodkas and "sliwowica". For simultaneous analysis of methanol and formaldehyde in mixtures, including industrial waste-waters, alcohol oxidase oxidizes methanol to formaldehyde, while MBTH plays a double role: (a) in the first step of the reaction, it forms a colorless azine adduct with pre-existing and enzymatically formed formaldehyde and prevents its further oxidation by alcohol oxidase; (b) in the second step, non-enzymatic oxidation of azine product to cyanine dye occurs in the presence of ferric ions in acid medium. This method has been proved for model solutions, for real samples of technical formalin and real industrial wastewaters.

#### Keywords: Enzyme-chemical method, alcohol oxidase, MBTH, Purpald

Acknowledgement: This work was supported by the Cross-border Cooperation Programme Poland–Belarus–Ukraine 2007-2013 no IPBU.03.01.00-18-452/11-00 and by the Polish Ministry of Science and Higher Education grant (decision number 3020/PBU/0755/11/13/2014/2).

## Occurrence and prevention of *Trichinella* spp. in the Prešov region

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#### Abstract

Trichinella is a helminth parasite, infecting also humans. Agents of many human and animals diseases caused by parasites circulate in nature. Wild animals sustain even serious infections without any symptoms, whereas man becomes seriously ill. Nowadays Trichinella parasite is wide-spread in the whole area of Slovakia. Its main reservoirs are carnivorous and omnivorous animals living close to human habitation, which become the risk of infection. Trichinelosis is one of the most spread parasitosis in the world. The aim of our project was to perform survey about the occurrence of Trichinella in the Prešov region, to analyze the occurrence of the parasite in wild boars and red foxes in the Prešov region, to compare the method of artificial digestion and compression method, to verify the chosen precautions in practice and propose practical usage of the obtained results. The observations were made at home, during the examination we were accompanied by a veterinary doctor, the samples from dead animals were gained from the Veterinary Institute in Prešov. For examination we used the method of artificial digestion and the compression method. In 2013 we discovered 13.3 % prevalence of trichinellosis in foxes and 0 % prevalence among wild boars. In winter 2014 we did a verifying research, focused on the threatened areas, the monitored animals were foxes. So far we have examined 22 samples, 7 of which were positive (31.8 %). All the positive samples were examined by both methods - digestion and compression, only 2 accordant results out of 7 positive samples were obtained. We performed an experiment of the vitality of larvae of *Trichinella britovi* in the frozen muscles of a mouse infected with the reference strain

Keywords: Trichinella, human, Trichinelosis, animals

### Peppermint, *Mentha* × *piperita* L., - the New Variety "KRISTINKA"

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#### Abstract

Peppermint, *Mentha* x *piperita* L., is a plant which represents the oldest and traditional medicinal herbs used both Eastern and Western traditions till recent time. The peppermint has a history of use in herbal medicine dating back to ancient Egypt, Greek and Roman times, although they may not be used for the same reasons. The wide therapeutic effects of peppermint dry drug but much more essential oil using in the human medicine has become peppermint precious applied in pharmaceutical industry. Peppermint essential oil has unique therapeutic properties which have been documented by use throughout history as one of the most well-known essential oils. Peppermint oil is a very grateful agent to allay nausea and vomiting, indigestion, fevers, flatulence, headaches, migraine, liver problems and arthritis. It is stimulating to the nervous system, cooling to the body for fevers or in hot weather.

The world peppermint production is realized by the large – scale cultivation upon the suitable intensive practices. Study on the qualitative – quantitative characteristics of the peppermint essential oil produced under agro-ecological conditions of the Eastern Slovakia confirmed its high composition of the Menthol [70 – 75 % of herbs and 80 - 85 % of leaves] of essential oil [2.6 %] into the dry raw material. Suitable Menthol content of peppermint cultivated in Slovakian provenience destines this peppermint gene material for the breeding of new variety "Kristinka", which was registered by the Slovak Ministry of Agriculture in 2013.

Menthol activates coolness feeling on the skin by the specific irritation of nervous axons with the desensitisation in the locality of application. It has an anesthetic, antiseptic, antibacterial affects, removes the itch and reduces gland secretion. It is suitable carminative and antiemethicum.

#### Keywords: breeding, essential oil, menthol, new variety, peppermint

Acknowledgement: This contribution is the result of implementation of the project: "The Use of R&D for Breeding of Medicinal Plant New Cultivars" (ITMS: 26220220013) supported by the Agency for the Structural Funds of EU.

### Phthalate esters determination in industrial soil

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### Abstract

Phthalate esters are industrial compounds widely used as softeners in plastics. They are world-wide produced in high quantities. Because their persist ency they are ubiquitous environmental contaminants and they are in the Normans list of new environmental emerging substances. Some of them are carcinogenic and also with estrogenic effect on living organisms. This paper describes results of investigation of the presence dimethyl phthalate (DMP), diisobutyl phthalate (DiBP) and diethyl phthalate (DEP) in industrial soil in the PVC flooring's factory. 10 samples of top 30 cm layer soil were taken, on the industrial site with agrochemical probe. Soil samples are distributed around the place where was tank with phthalate esters before it removed as a result of implementation of ISO 14000 in the factory. Soil samples are dyed, homogenized and extracted using appropriate USEPA 3500 series method. Extracts were purified on alumina and analyzed with gas chromatography with electron capture detection according to USEPA 8061A. Instrument were Agilent GC-ECD 7890B (G344B), Serial#CN14043041 equipped with auto sampler GC80 and Agilent HP-5 column (30 m x 0,32 mm x  $0.25 \,\mu\text{m}$ ) in temperature programmed owen. It was found that concentration of all three phthalate esters decreased with distance from previous tank position. DMP concentration was much higher than other two compounds probably because DMP is result of degradation of higher esters. High concentration of the phthalate esters in soil can be the source for contamination of ground waters and also river Danube which is running nearby.

#### Keywords: phthalate esters, industrial soil, GC-ECD

Acknowledgements: The work is financed by Ministry of education, science and technological development of Republic Serbia, number: III 43010.

### Phyto-toxic activity of the essential oil from canadian goldenrod (Solidago canadensis L.)

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#### Abstract

Representatives of the Solidago genus, Solidago canadensis (*Solidago canadensis* L.) and giant goldenrod (*Solidago gigantea* Aiton) originating from North America are currently found to be one of the most serious invasive neophytes in Slovakia. Their representation in indigenous communities has grown particularly since the 90s of the 20th century. One of the main mechanisms of plant invasion is production of metabolites that hinder germination and growth of other plant species.

This work evaluates the phyto-toxic activity of secondary metabolism product - essential oil of selected representative of the Solidago genus, canadian goldenrod (*Solidago canadensis* L.). Essential oil was extracted using distillation method, plant material collected within four localities in the urban and suburban zone of Prešov and surrounding villages Eastern Slovakia was proceeded. Phyto-toxic activity, i.e., effect on the germination and the growth of roots was tested using model organisms *Raphanus sativus*, *Lepidium sativum*, *Sinapis alba* and *Lactuca sativa*.

On the base of obtained results we concluded, that the essential oil from the canadian goldenrod (*Solidago canadensis* L.) has phyto-toxic activity and could be potentially used for the development of the biological herbicides.

Keywords: allelopathy, essential oils, phytotoxicity, invasion, Solidago Canadensis

### Potentiometric determination of anionic surfactants

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#### Abstract

World production of surfactants is estimated at 15 Mton/y. The commercially most significant type of surfactants is currently the sulfonate anionic surfactants (2.3 Mton/y), which is widely used in cleaners and detergents. These surfactants often cannot be completely removed or can be completely removed only with many time pure water washing.

Anionic surfactants mainly show eye and skin irritation potentials. The dual character (lipophilic and hydrophilic) of anionic surfactants facilitates their accumulation in living organisms. Thus the development of reliable methods for fast and accurate determination of small amount of anionic surfactants in textile is very important.

Various techniques are known for the determination of low levels of anionic surfactants. In our study we used potentiometric titration as fast, cheap, reliable and quite simple method. This technique let us to avoid time-consuming extraction and preconcentration procedures.

We construct a simple, cheap, long lived and high sensitive cetylpyridiniumion selective electrode with polyvinylchloride base, o-nitrophenyloctyl ether as plasticizer and cetylpyridinium-tetraphenylborate ionic associate as ion active compound. Cetylpyridinium chloride was used as titrant.

We developed a technique for determination of total quantity of anionic surfactants in the form of sodium dodecyl sulphate in domestics and in wastewater. These method characterized with good reproducibility (Sr = 0.05, n = 3, P = 0.95) and it can be carried out automatically.

Keywords: ion selective electrode, waste water, domestics, anonic surfactant

## Radioecological monitoring of groundwater resources in the Chernobyl exclusion zone

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#### Abstract

The general characteristic of water resources of the Chernobyl exclusion zone is presented. The main waterway, the most important and the largest tributary of the Dnieper is the Pripyat. Modern hydrography of the Pripyat consists meandering, tranquil rivers, many land reclamation canals, artificial lakes and swamps.

Methods of radiological monitoring of groundwater in Chernobyl exclusion zone are given. Monitoring results can be used for prediction the state of pollution and they are the basis for calculations of radionuclide migration in the Dnipro cascade. Also using these results we can determine the suitability of water for drinking water supply, for irrigation, definite priorities in water protection activities to reduce the negative impact of radioactive pollution on staff and the public.

According to the physical state of the objects such as points of radioactive waste and temporary points of radioactive waste in exclusion zone, and the total activity of groundwater pollution, the greatest danger in the near future will be on such objects as "Red Forest" - (districts of Budbasa and Yanivsky backwater), district cooling pond PC-14, district "Pidlisny" and Lake Azbuchyn. The smallest danger of groundwater pollution will be on objects in district "Buryakivka" and the solid waste landfill near village Leliv. Other objects are medium dangerous.

In evaluating the total content of radionuclides <sup>137</sup>Cs and <sup>90</sup>Sr in groundwater is found that the basic way, when radionuclides get into water is a washout of activity in surface waters of the river. Amount of radionuclides in the Pripyat from the territory of Belarus is estimated at approximately 50 Ci/year. The washout of surface waters in the Pripyat from the territory the Chernobyl exclusion zone is estimated as of 50 Ci/year. Rivers Uzh and Brahinka add about 3.4 and 7.5 Ci/year of <sup>90</sup>Sr.

In closed ponds of exclusion zone for many years will be kept high levels of water pollution. The main factor in the self-cleaning of none closed water objects from pollution are internal processes and sedimentation in the soil. Water objects compared with closed ponds relatively quickly cleared from radionuclides by constant washout.

**Keywords**: environmental radiation monitoring, exclusion zone, radioactive pollution, radioactive elements, water resources, radioactive waste

## Reduction of selected spoilage bacteria by *trans*-2-hexenal, lactic acid and hydrogen peroxide on minimally processed cabrage and carrots

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#### Abstract

This study was carried out in order to improve the microbiological safety and shelf-life of minimally processed cabbage and carrots at 16°C. Salad vegetables can be a source of opportunistic pathogens and spoilage bacteria – namely, *Aeromonas hydrophila*, *Aeromonas sobria* and *Pseudomonas syringae*. The inhibitory potential of *trans*-2-hexenal, lactic acid and hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) against the selected bacteria was assessed in vitro and in situ conditions using their respective Minimum Inhibitory Concentration (MIC). Application of *trans*-2-hexenal and lactic acid caused a significant decrease (p < 0.05) in bacterial count in in situ conditions during 6 days of testing. Lactic acid and *trans*-2-hexenal showed the highest inhibitory potential for concentrations <sup>3</sup>/<sub>4</sub> MIC and 2 MIC, respectively, depending on the tested bacteria and substrate. H<sub>2</sub>O<sub>2</sub> showed the lowest inhibitory potential regardless of the testing conditions.

Keywords: microbiological safety, spoilage bacteria, minimally processed vegetables, inhibitory potential

## Research of possibilities of growing juniper (*Juniperus communis* L.) for the production of fruits

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#### Abstract

Common juniper berries (Juniperus communis L.) is an important and essential raw material in the distilled spirits industry. They need to declare Slovak distillers to approximately 500 tonnes per year. Since juniper is also one of medicinal, aromatic and spice plants, is negligible and its use in the cosmetic, food and pharmaceutical industries. Paradoxically, juniper berries necessary for the production of liqueurs, syrups and other products in Slovakia are currently only provided by imports from Albania and Mecedonia, while it is mostly about prickly juniper berries (Juniperus oxycedrus L.), which contain large amounts of sugar, but the other hand, have less aromatics compared with common juniper berries. Imports juniper adversely affects the balance of foreign trade and produces distilled spirits industry for our continued dependence on raw materials, the price of which in recent years increases proportionally with decreasing offers plenty of juniper market. Perhaps regrettably noted that despite the fact that Slovakia has suitable soil and climatic conditions and lack of suitable areas for intensification of its cultivation, domestic production juniper is minimal. The solution to this situation offers the proposed project, in which knowledge will be gained from research juniper populations in Slovakia, focusing on chemo type characteristics, ecological environmental factors (soil conditions, climate), inside – ecosystem relationships used to design a suitable method of propagation juniper, nursery production female and male subjects, the selection of suitable sites for planting and design of technological process for plantation cultivation for the production of juniper berries.

Keywords: alcohol, beverage, biodiversity, monitoring, genus, industry, Juniperus

Acknowledgement: This research was supported by the Slovak Research and Development Agency (SRDA), the project: APVV-14-0843: "Research of possibilities of growing juniper (*Juniperus communis* L.) for the production of fruits".

## Riboflavin production by the recombinant *Candida famata* yeasts strains

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#### Abstract

Riboflavin, also known as vitamin B2 or additive E101, is an easily absorbed micronutrient with a key role in maintaining health in humans and animals. It serves as biosynthetic precursor of flavin nucleotides FMN and FAD used as coenzymes by flavoproteins. As such, vitamin  $B_2$  plays a key role in energy metabolism, for metabolism of fats, ketone bodies, carbohydrates, and proteins. Recently, applying approaches of random mutagenesis and metabolic engineering, a riboflavin overproducing strains of the flavinogenic yeast Candida famata were constructed. The aim of this work was optimization of cultivation conditions for maximal accumulation of riboflavin by the isolated recombinant strain C. famata #91. A series of experiments were first carried out to study the effects of various nitrogen and phosphate sources on the riboflavin production by the C. famata #91 strain. The riboflavin production in the media containing different nitrogen sources as  $(NH_4)_2SO_4$ ,  $(NH_4)_2HPO_4$ , urea, glycine and different phosphate sources as KH<sub>2</sub>PO<sub>4</sub> and K<sub>2</sub>HPO<sub>4</sub> were studied. The best results were obtained added to optimize medium composition at a concentration of : urea - 1,5 g/L; glycine -2g/L; KH<sub>2</sub>PO<sub>4</sub> - 0,3 g/L; K<sub>2</sub>HPO<sub>4</sub> - 1,2 g/L. Fermentation of C. famata #91 strain under optimized strategy in batch cultivation conditions allowed to reach riboflavin titer of 7.3 g/l and biomass production 57.4 mg/ml in 96 h. Thus, optimization of cultivation conditions led to a noticeable improvement in riboflavin production by the recombinant C. famata strain.

Keywords: riboflavin, Candida famata, optimization

### Seasonal variability of content and composition of essential oil from Solidago species grown in Prešov surrounding

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#### Abstract

The main problem in many ecosystems are invasions of non-native plants or animals. They present serious threat for environment. Large area in Prešov surrounding is occupied by the monocenosis of the genus Solidago. The species of the mentioned genus were introduced as ornamental flowers from the American continent. Nowadays are in the list of invasive species which supress native flora. There are some scientific works described their secondary metabolites.

The aim of this work was to evaluate the seasonal variability of the qualitative compositions of essential oil (EO) produced by the *Solidago canadensis* occurred in East Slovakia. Following aims compared the composition and quantity of EO extracted from different plant organs as are leaves, stems and flowers in three different plant developmental stages. Samples were collected from four localities.

On the base of our results, we have identified dominant components of EO  $1R-\alpha$  – pinene,  $\beta$  – pinene, limonene, bornyl acetate,  $\beta$  - elemene, germacrene D,  $\beta$  – gurjunene a  $\delta$  – cadinene. The quantitative and qualitative differences were evaluated in different plant orgas as well as in different developmental stages and collection locality.

Keywords: biodiversity, goldenrod, invasive species, sesquiterpenes

## Selected morphological parameters of the canadian goldenrod (*Solidago canadensis* L.)

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#### Abstract

Canadian goldenrod (*Solidago canadensis* L.) originating from North America represents one of the most wide-spread neophytes in Slovakia. However, impact of the ecosystem changes connected with the goldenrod invasion on the abiotic and biotic components are still not absolutely clear. Experiment deals with the evaluation of 29 morphological parameters, analysis was performed on the 599 plant specimens. Plant material was collected during May-October of the season 2014 within 12 localities in the urban and the suburban zone of Prešov and surrounding villages in eastern Slovakia.

The highest measure of growth achieved canadian goldenrod on the beginning of August, what is in accordance with several authors. We hypothesis, that goldenrod will thrive mostly on the soils with higher moisture as well as it will achieve higher measure of growth within vegetation with higher density of specimens per surface unit. However we did not confirm neither one of our hypothesis. We also did not observed any correlations between measured morphological parameters and selected environmental variables. On the base of the results obtained, we also concluded, that Regular harvesting seems to be an effective tool for protecting the native grasslands against invasion, as well as the mechanism for removing the goldenrods from previously invaded areas.

Keywords: Canadian goldenrod, plant neophytes, morphological parameters

## Small fruits extracts in ABTS radical scavenging assay

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#### Abstract

For ABTS assay, the procedure followed the method of Re et al. with some modifications. ABTS radical cation (ABTS++) was generated by incubation of 2,2'-azino-bis(3-ethylbenzothiazoline-6-sulphonic) acid stock solution (7 mmol/L) with potassium persulfate (2.45 mM) in the dark, at room temperature, for 12-16 h. The solution was then diluted with ethanol in order to obtain an absorbance of 0.68-0.72 units (measured at 734 nm). Fresh ABTS++ solution was prepared for each assay. Extracts (Aronia melanocarpa, Vaccinium myrtillus, Vaccinium corymbosum, Sambucus nigra) were dissolved in dimethyl sulfoxide; each dilution (0.02 mL) was mixed with ABTS++ solution to a total volume of 2 mL. The absorbance at 734 nm was recorded 6 min after mixing. Quercetin and gallic acid were used as positive controls. The scavenging activity was calculated using the following equation: ABTS radical cation scavenging activity (%) =  $100 \times (Acon$ trol – Asample) / (Acontrol), where Acontrol is the absorbance of the control and Asample is the absorbance in the presence of extracts or positive controls. In order to calculate TEAC values (Trolox equivalent antioxidant capacity), Trolox was used as standard. For extracts and positive controls there were selected three concentrations (µg/mL) producing a percentage of absorbance decrease in the most linear region of Trolox curve (20%-80% activity). Percentage of absorbance decrease as a function of selected concentrations was plotted for each extract and positive control. TEAC (µM concentration of Trolox equivalent to 1 µg/mL extract/positive control) was calculated as the ratio between the slopes of doseresponse curves of extracts/positive control and Trolox. ABTS scavenging activities of tested extracts were significant and increased with their concentrations. The antioxidant capacity measured by ABTS method ranged from  $0.40 \pm 0.0$  to  $3.10 \pm 0.01 \mu$ M Trolox. The EC50 values and the Trolox equivalent antioxidant capacity (TEAC) values were the highest for Aronia melanocarpa extract, while the less active sample proved to be Vaccinium myrtillus. Gallic acid was more active than quercetin; only 1  $\mu$ g/mL gallic acid was needed for 92.85  $\pm$  0.05% scavenging activity. The EC50 values and the TEAC values indicated that the positive controls were more active than the investigated samples.

Keywords: antioxidant activity, blackberry, elderberry, chokeberry

Acknowledgement: This research was supported by the Slovak Research and Development Agency (SRDA), the project: SK-RO-0002-12 "Monitoring of Anthocyanins Content in Selected Plant Species and Determination of their Antioxidant Activity".

### Succession processes in artificial channel

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#### Abstract

The construction of new artificial river bed, nearly 3 km long, continuously (barrier-free) connected with original native stream is worldwide very rare phenomenon. Our study examined the initial ichthyofauna changes, parasitic infection of fish and macrozoobenthos structure in the old and new channel of this stream. Samples were performed on 5 localities in 4 sampling during the years 2009 - 2010. Three localities were selected in the new channel and two in the old channel. The new channel was colonized by dominate fish species of the old channel – the typical rheophilic A and species with wide ecological valence. Statistical analysis confirmed significant interaction between coefficient of fish condition and type of channel. Analysis showed statistical significant differences in parasitic infection and coefficient of fish condition. Macrozoobenthos colonized the new channel relatively quickly. Our results seem to be close to the 400 days. Downstream movement of macrozoobenthos was probably the most important source of colonisation in the Nitra River.

Keywords: artificial channel, succession, fish, parasitic infection, macrozoobenthos

Acknowledgement: This research was supported by the Slovak Grant Agency VEGA – project No. 1/0847/13.

# Suggestion of the management optimization of the Osturnianské jazerá lakes present status

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#### Abstract

Natural reservations, Veľké Osturnianske jazero lake and Malé jazero lake laying within urban zone of Osturňa village, north-eastern part of Slovakia. They belong to the NATURA 2000 network as well as to protective zone of the Pieninský national park. Within succession process, lakes grow up with plants, what deals to their drying-out. In aim to keep their natural character as well as their landscape and ecological function, it is necessary to optimize their condition and slow down this succession process. This work deals with the concrete management steps proposed on the stands and aquatic faunal communities proper reconnaissance:

- on the road communication localised upon the lake (Malé jazero) we propose to adversely place opened, dewatering channel which will drain rain water in the direction to lake; in the forest which separates road communication and lake to create narrow corridors; we suppose, that proposed steps will prevent rain water to flow down on the contour line and enhance it flow in the direction to the lake,
- on the both of localities to excavate several holes able to fitfully keep higher amount of precipitation in the rain time; such a holes could in the dry period play role as the refugia for local aquatic faunal communities,
- to remove successional pioneer vegetation and part of pine monoculture within lakes coastal zone, and in that way to create small coastal islands and broad the coastal zone; we suppose, that proposed steps could help to increase microhabitats heterogeneity in the lakes surroundings and also to delay source of pioneer vegetation,
- to build up adverse dam in the lowest point of the both lakes, what could help to keep the water in the lake bodies; the wooden mass obtained by the pine monoculture removal (mentioned in previous point) could be use within this step.

Keywords: management, optimalization, succesion procces, Osturňa

### Surface water quality of coastal zone North Western Black Sea

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#### Abstract

According the World Bank definition the coastal zone is zone of interaction of land and ocean environment of the coastal line including and the shallow water as well. The definition of the European Commission is the land and the sea zone of interaction with the width depending on environment characteristics and managements tasks. The coastal zone includes the littoral and beaches, wetlands, surface water, limans (estuaries), the land for agriculture using, cities and industrial territories. The goal of the investigation is evaluation of the water quality of the surface waters of the coastal zone North Western Black Sea. The North Western Black Sea includes Odessa, Nikolaev and Kherson regions. The object of investigation is the surface waters in these regions.

In result of investigations it was established that water quality of the Dniester river in Odessa region characterized as I "slightly polluted", II –"polluted" and III b "very polluted". The maximum level of pollution of the Dniester river was recorded in the period from 2006 to 2008. The water quality of Nikolaev region is very stable and characterized as "very polluted". In 2005 and 2007 the water quality was "dirty" according of index IVa. The max of combinatorial pollution index had been marked in 2005 and from 2008 small tendency of decreasing had been marked. The surface water quality of Kherson region characterized as "very dirty" IVa – IVc. Max level of pollution was in 2005 – 2008 but at the beginning of 2008 the decreasing of pollution index was marked and some improvement of water quality was marked respectively. Thus, the condition of surface water in the coastal zone of the North Western Black Sea has not sharp variability during the last four years and was stable, but it was not good.

Keywords: coastal zone, surface waters, quality, combinatorial pollution index

# The assessments of the impact of irrigation on soil – vegetation cover in Dnepropetrovsk region

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#### Abstract

At the time of irrigation is increasing human pressure on the objects of environment and creating preconditions for aggravation of the environmental situation. One of the reasons is quickly strengthening role of the surface, intra-soil and drainage wastewater in the migration of various elements including heavy metals.

There was decided the problem of studying the regularities in the distribution of heavy metals and radionuclides in the soil - vegetation cover in Dnipropetrovsk region and determine the degree of contamination in natural waters (surface, groundwater, drainage) and soil these elements.

In ecological researches of recent decades, considerable attention is directing by the characteristics of absorption and migration of polluting elements in the soil cover. In this case is using a system approach developed by R.M. Alexahinym and N. A. Korneevym, also P.H. Naiy and P.B. Tinker regarding transformation solutions in system "soil cover - plant". These approaches have been used in this work.

Growing crops under irrigation leads to problems of radioactive contamination of soil and plants. As a result, additional irrigation is getting polluting elements, the main ones are heavy metals and radionuclides. In terms of Dnipropetrovsk region the least possible contamination with heavy metals will be with using irrigation water from Frunzivska irrigation system. For reduction of radioactive contamination is desirable to use furrow watering method. In this case, the lowest average coefficients of radionuclides transfer from soil to plants received for black soil.

Keywords: heavy metals, radionuclides, irrigation water, soil - vegetation cover

## The effect of extract purification on the Blackcurrant lyophilizates composition

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#### Abstract

Anthocyanins are natural food colorants with strong antioxidative properties and ability to improve of eyesight, to reduce a blood pressure, to inhibit the mutations, due to their strong anti-inflammatory and antimicrobial activities and ability to suppress a proliferation of human cancer cells. The fruits of blackcurrant (*Ribes nigrum*) is well known natural source of anthocyanins. The present study is dedicated to extraction, purification and lyophilisation of anthocyanins from blackcurrant, cv. Titania.

The extraction was carried out by using acidified ethanol-water solution. Both, non-purified and purified (solid phase absorption - silica gel 100 C18 adsorbent) extracts were used for lyophilisation by the GEA Lyophil SMART LYO SL2 equipment. Total anthocyanins were measured by pH-differential UV-Vis spectroscopy method. The anthocyanin profile of blackcurrant was determined using a Dionex UltiMate 3000 Quarternary Analytical LC System with diode array detector interfaced to a Varian 310-MS mass spectrometer with electro-spray ionization source. The total phenolics were determined by the Folin-Ciocalteu method, using gallic acid as a standard.

The significant difference in content of anthocyanins and phenolics between non-purified and purified lyophilisates was found. Non-purified lyophilisate contains 5.06 % of phenolics, incl. 1.97% of anthocyanins. Purified lyophilisate contains 56.28 % of phenols, incl. 36.51 % of anthocyanins. The purity of extract also has effect on process of lyophilisation because of foaming. The lyophilisation of purified extract leads to obtaining of stable compact tablet what is not achievable with non-purified extracts.

#### Keywords: Ribes nigrum L., anthocyanins, freeze drying, total phenolics

Acknowledgement The research was supported by the Ministry of Education Slovak Republic, the project: The isolation of plant natural components by lyophilisation process and modification of their qualitative-quantitative properties (No. 00162-0001 /MŠ SR-3634/2010-11/) and the Agency of Ministry of Education, Science, Research and Sport of the Slovak Republic, the project ITMS: 26110230069.

### The efficiency of wastewater treatment L'landfill

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#### Abstract

The problem of municipal solid waste (MSW) – one of the most pressing environmental problems beginning of the third millennium. A significant contribution to the unfavorable ecological situation make urban solid waste landfills, poisoning their existence soil and air, surface water and groundwater, killing flora and fauna, they are a source of infectious diseases. MSW Landfills serve polluting source of intense ecological pressure on groundwater. The hazard of contamination of groundwater near the landfill solid waste, primarily related to the seepage of contaminated water from the mass of waste disposal facilities abroad, the presence of direct contact with the waste precipitation.

Purpose - Quality Assessment sewage Lviv communal enterprise (LCE) "Zbyranka", which operates the landfill Lviv.

The experience of different countries in the field of clean filtrates landfills, including USA, Canada, Netherlands, Germany, of Denmark, Switzerland, Russia and Ukraine.

The state revenue and the quality of wastewater treatment LCE "Zbyranka". Technology infiltration of water purification station in Lviv physico-chemical treatment consisting of 5 main parts cleaning. Quality of wastewater treatment are: color, clarity, odor, suspended solids, salt content, BOD5, COD, chlorides, ammonia nitrogen, pH.

The analysis cycle recirculation water infiltration and results of the study samples of sewage before and after the purification step. Established that the values of significantly decreased after treatment, suspended solids - from 56.4 mg/dm<sup>3</sup> do18,6 mg/dm<sup>3</sup>; dry residue - with 1784.0 mg / dm<sup>3</sup> do 1466 mg/dm<sup>3</sup>; ammonium nitrogen - from 192.0 mg/dm<sup>3</sup> to 12.5 mg/dm<sup>3</sup>; Nitrates - from 14.6 mg/dm<sup>3</sup> to 8.4 mg/dm<sup>3</sup>; nitrites - from 2.2 mg/dm<sup>3</sup> to 1.6 mg/dm<sup>3</sup>; sulphates - from 156.0 mg/dm<sup>3</sup> to 78.4 mg/dm<sup>3</sup>; chloride - with 3220.0 mg/dm<sup>3</sup> to 482.3 mg/dm<sup>3</sup>; phosphates - from 37.2 mg/dm<sup>3</sup> to 29.8 mg/dm<sup>3</sup>; common iron - from 3.2 mg/dm<sup>3</sup> to 2.8 mg/dm<sup>3</sup>; BSK5 - from 760.0 mg/dm<sup>3</sup> to 64.0 mg/dm<sup>3</sup>; Surfactants (anions, nonionic) - with 1.8 mg/dm<sup>3</sup> to 2.4 mg/dm<sup>3</sup>.

But now virtually no use of recycled materials. The expediency of improving the system of cleaning of landfill leachate using new technologies.

Keywords: landfill, filtrate, pollution, environment, waste water, purification

## The influence of the mycorrhizal fungi for the increasing of the biomass and creating secondary metabolites at commercial useful plants

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#### Abstract

Myccorhizal fungi are a kind of symbiotic relationship and it represents a mutually beneficial coexistence of fungi with the roots of plants. The created mycorrhizal fungi allows a sort of better intake of water and nutrients, mainly phosphorus and nitrogen, and a more efficient transport to the plant. Moreover increases the production of biomass and secondary metabolites of plants. The aim of our study was to assess the effect of mycorrhizal fungi of the genus Glomus for increasing biomass production and their impact on the production of secondary metabolites of selected species of useful plants - basil (Ocimum basilicum L.), common oregano (Origanum vulgare L.) and dragon wormwood (Artemisia dracunculus L.). The experiment was established in three variants with different soil conditions - cultivation in the soil substrate without the addition of mycorrhizal fungi, with the addition of fungi and cultivation in a substrate free of any organic materials. Through hydrodestillation we were capable to extract aromatic oils from plants. Gas chromatography was used for determination the substances contained in extracts quantitatively and qualitatively. Plants of the family Lamiaceae (basil and common oregano) grown in soil with the addition of mycorrhizal fungi of the genus Glomus prospered better than those plants which were grown in ordinary substrate and substrate which has been stripped of organic ingredients. The biomass values of species dragon wormwood were the highest in cultivation in the classical substrate without the addition of AM fungi. Adding mycorrhizal fungi did not affect the quantity of EO in any of the test plants. Variability of the components of EO between variants were determined.

Keywords: basil, biomass, essential oil, Glomus, oregano, dragon wormwood

## The isolation of plant natural components by lyophilisation process and modification of their qualitative-quantitative properties

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#### Abstract

Research activities were focused on the development of the extraction process using a variety of chemical solvents that allow obtaining higher concentration of interested therapeutically active substances and their stabilization by lyophilisation process while maintaining their biological properties. After selecting plant material and its collection, the analyses of environmental toxicity have been made by using AAS, gamaspectrophotometric analysis and GC analysis of concentrations of residues of used pesticides. All results were within the limits. The purpose of the type of extraction was anthocyans isolation in pure form and the results of a suitable method of preparation has been undertaken on the water, ethanol extraction and the method of isolation anthocyanins with acetone and chloroform. Measurement of total anthocyanins in the obtained extracts was carried out by differential spectrophotometry. These extracts were then used to study their stabilization using technology of freeze-drying, chromatography (LC/MS and LC/MS-IT-TOF) determination of the quantity and quality of the types of anthocyanin's in selected plants species and were tested their biological properties. Before lyophilisation, the extracts also determined the residue from solvents and qualitativequantitative analysis demonstrated the presence of any residues. To create an optimal freeze-drving method for each extract separately, cryoscopy analysis were done to carried out the crystallization temperature, sublimation temperature, the primary drying pressure of the primary drying, temperature and pressure secondary drying secondary drying which are important to adjust lyophilisation process. To determine the antibacterial (biological) effects of tested extracts and lyophilisates the modification of laboratory space was done, built to ensure aseptic space and laboratory equipment and chemicals for testing. The final phase of research, which was focused on testing anthocyanin's the methods for in vitro and in vivo were developed to test the anticancer effects of anthocyanin's on their action on cells of established cell cultures, further testing antimicrobial activity of extracts on the potentially pathogenic bacteria strains and also at the microorganisms that may be part of the normal intestinal microflora and testing of their antioxidant activity as the ability to scavenge free radicals.

Keywords: extraction, pharmacodynamics, in vitro methods, LC/MS-IT-TOF, lyophilisation, natural substance

### The problems of ecological safety of the Lviv landfill

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#### Abstract

Because not all awareness of the problem of waste, failure of legal acts, including the Law of Ukraine "On Waste", building codes, environmental degradation is a waste disposal areas and adjacent polygons areas.

The aim is to evaluate the ecological state of the Lviv landfill.

This ground does not meet the criteria for safe use, because it has long exhausted its terms of operation and despite this, he further exploited, the negative impact on all components of the environment that are irreparable harm to life and health of the population region and biota.

Lviv solid waste landfill located on lands Hrybovytskoyi Malehivskoyi and village councils Zhovkva district, its area is 50 hectares, of which 26.5 hectares for waste disposal. At the entrance to the landfill established a new checkpoint, equipped with a barrier - newly built weighing station. On the city operates three landfill sites unloading waste. At the landfill has accumulated more than 200 thousand tons of acid tars - waste Lviv Research naftomaslovoho plant. The company organized a surveillance system to surface and groundwater. This monitoring network established to identify the possible environmental pollution. Also in Hrybovytskoho landfill gas pumping station is that functioned in previous years, but at present time it does not work, and degassing of Lviv landfill is performed. According to the "State sanitary rules of planning and building of settlements," Sanitary Protection Zone landfill between apartment buildings sustained. In Lviv communal enterprise "Zbyranka", which currently operates the landfill, there is no authorization to limit the generation and disposal of waste, but the company will continue conducting and non-permit unlimited dumping of waste at the landfill. Today Lviv solid waste landfill provided three times higher than health standards and terms of its operation.

So, Lviv solid waste landfill is a potential risk of methane emissions that result can lead to spontaneous landfill. Lifetime landfill exhausted, but intense exploiting carried further, leading to disruption of the ecological balance of the landfill. To ensure the environmental safety of landfill must perform immediate and effective reclamation of waste purification process of solid waste.

Keywords: waste, landfill, environmental condition, air environment, groundwater, soil
# The seed production of special crops (medicinal plants)

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#### Abstract

Quality seed of a medicinal, aromatic and spice plants provides a basis for high yield cultivation of these crops of special plant production. Seeds suitable for sowing must have its origin and varietal identity, which is provided by maintenance breeding of particular species. The necessity to perfectly understand plant propagation is the main prerequisite meeting the process of obtaining high-quality seed material. In the past, breeding and seed production of a wider variety of species of medicinal, aromatic and spice plants was conducted by the state breeding stations. Each delivery of seeds was then controlled by the Central Control and Testing Department of the Agricultural Institute. The standard way of placing a seed product on the market begins with validation experiments with a selected plant species or its variety. Experimental work in this case is carried out within 3-5 years. In addition to morphological characteristics of the various stages in plant development, becomes observed also the adaptation ability of a special crop to biotic and abiotic environmental factors, and the accumulation of pharmacologically active components. Obtained seeds are tested according to the norms in the laboratory of a company that is regularly certified by government's agricultural institutions. Subsequently gets concluded a license agreement with the owner of a medicinal plant variety about possible production of seeds and seedlings for the purpose of their selling. The produced seed becomes stored in special rooms with controlled low humidity and low temperature. The purpose of the thesis is to highlight the importance of the seed industry development, while it is important to emphasize that a quality seed still is and will be an initial propagation product for the monoculture, which contains natural substances with healing properties for humans. In a special part of this thesis we focused on a selection of main cultivated species of medicinal plants with an emphasis on their production of seeds.

Keywords: seed embryo, medicinal plants, production & quality, seeds

# The sources of herbal raw material in Slovakia

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### Abstract

Slovak Republic is placed in the Central Europe. It lies in the climatically favorable mild zone of Northern Hemisphere. Nowadays 150 and about 200 medicinal plants are used in the official therapy and in popular doctoring, respectively. A wide range of herbs are now produced in Slovakia and can be divided into three broad categories: - those collected from the wild (either individually or on commercial scale), - contracted supplies from small-scale growers and - large-scale production on agricultural farms. In Slovakia currently around 60 - 70 % of the herbs needed medicinally are collected locally. Successful collection from the wild demands a detailed knowledge of the various species and several publications are available which contain detailed descriptions, photographs and collection methods of the plants needed. Most collectors sell their plants to the bulk-buying centers operated by the Fytofarma Ltd. in Malacky or other private companies. The large-scale cultivation of medicinal plants belongs to the special agricultural production. It is an only way of supply the contracted volume and quality of these crops. This special crop production is of great importance from several points of view in the specialized agricultural farms: \* rational (offering appropriate occasion for unemployed people), \* production (better exploitation of problematic land resources /salty soil, lower quality soils in sub-mountainous or mountainous areas/) and \* economic (from the viewpoint of market value the medicinal plants belong to the most effective agricultural crops). The important elements for optimal technology of medicinal plants cultivation are: selection of biological material, soil cultivation, seeding and planting, nutrition and fertilization, control of harmful factors, harvest, processing and conservation. The Slovak Ministry of Agriculture mandated the Research Institute of Agroecology in Michalovce to elaborate "The Development Programme of Medicinal, Aromatic and Spicy Plant Cultivation and Processing in the Slovak Republic" in 2000 and a monograph "Good Agriculture, Collection and Manufacturing Practice" in 2012. More than 60 specialists from the sector of medicinal plant cultivation, processing, business and science were contacted. All material has presented to the leader-ship of the Slovak Ministry of Agriculture.

Keywords: cultivation fields, conservation, herbs, harvest, program, production, nature

# The use of chicken egg in biomonitoring and toxicological studies of cadmium

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#### Abstract

In birds, the reproductive system is particularly sensitive to heavy metal exposure and avian eggs and embryos are considered to be sensitive indicators of environmental pollution. The aim of the study was to control the contamination of hens egg produced in different husbandry systems in Podkarpackie region with cadmium and lead. Based on obtained results the embryotoxicity of cadmium using *in ovo* model was studied.

The greatest pollution of eggs form free range system was observed as a result of bio-accumulation of Cd and Pb metals from grass and soil, which hens are contacted with. The maximum level found in home-produced eggs was  $301.3 \mu g/kg$  (about 18,7  $\mu g/egg$ ) and 49  $\mu g/kg$  (about 2.9  $\mu g/egg$ ) for Pb and Cd, respectively. The eggs from battery cage system were free of lead and cadmium.

Therefore the in ovo experiment was conducted taking into account exposure dose 1, 3 and 6  $\mu$ g/egg, that mimic the level of cadmium found in polluted environment. Cadmium ions were injected to egg white (50 eggs per group) with live embryos on day 4th of incubation. Hatchability of the chicks after cadmium exposure during embryogenesis significantly decreased, from 69% in the control group to 74, 50 and 44% in the group exposed to 1, 3 and 6  $\mu$ g Cd/egg, respectively. In control group the sex ratio (male:female chicks) 1:1 was observed, whereas during the highest exposure it changed to 2:1.

It has been shown that the heavy metals contamination of chicken eggs produced in Podkarpackie region is strongly related to husbandry system and is affected by place environmental pollution. The average Cd contamination of eggs do not possess risk for birds embryogenesis. However, the increase of environmental cadmium contamination may be an important factor disturbing birds breeding.

Keywords: chicken eggs, cadmium, lead, contamination, embryotoxicity

# The using SH, NH-active 1,2,4-triazoles as ligands for instrumental detection of heavy metals in environment

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### Abstract

In recent years the using of organic ligands for instrumental determination of heavy metals in environment achieved great interest. The objective of this research is to optimize of selection parameters of the analytical forms of heavy metals depending of nature of triazole functional derivatives.

We have synthesized two the most effective triazole–containing ligands for selective & sensitive determination of such heavy metals, as: Hg, Pb, Cd, Cu, Zn, Bi, Cr, and Ni, which is based on spectrophotometric measurement of metal-ligand-(dye-stuff) ionic associate. The ionic associates were prepared by direct interaction of probe with the chelating agent dissolved in organic solvent solutions of and dye-stuff with next extraction with toluene. The sensitivity of metal detection for the proposed methods consist of 0.5-1.2·105 L mol-1·sm-1; that is why they can be successfully used for metal determination in environment. Chelating agents were synthesized according techniques, elaborated by our research group. Ligands of structure I (derivatives of triazolyl dithionic acid) were obtained due to interaction between 1,2,4-triazol-3-thiones and potassium ethyl xanthate; they are active in a cause of Hg, Pb, Cd, and Cu determination. Ligands of structure II (derivatives of triazolyl dithionic acid) were produced by alkaline cyclization of aroyl bisthioureas with next acidification; they are active in a cause of Cu, Zn, Bi, Cr, and Ni determination.

Keywords: eco-monitoring, heavy metals, SH, NH-Active 1,2,4-triazole, instrumental determination

Acknowledgement: This investigation was supported by the National Scholarship Programme of the Slovak Republic (SAIA).

# Ultrasound modification of carbon material based on plant raw material

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#### Abstract

Processing of wood and agricultural products are accompanied by the formation of a large quantity of waste requiring disposal. The main method of disposal is incineration, which not only harms the environment but does not allow getting more products. One of the promising methods of recycling is to use them as a raw material for activated carbon, the use of which in the industry has rapidly increased in recent years. During carbonization and activation of carbonaceous materials, we can obtain types of coal with different properties of surface groups, different burn degrees and different pore distribution. The disadvantage of the main methods of activation is high ash content and low sorption activity of the carbon derived. Therefore, in technological processes, the methods of modifying ready carbonaceous materials began to take a center stage. The acid and heat treatment at elevated temperatures in controlled atmospheres are most commonly used for modifications. This treatment significantly alters, first of all, available surface groups, as modified activated carbon is twice more active than activated carbon with uniform surface in many redox and acid-base reactions. However, these methods of modifications are energy-consuming and environmentally dangerous. The aim of this work was to study the impact of ultrasonic radiation in precavitational and cavitational modes on the properties of wood activated carbon.

The study was conducted in an ultrasonic reactor with 42 kHz radiation frequency and variable power. The coal went to the reactor in the form of 10-20 wt% dispersion in distilled water. It was established that both precavitational and cavitational modes, activated carbon was intensely crushed and its ash content is reduced from 2,7 % to 1,8-2 %. Also, the surface is oxidized and gets hydrophilic. During irradiation in precavitational mode the hydrophilic property of the surface increases by 10 % and in cavitational mode – by 46 % compared to the hydrophilic property of the initial activated carbon surface, which is 42 %.

Thus, the ultrasound radiation can effectively change the properties of the activated carbon surface, derived from plant raw material. This method of modification is environmentally safe because it does not involve the use of chemicals and energy intensive equipment, and the necessary properties of modified activated carbon can be controlled by varying the power and energy of the ultrasonic radiation.

Keywords: activated carbon, ultrasonic, ash content, hydrophilic property, environmental safety

# Wedge-shaped dehydration as an integral method of indication of nanoparticles interaction with biological objects

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#### Abstract

Nowadays, the methods of receipt and application of nanoparticles open new possibilities in many areas of human activity due to the unique chemical, physical, biological, pharmacological properties of nanoparticles. However, the pace of nanoparticles introduction into everyday life exceed the speed of researches of their influence on living organisms, which can lead to environmental degradation. The nanoparticles interaction with nucleic acids, proteins and cells results in changes in their metabolism. The study of such effects in the clinical medicine is widely conducted using methods of analysis of solid phase of biological fluids. The purpose of this study was to determine the possibility of using wedge-shaped dehydration method for indicating the presence and effects of nanoparticles interaction with protein.

For research we used bovine serum albumin, nanoparticles Fe and Cu of 40 and 20 nm size respectively, and citrate Fe and Cu with particle sizes 100 nm. Solutions was obtained by mixing 1 % protein solution with a solution of nanoparticles concentrations 1-10 mg/ml in the ratio 1:1. The analysis of facies showed that the interaction of nanoparticles with protein molecules appeared in change of the drying kinetics and facies basic structural elements. For solution of the protein and nanoparticles Fe protein roller is not generally formed, and an additional transitional area between the roller and the interior of the facies appears in the protein solution with nanoparticles Cu. In addition, a drop of pure albumin solution dried up for 18 min, and all solutions with nanoparticles dried up for a time close to 13 min. We believe that the change of characteristics of albumin facies in the interaction with nanoparticles is caused by nanoparticles denaturing effect. First, the hydrophobic bonds system is broken as a result a tertiary structure begins to be broken, and tryptophan changes its position in the protein globules as shown in fluorescent studies.

Thus, the wedge-shaped dehydration is an operational method of the qualitative analysis of the nanoparticles interaction with biological objects. The improvement of methods of research will allow to widely use it for environmental monitoring of pollution caused by nanotechnology.

Keywords: albumin, nanoparticles, wedge-shaped dehydration, conformational changes

# Weed puncturevine as a source of important components for restoration human natural testosterone level

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#### Abstract

*Tribulus terrestris* is an annual plant in the Caltrop Family (Zygophyllaceae) widely distributed around the world. It is native to warm temperate and tropical regions of the Old World in southern Europe, southern Asia, throughout Africa, and Australia. It is an invasive species in North America. As a noxious weed in California, puncturevine produces many burs with sharp spines that can injure humans and animals, as well puncture bicycle tires. In addition, leaves contain compounds called saponins. Some body builders use *T. terrestris* as post cycle therapy. The extract is claimed to increase the body's natural testosterone levels and thereby improve male sexual performance and help build muscle. It is used in Ayurvedic pharmacology as well as in traditional Chinese medicine as one of the most claimed aphrodisiac plant known as "plant Viagra".

The study aimed to the introduction of puncture vine into large-scale cultivation during two years (2007 and 2008) was carried out. Two different methods of cultivation were compared in the experiment and production of biomass and evaluation of the content of furostanol saponins were done. Transplantation of seedlings into the open field after their cultivation in pots in greenhouse was more effective for production of high amount of biomass and active components than in plants from direct seed sowing into the open field. Used method of transmission seedlings into open field seems to be suitable for the puncture vine cultivation and brings higher biomass in large-scale production.

Keywords: active components, biomass, medicinal plant, plant Viagra, protodioscin

# Seccion:

# Ecology and bioethics in theology

09:00-09:10	Opening of seccion
	<b>Prof. Dr. Ján Šafin</b> Dean, Faculty of Orthodox Theology, University of Prešov in Prešov, Prešov, Slovakia <b>Assoc. Prof. Dr. Ivan Šalamon</b> Project manager University of Prešov in Prešov, Prešov, Slovakia
09:10-11:00	Oral presentations
	<ul> <li>Prof. Dr. Ján Šafin</li> <li>"Flies in paradise. Ecological crisis as theological crisis"</li> <li>(University of Prešov in Prešov, Prešov, Slovakia)</li> <li>Prof. Dr. Radim Pulec – Kryštof</li> <li>"Ecumenical Patriarch Bartholomew and Ecologia"</li> <li>(University of Prešov in Prešov, Prešov, Slovakia)</li> <li>Prof. Dr. Marek Petro</li> <li>"The life protection before birth in the post-council documents"</li> <li>(University of Prešov in Prešov, Prešov, Slovakia)</li> <li>Prof. Dr. Pavol Dancák</li> <li>"On sacramental relationship to nature nowadays"</li> <li>(University of Prešov in Prešov, Prešov, Slovakia)</li> <li>Prof. Dr. Alexander Cap</li> <li>"Bible and animals"</li> <li>(University of Prešov in Prešov, Prešov, Slovakia)</li> <li>Prof. Dr. Malgorzata Duda</li> <li>"Ecosystem - a sense of responsibility for the irresponsible world"</li> <li>(The Pontifical university of John Paul II in Cracow, Cracow, Poland)</li> <li>Assoc. Prof. Dr. Mária Belovičová &amp; Assoc. Prof. Dr. Liliana Belovičová</li> <li>"Contraception in terms of medicine, bioethics and Orthodox theology"</li> <li>(Bardejov Spa a.s., High School of Health and Social Work of St. Elisabeth, Bratislava, Slovakia)</li> <li>Assoc. Prof. Dr. Gabriel Pal'a</li> <li>"The use of media in environmental education and nature conservation"</li> <li>(University of Prešov in Prešov, Prešov, Slovakia)</li> </ul>
11:00-11:20	Discussion and tea/coffee break

#### **Oral presentations**

Dr. Marek Rembierz

"Etika, ekológia a bioetika v teológii" Assoc. Prof. Dr. Miroslav Župina "The relationship between man and creation according to the Apocalypse of John the Apostle" (University of Prešov in Prešov, Prešov, Slovakia) Assoc. Prof. Dr. Ján Husár "The human being as the protector of nature (Biblical reflection)" (University of Prešov in Prešov, Prešov, Slovakia) Dr. Artur Aleksiejuk "In vitro fertilization from the perspective of the Jewish bioethics" (Christian Theological Academy in Warsaw, Warszaw, Poland) Mgr. Jacek Marian Hołub "Ecological Camino de Santiago pilgrim as an example dear St. Jacob Via Regina in the region Podkarpacki" (University of Rzeszów, Rzeszów, Poland) Mgr. Joanna Elżbieta Potaczek "Ekologiczny kontekst wspólczesnego dziedzictwa historii i kultury źydów na przykladzie cmentarzy zýdowskich na Podkarpaciu"

#### Lunch

14:00 – 16:30 Oral presentations

Dr. Andrej Nikulin "The role of the Church in resolving current issues of ecology" (University of Prešov in Prešov, Prešov, Slovakia) Dr. Ján Pilko "Deväť homílii o stvorení sveta v diele Vasila Veľkého" Mgr. Katarzyna Wojtanowicz

"The failure of social support as an example of disrupting the ecosystem" (The Pontifical university of John Paul II in Cracow, Cracow, Poland)

### Dr. Bogdan Zbroja

"The man and his basic living environment in the Book Genesis (Gen 2:4-25)" (The Pontifical university of John Paul II in Cracow,

Cracow, Poland) Dr. Ioannis Ladas

"The relationship between God and world in the Orthodox Dogmatic Theology and the positions of Christian ethics to overcome the ecological crisis"

(University of Athens, Athens, Greece)

# Dr. Daniela Cehelská

"Dimension euthanasia as a social cultural phenomenon "

(University of Prešov in Prešov, Prešov, Slovakia) Mgr. Ing. Miroslav Šulík

"Abortion from the point of view of criminal law and religion"

(University of Prešov in Prešov, Prešov, Slovakia)

# Mgr. Mário Blahota

"Ecology in theology in 21. century"

(University of Prešov in Prešov, Prešov, Slovakia)

# Mgr. Martina Kormošová

"Biological aspects of internet addiction. The Orthodox view of the issue"

(University of Prešov in Prešov, Prešov, Slovakia)

# Mgr. Andrej Dupej

"Nature in theology"

(University of Prešov in Prešov, Prešov, Slovakia) Mgr. Zuzana Jusková

"Christian perception of the genetic engineering" (University of Prešov in Prešov, Prešov, Slovakia)

16:30 - 17:00

Discussion

# Abortion from the point of view of criminal law and religion

# Miroslav Šulík1

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#### Abstract

A new scientific discipline - bioethics (resp. ethics of life) is inextricably connected with the issue of human life. It is a science that studies human behaviour in life or human health from the perspective of rational moral values and principles. We can say that bioethics is an interdisciplinary science, since it uses the knowledge that comes from several sciences - biology, medicine, philosophy, law, sociology, as well as theology, psychology, and more. One of the issues bioethics deals with is abortion. Abortion (miscarriage) is not only a problem of our time. Its origins go back to ancient times, just in different forms. Abortion is a medical procedure whose execution is regulated by law. The attitude of the Church, which also formed the society's attitude towards abortion, became more rigid especially in the last few centuries, and with the development of human knowledge, the penalties for this sin have also changed.

Keywords: abortion, bioethics, human life, criminal law, religion

# **Bible and animals**

# Alexander Cap<sup>1</sup>

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### Abstract

From the first book of Moses we learn that animals were created by God in the fifth and the sixth biblical days. Man was to rule over them, command them and name them. Probably, man did not eat them until the fall. After banishing from the paradise, man begins to domesticate animals, eat them, offer to God and as a result of the sin man also commits zoolatry – deification of animals. Animals feel the holiness of man and there were cases when they protected man or even attacked the sinners.

Keywords: Bible, Moses, God, paradise, man, animals

# Biological aspects of internet addiction. The Orthodox view of the issue

### Martina Kormošová<sup>1</sup>

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#### Abstract

The internet is undoubtedly a phenomenon of post-modern society, which has become an unseparable part of human life, of households, and a phenomenon intruding on all walks of life. However, it is also possible that the internet serves as a kind of prison as a kind of entrapment, which controls the minds, thought patterns and world views of people who use it in everyday communication, communication incorporating family, friends and so on. The internet also has significant consequences for the development of ethical and moral values, of the development of the individual in all his or her dimensions. The overall impact of the Internet is not easy to define - in conflict here gets a huge amount of options and the positive impact of the risks of full subdue the human uniqueness and individuality; however, we can monitor the incidence mind increasingly, attention and ability to concentrate, as well as emotional numbness and overall socialization patterns change more often. Besides the above mentioned we deal further biological impact of Internet addiction in our work. Finally, we look at the opinions of experts commenting the position of Orthodoxy in today's Internet or rather information society.

Keywords: internet, internet addiction, biological effects, individuality, Orthodox

# Contraception in terms of medicine, bioethics and Orthodox theology

Mária Belovičová<sup>1</sup> & Liliana Belovičová<sup>2</sup>

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<sup>2</sup>High School of Health and Social Work of St. Elisabeth Bratislava, Slovakia, Email: mriab9@gmail.com

### Abstract

Christianity brings world recognition of the rarity value of life. The foundation of christianity are the words "I am the Way, the Truth and the Life" (Jn 14: 6). We receive life as a gift and human life becomes a value but not in the sense of its possibility of use and handling thereof. Abortion, contraception, sterilization existing forms of medical intervention in human reproductive capacity. In the 20th and 21st century such interventions have continually a mass character. In light of the worldwide use of contraception, release morals, has increased the number of sexually transmitted diseases. Their long-term consequences include: pelvic inflammatory diseases, infertility, ectopic pregnancy, chronic pelvic pain. Recently, there are also oncological complications (cervical cancer, hepatocellular carcinoma). Persistent viral infections including HIV, herpes simplex virus, human papilloma virus affected millions of people. Annually sexually transmitted diseases infect about 13 million people. They mostly affected young people under 25 years. Contraception is a violation of human nature and serves only to gratify the passions, so the church does not bless it. "The person filing the drug ejection of the fetus is a murderer just like a woman who has adopted this poison" (Basil the Large, rule No. 8). Using contraception in order to not have children is perverted concept of christian marriage. In addition, of course, no contraception has 100% sure of avoiding pregnancy. In the US, where is the most developed pharmaceutical contraceptive industry, 60% of all abortions are taking place just after taking contraceptives. It is known that most so called safe contraceptives are harmful to the health of mothers and contains in itself abortive agent. The authors give specific examples of harm young women from medical practice in connection with the use of contraception.

Keywords: contraception, unwanted effects, bioethics, orthodox theology

# Dimension euthanasia as a social cultural phenomenon

### Daniela Cehelská<sup>1</sup>

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#### Abstract

In our society, euthanasia represents a complex and diverse phenomenon, knotty knot of cultural, medical, ethical and legal issues. The present work examines the phenomena associated with this phenomenon and demonstrates the view of understanding its terminology as well as from historical and cultural perspectives, i.e. from attitudes to this problem in selected countries of the European Union and it defines the dimensions of euthanasia as a social phenomenon from the aspect of auxiliary disciplines. Bioethical issues are addressed from the perspective of social work and basic human rights through the current Constitution of the Slovak Republic and observance of the code of professional ethics of members of the Slovak Medical Chamber. The paper deals with benchmarking Slovak legislation procedure called the legislation a criminal offense of participation in suicide and foreign legislation. The aim of this paper is to bring meaningful and comprehensive view of the legislation of examined issue in compared legal systems, view of death as a social problem. In Europe, there is still discussion about this problem in recent decades. Generally, the focal point of consideration is that suicide is seen as a right to natural death, i.e. euthanasia. If we talk about dying in the elderly, not only matters relating to the physical condition of the client are important, but also his or her spiritual needs and their serving. The role of social workers as well as other workers from the ranks of auxiliary disciplines plays the key role in this issue.

Keywords: euthanasia, culture, history, religion, social phenomenon

# Ecological Camino de Santiago pilgrim as an example dear St. Jacob Via Regina in the region Podkarpacki

Jacek Marian Hołub<sup>1</sup>

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#### Abstract

Camino de Santiago is the longest trail Christian leading from the eastern parts of Europe on the Pyrenean peninsula. From the Middle Ages to modern times Europe's most beautiful road was filled with thousands of pilgrims (lat. Peregrinus) bound for the grave of St. Jacob the Apostle. As in the Middle Ages, so now everyone the pilgrims to have strength, he had to satisfy hunger and thirst. Certainly food in distant times produced by farmers had the ecological patent not contaminated by man. Modern times trek to Santiago de Compostela is a big challenge for camino people.

Because camino is not only way, but life on it, which consists of the muscular effort of the pilgrim and the time of their regeneration, i.e. a rest, which must enrich, among others, appropriate food. It is therefore necessary to ask the question -whether modern pilgrim Way of St. peregrination. Jacob ViaRegia, among others, in the Podkarpacki region belongs to the conscious environmentalists? Whether its daily menu includes organic and healthy products? Is communing in nature is aware that modern camino is a time consuming organic food such that give strength to overcome great distances.

Keywords: Camino de Santiago, the pilgrim, peregrination, healthy products, organic food

# Ecology in theology in 21. century

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### Abstract

The aim of the article is to point out the fact that the ethic of responsibility of man for the environment, and also for all the living beings on earth, is already contained in the biblical texts of the Old and New testaments. Dogmatic christian churches are more or less formulated anthropocentric and in the context of learning about the creatures of the world, only talk about the creation of the world as a whole with a unique status of human beings as Imago Dei. The truth, however, is that the biblical message about the creation of the world understand the man as a "primus inter pares" - first among equals. Such a feeling is growing even among other biblical passages reports, which outline the image of the relationship of man with the world, in the sense of everything in creation in the biblical sense is true, and therefore also the animals. I say, that Christianity, as such, has tolerated cartesian thinking towards nature and animals. It is a paradox that the biblical texts leave us a link in the form of respect and ethical responsibility towards nature and animals. It is also a consequence of the understanding of the biblical message of the book of Genesis 1.26 where it speaks of the estate of man over nature, and this message is to be interpreted in the sense of absolute dominion of man over nature. The truth is, however, that such thinking have tolerated cartesians spirit without having to christianity was conscious. Today is a modern talk about the eco-ethics and think that this is a modern day phenomenon, but the truth is that the biblical man-abiding the will of God and in the truth-seeking, peace with God, looks at the nature and animals with respect and dignity, not with despect, and already not at all with anthropocentric absolutism. Therefore, if theology will be based on the position of man as the Imago Dei, but in the sense of "primus inter pares", so it can react more flexibly to the alarming environmental condition of our planet in all spheres of society. And this will be one of the biggest challenges of theology 21. century.

Keywords: ecology, dogmatic, ethics, cartesianism, Imago Dei, primus inter pares

# Ecosystem - a sense of responsibility for the irresponsible world

# Małgorzata Duda<sup>1</sup>

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#### Abstract

Man lives in a natural environment and is therefore dependent on it. The world is constantly evolving, it becomes a threat to the ecosystem. Speaking about the ecosystem should be talking about something more than ecology - it's also a social system connected with nature. Total should be consonant. This article aims to identify only some of the dangers that threaten the future of humankind, and are associated with human activity. The author also wishes to zoom the social teaching of the Church about the responsibility for the fate of the Earth.

Keywords: ecosystem, the social teaching of the Church, responsibility

# **Ecumenical Patriarch Bartholomew and ecologia**

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#### Abstract

His All Holiness, Archbishop of Constantinople, New Rome, and Ecumenical Patriarch, Bartholomew I is a great personality with an international reputation and recognition. This recognition goes beyond the boundaries of the Orthodox world. From the first time after electing as Ecumenical Patriarch was interested in solving the ecological problem. His actions were continued with every message at every opportunity and he is trying to talk about it constantly. Aware that environmental destruction is the eminently modern problem, which threatens the Creation of God, Patriarch Bartholomew highlights the environmental protection high in the "agenda" of his Patriarchate. To the point that he has been called the "Green Patriarch". Thus, established the September 1 (the beginning of the ecclesiastical year) as Environmental Protection Day. Furthermore, he regularly organized symposium according to this topic in all over the world. "We hope that the desire for a better environment will be widespread and will become a scientific proposal and the legislative mandate," Patriarch Bartholomew says and continues "Certainly, the struggle will have the effect of restricting certain excesses of the deep ecology, so the demand of environmental protection to be reasonably and practically applicable limits and to not make an obstacle for the necessary for life on earth human intervention in the natural environment".

Keywords: Patriarch Bartholomew, bioethics, ecology, environment, ethics

# Flies in paradise. Ecological crisis as theological crisis

# Ján Šafin<sup>1</sup>

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#### Abstract

In Christian view of the world, two opposite poles appear easily, both false in their unilaterality: one is the world-rejecting manicheism, creating an uncrossable gap between God and the world and thus emptying God-manhood; the other is pantheism or cosmotheism, accepting the world as it is and practically deifying it, even though ...secularisation" does this as well. The first view is found in different and often unexpected connections, mostly when there's a strained religious sense and direct-like experience of God places two alternatives before man: God or the world. Thanks to this, man turns away from the world in his focus on God, overlooks its values and works and already leaves the world to its own fate in distancing itself from God. The reaction to this view was historical secularisation, which entered the European world along with renaissance and reformation, those two parallel streams of one flow - anticosmic cosmism. Focus on the world in humanism, which ascribed to it a right for its own existence, is a reaction against rejecting the world in Christianity. Here we meet a dialectics of impassable contradictions, which are killing the present culture. But this impassable dialectics doesn't make the last words of wisdom. The historical end of renaissance is accompanied by decomposition of every organism, all organic. In renaissance, the organic way of life was still left. Life was hierarchical, like all organic life is hierarchical. That was just the beginning of the process of secularisation, which, in the end, has to lead to mechanisation of life, to falling away from all organic organisation or order. At the beginning, in its first stages, this secularisation was being accepted as freedom of creative power of man, as joy of its free play. But human power, originating from organic state, becomes inevitably subordinated to mechanical state. This isn't immediately visible. For some time, people live in an illusion of being freed both from organic bounds and mechanical fixation. This transition period, when the European man feels like being freed from organism, but isn't subordinated to mechanism yet, fills the historical renaissance and its climax in 17th and 18th century.

Keywords: ecology, theology, secularisation, mythology, philosophy, crisis

# Christian perception of the genetic engineering

# Zuzana Jusková<sup>1</sup>

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#### Abstract

The thesis focuses on the opinions' comparison of christian authors on the topic of the genetic engineering. It does not attempt to obtain the all possible information about genetics, neither the mediation of the scientific perception. Instead, it focuses on the brief description of that what genetics currently can bring forward, the simplified point of view on the genetic engineering, hardly comprehensible concept for amateur, to ordinary reader.

It contains findings, reflections and opinions of various christian experts and it also focuses on the introducing of the church opinion on the human cloning and genetic manipulation of material. It also clarifies biblical point of view on the cloning and explains God's instructions towards life that are in the Bible. The thesis is a summary serving for orientation and reflection of ordinary reader with an interest in Christianity and it serves for its understanding and building the own perception of this relatively new current theme.

It clarifies the main reason of rejection of therapeutic genetic medication given by the Catholic Church which is the protection of life of yet unborn fetus that must be destroyed within the experiment. It contains historical look on the first cloning success and expression of the Russian Orthodox Church to excommunicate everyone who would try to do experiments in this field and whose body would accept such genetic material. In conclusion, it addresses the christian reader with the intention to maintain the human dignity, ethics and critical thinking in christian vigilance.

Keywords: bioethics, genetics, cloning, christianity, interspecific mixture, life

# In vitro fertilization from the perspective of the Jewish bioethics

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#### Abstract

This paper is an attempt to present the attitude of Jewish bioethics broadly understood with regards to *in vitro* fertilisation. The general attitude of the majority of Rabbis of the main denominations of Judaism towards artificial methods of procreation should be viewed as positive. Many of them consider *in vitro* fertilization as a means of fulfilling the most important commandment of Judaism: the obligation (*mitzvah*) to procreate (*peru u-revu*) and populate the earth (*lashevet yetsara*).

In Judaism, procreation is one of the main tasks of marriage and the ability to bear children is seen as an integral part of the covenant of God with His people and a sign of God's blessing for those who observe the Law (Deut. 7, 12-14). It is obvious that married couples that are not able to have children for various reasons are placed in a difficult situation. Their difficulties in this respect can be interpreted as a sign of being cursed and rejected by God. However, many Rabbis emphasize that there are situations in which infertility should not be regarded as God's punishment for disobeying the Law, but as the result of the faultless human physical and psychophysical inability to have children. As such, infertility should be treated as an illness that should be treated. The problem of infertility therefore enters the realm of the practice of a doctor, who is the servant and co-worker of God.

When taking into consideration the above mentioned arguments, the majority of contemporary Rabbis and Halakhic authorities permit the use of medically assisted procreation, particularly *in vitro* fertilization, when all other methods have failed. The vast majority of Rabbis, who belong mainly to progressive and conservative denominations, support the use of artificial methods of procreation. It is worth noting that there is strong opposition to using these methods among Rabbis, particularly those of orthodox movements. The objective of the article is to demonstrate the attitude of the main Jewish denominations to *in vitro* fertilization and the ethical problems associated with this procedure, including the attitude to surplus embryos.

Keywords: Jewish bioethics, in vitro fertilization, surplus embryos

# Nature in theology

# Andrej Dupej<sup>1</sup>

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### Abstract

Nature from the view of Christian theology deals with the relation of Christian doctrine to nature as part of our world. Due to Christian education of most of eastern societies we can estimate the attitude of the Eastern world towards the protection and conservationist. The thesis offers motives and attitudes to the protection of nature in Christian doctrine. The aim of the thesis is to point out the answers, how environmentally favourable negotiation is held in Christian doctrine. We also intend to raise common attributes of Christian doctrine and environmental favourable way of life. In this report we try to evaluate the attitude of theology to conservationists, their methods and incentive to protection of the natural wealth of the Earth.

Keywords: nature, theology, nature protection

# On sacramental relationship to nature nowadays

# Pavol Dancák1

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### Abstract

Man as "a being in the world" is tightly connected with the nature but it is defied in science-technical civilization and used only as material. Reduced technical relationship to nature is also reflected in technical relationship to a man, that means that a man destroys his own substance. However, a question emerges whether this defying is not original, if it does not express substance of man in his relationship to nature. The Biblical legacy clearly refers to man as entitled to take care of the earth and to protect it with love. The beauty of nature and man is, above all, the beauty of life which is able to develop itself according to its own laws. Culture protects what in its own substance has sign of divine independence, self-reliance and power and from this reason it is almost a sacrament, but at the same time, it is fragile and needs care, full of respect and responsibility.

Keywords: man, nature, biblical message, sacrament, culture, responsibility

# The failure of social support as an example of disrupting the ecosystem

### Katarzyna Wojtanowicz1

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#### Abstract

Social support system requires constant monitoring and adaptation to social needs. There are still areas not covered by effective aid system, which has an impact on improving the living situation of the destructive and transmission function in open schemas for the next generation. One of such phenomena is inheritance of learned helplessness and generational social aid. To a large extent these deepen phenomena on due to lack of complete "chain" scheme, the lack of cooperation between the various components of the system which translates to a lack of continuity in helping. Such an approach not only interferes with the functioning of the institutional, but primarily perpetuates pathology occurring. In her presentation she will bring the selected areas of abandoning social support in Poland, which will greatly promote strong for tearing down the functioning of the social development and attempts to indicate the requirements in this regard.

Keywords: social support, help system, the social ecosystem

# The human being as the protector of nature (Biblical reflection)

# Ján Husár<sup>1</sup>

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#### Abstract

The contribution looks at the Biblical account about the role of the human being, in the created world. What is the status of the human being in relation to nature? -Master?, Caretaker?, Tenant?, Servant? Undoubtedly the human beings relationship towards nature and to the created world generally, should be similar if not identical to the relationship that the Creator has to his creation. If the Creator from the beginning desires harmony and welfare in creation, this should also be the same for the human being, the most perfect of Gods creations, and whose task is to care for all that the Creator has made. The Bible helps us to answer the question as to what should this task of the human being towards creation include.

Keywords: human being, nature, Creator, protection

# The life protection before birth in the post-council documents

### Marek Petro<sup>1</sup>

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#### Abstract

"The human and social progress was initially characterized especially by the industry development and production of consumer goods, today it is evaluated by an informatics development, research in the genetic field, medicine and biotechnology, applied to humans" (Dignitas personae 37). This has reduced human life, unfortunately, to the biological and psychological sphere.

This gives rise to the urgent moral issues. As they are new, we cannot find the answer in the past; and as they are actual, we cannot postpone their solution to the future. The medical science has developed an admirable way of understanding a human life in the early stages of his existence in recent decades. This enabled a better knowledge of man's biological structures in the process of his birth. On the other hand, the great achievement of science has become as causer of theological and philosophical "non-science".

The content of this issue is to present the post-council Catholic theological science, which submits the principles and moral attitudes. So they are drawn in the light of reason as well as the faith and thereby contribute to the development of an integral vision of man, starting from the premise that the dignity of the person belongs to every human being from conception to natural death.

The question of cryopreservation belongs among the questions completely unanswered, including from the view of Catholic Church. Although the Church proclaims the incompatibility with the respect that appertains to the man's dignity, but it does not itself give the categorical answer to capital solution to this problem. Since the new questions require the new answers, also the post-council documents of the Church, especially *Donum vitae* (1987) and *Dignitas personae* (2008) touch the issue of life protection before the birth.

Keywords: life, man, council, science, bioethics, cryopreservation

# The man and his basic living environment in the Book Genesis (Gen 2:4-25)

## Bogdan Zbroja<sup>1</sup>

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#### Abstract

The second narration of the creation of the man in the Book Genesis includes important theological topics. Here we have talking about the necessity of soil by humans and the fact that by the same of material God created whole mankind. Ecology – environmental care – contains in itself improve the quality of life of the man himself. An important fact is also that creating a woman God used an element coming from the man. Exactly so it is here underlined the identity of the material sphere from which the man can not isolate.

The article includes analysis of the exegetical text: Genesis 2,4-25, taking into account relevant comments. The main conclusion is that improving the quality of the human environment results in the improvement of human existence itself.

Keywords: ecology, Book of Genesis, human

# The relationship between God and world in the Orthodox Dogmatic Theology and the positions of Christian ethics to overcome the ecological crisis

Ioannis Ladas<sup>1</sup>

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#### Abstracts

Basic thesis of the Orthodox Dogmatic Theology is the distinction between the Created and the Uncreated. In the sphere of the Created, belongs not only everything that exists around us - but even ourselves -, whereas in the sphere of the Uncreated belongs only God. The providence of God for the world consist in maintaining and ruling upon it. God acts in the natural laws without interfering in the free will of human. This happens because the whole creation together with human are made God's creation, but only the creation is absolutely subject of God's willing and not the human who is able to act according to his willing. God helps and reinforces human to do the good, but he never participates in the commission of evil, which only allows to be effected. God, by respecting human's freedom, allows the existence of evil - perhaps for pedagogical reasons - and by His divine providence ensures that evil eventually operates by helping good.

According to the Orthodox teaching ecological disaster has its roots on human's sins. Each and every human being is responsible for it and not humanity in general. Moreover, ecological crisis has its roots on the removal of human from God and neighbor, in the arrogant and luciferian human's behavior, in that human has not respected the command which God gave to Adam to keep and protect the natural environment. Church does not fight ecological crisis in moral or social level, but in ontological. Through the patristic theology we realize that the proposal of the Orthodox Christian teaching is not a new ethics and metaphysics for nature, but a new religious and cultural behavior.

Keywords: dogmatic theology, bioethics, ethics, ecology, environment

# The relationship between man and creation according to the Apocalypse of John the Apostle

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#### Abstract

The work concerned explores the relationship between man and creation in the context of the Apocalypse (*The Revelation*) of John the Apostle. This single prophetic book of the New Testament is increasingly drawing the attention of many contemporary environmentalists because it comprises of images that can be identified with the existing, but mainly with future ecological factors. The aim of this contribution is to highlight the interdependence that exists between man and creation, i.e. nature.

This work presents a series of conclusions based on the fact that the *Apocalypse* holds in the collection of the New Testament books a very specific position. While other biblical texts put the main emphasis on common expectations of salvation and redemption of man and creation, which is scheduled to occur after the Christ's second coming, the *Apocalypse* reveals as the "most important" factors especially the distinctive irreversible and definitive images of the impending disaster of the world and its tragic end. We find out that the Apostle John, when seeing at the end of the first century the cruel persecutions of Christians by the pagan Roman power, the number of martyrs, and their call "for revenge and punishment" at the end of human history, he became this way the prophetic witness of similar and even much more tragic global negative factors that have immediate impact on the lives of people living in sin exactly through actions of destructive natural phenomena.

We consider as the main conclusion the fact that Apostle John finds and identifies the root causes of the fact that the creation has a very antagonistic relationship towards a man. It is the Biblical truth that says that nature and its manifestations directly reflect the relationship of man to God. If one lives in sin, if he lives an unnatural way of life and instead of God he glorifies and worships the creation without its Creator, whom he ignores, it comes to such a consequence, amongst other factors, particularly prevailing in various forms of neo-paganism and idolatry of the recent times, that is manifested by natural anomalies and phenomena directed against man.

Keywords: God, man, creation, Apocalypse, paganism, cataclysm

# The role of the Church in resolving current issues of ecology

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#### Abstract

We have the opportunity to see the dizzying progress in the use of natural resources and overall handling of man the nature for decades. On the one hand, humanity tries to get control and dominate nature; on the other hand we see a number of natural disasters which give the result of careless handling of man with nature. The ecological situation forces us to seek not only solve the present problems, but reframed the relationship of man to nature, think about the value of what the outside world has for humans.

This relationship has an obvious spiritual context in the Christian tradition. The relationship between man and the surrounding world can understand, on the basis of man's relationship to the Creator. On the one hand there is human highlight of all creation his occupation to rule over it; on the other hand, the primacy of man is conditional upon his spiritual development, which comes from the relationship between him and the Creator. A man can understand creation and take responsibility for it only when you yourself realize their place and occupation that is from God and that stemming from knowledge of God. Therefore, answers to many current environmental issues must be sought in the spiritual condition of man. Article has to point out the relationship between the spiritual life and mentality of man and his attitude towards the environment. It clarifies what are the underlying basis of Christian doctrine and principles of formation of ecological consciousness in Christianity.

Keywords: man, nature, Christianity, Church, ecology, spiritual life

# The use of media in environmental education and nature conservation

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#### Abstract

The field of media enjoys now the great popularity not only of young people, but it spread the whole company. Certainly it has its positive and negative aspects, on the one hand help us, facilitate access to information and offer greater convenience in education (self-education), and secondly, it close us on virtual space without real life, air and water, that could be experienced but in the real world of nature. The goal of this study is not to exhaust all possibilities of implementation of environmental education and nature conservation through the media, but to highlight and draw attention to some of the cases, respectively approaches that media offer.

Keywords: environmental education, education portals, media, internet, modern technologies

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Title of publication:	New trends in ecological and biological research
Type of publication:	Book of abstracts
Authors of publication:	Group of authors
Editors:	Ján Ševc & Jana Kisková
Publisher:	University of Prešov
Pages:	142
Number of printed copies:	300 ks
Press:	GRAFOTLAČ PREŠOV, s. r. o.

Published abstracts have been reviewed. Authors and reviewers are responsible for professional level of contributions. Texts have not been reviewed by language editor. The publication is issued for needs of conference participants and for their practice.

The scientific event is financially supported by "Research Agency" as one of the outputs of the project "Acceleration of development of human resources in science and research, innovation and quality improvement of the education process" (ITMS: 26110230069).

## ISBN 978-80-555-1354-6



University of Prešov



Faculty of Humanities and Natural Sciences



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Faculty of Orthodox Theology