



CASEE CONFERENCE 2019

**The role of life science universities in redirecting land use from threat
to guardian of ecosystem|**

Book of Abstracts

**University of Sarajevo (Faculty of Agriculture and Food Sciences),
Sarajevo, Bosnia and Herzegovina
12 - 15 June, 2019**

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Annotation

In the following we are publishing
the abstracts as submitted by the authors.

Keys and Abbreviations:
P Poster Presentation

Foreword of the ICA-CASEE President

Prof. PhDr. Michal Lošťák, Ph.D.



Dear participants of 10th CASEE conference, dear readers,

It is my deep pleasure to address you through this Book of abstracts which contains the main ideas of oral presentations and posters delivered during the 10th CASEE conference under the theme **“The role of life science universities in redirecting land use from threat to guardian of ecosystem”**. **The conference is organized by the Faculty of Agriculture and Food Sciences which is a part of University of Sarajevo in Bosnia and Herzegovina. Therefore special thanks are conveyed to Prof. dr. Rifat Škrijelj, Rector of University of Sarajevo, Prof. Dr. Aleksandra Nikolić, Vice-Rector for International Cooperation of University of Sarajevo, Prof. dr. Muhamed Brka, Dean of the Faculty of Agriculture and Food Sciences, University of Sarajevo and Prof. dr. Enisa Omanović-Miklićanin, Vice-Dean for Science, Research and International Cooperation, Faculty of Agriculture and Food Sciences of University of Sarajevo.** Their support and activities together with other members of organizational committee and scientific committee were crucial for the success of this conference. Many thanks also to all others who were committed to organize such a nice conference, which already has its tradition. This year the conference is conducted in 6 working groups/sessions: (1) Modern agriculture and rural development (including landscape planning), (2) Renewable resources – opportunities and constraints (including forests and biotechnology), (3) Sustainable food systems and food quality, (4) Environmental safety and climate change, (5) New challenges in animal science and veterinary medicine, (6) Experimental farm/stations experience.

CASEE is an international network of the life sciences universities and faculties from the region of Central and South-Eastern Europe. It operates as the standing committee of ICA - Association for European Life Science Universities. The aim of CASEE is to bring life sciences universities and faculties together to present their intellectual power and to have a voice of life sciences and related disciplines in the region. That is why CASEE also organizes such conferences – to be visible and to have an impact in the region. All participants of the conference contribute to achieve this goal.

The main theme of the conference indicates the importance of land. Indeed, land is not only about agriculture or food production. Today, land is a crucial element for bioeconomy – a new paradigm in managing and utilizing biological resources. Such a new paradigm necessities new approaches echoing sustainable stewardship of natural resources and reflecting challenges of climate change. All named issues are discussed by the abstracts in this book. Land is not any more a mere factor of production. Land is much more today. It is a sort of our mirror showing us the world we shape with all our hopes and problems. I am glad that this conference demonstrates the importance of life sciences universities and faculties in the region. It is important that this conference is intended to be a forum for Ph.D. students and young researchers to exchange their ideas in an international milieu. I hope that those who will read this Book of abstracts will recognize the power resting in young generation affiliated to life sciences universities and faculties in Central and South-Eastern Europe and will recognize how valuable assets these universities and faculties have.

Enjoy the conference.

Prague, June 2019

ORAL PRESENTATIONS

Session 1a: Modern agriculture and rural development (including landscape planning)

1a.01

Sustainable phosphorus fertilizing in agriculture

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Phosphorus is an essential macronutrient needed mostly for the energy transfers in cells and also for a lot of other metabolic processes. However, this element is starting to be one of the most limiting in plant nutrition. The resources of quality phosphate minerals are limited as well as they appear only in few countries (e.g. Kazakhstan, Morocco). It is also possible to predict that prices of phosphorus will be increasing and this element become to be important not only for plant nutrition, but also for political strategies. Therefore, it is at hence to start with using a modern fertilizing systems supported with proper soil diagnostics.

The aims of this study are to:

- i) present the actual possibilities to determine bioavailable phosphorus content in soil and
- ii) to summarize the advantages and disadvantages of modern fertilizing strategies. Aim 1: There are many methods for diagnostic of bioavailable phosphorus content in soil. Common for these analyses should be: easy preparation of the extracts, possibility of repeating the procedure with same results, estimate the P-pool which corresponds with P content and/or uptake by plants. The methods for determining of bioavailable phosphorus is possible to divide in three groups:
 - i) Methods for determining of readily available phosphorus, which should extract the P pool corresponding to P in soil solution (water extracts, 0.01 mol/L CaCl₂),
 - ii) Methods for determining bioavailable phosphorus, which means P in soil solution together with P which is slightly sorbed in soil (more than 50 extracts including e.g. Mehlich 3, Calcium ammonium lactate, Olsen, Anion exchange membranes, DGT technologies) and
 - iii) phosphorus sorption isothermes which should predict the sorption of P in soil as well as risk of releasing of P in environment. Proper evaluation of the results allows to save the costs for phosphorus fertilizers and increase the quality of production. Aim 2: With the development of new techniques are increasing the possibilities of more reasonable fertilizing strategies:
 - i) One of the most promising way to increase the efficiency of applied P is fertilizer placement. Good results are described mainly with band application close to the roots or so called “underfoot” application of P-fertilizer granules under the seed,
 - ii) Second strategy is application of the recycling or waste materials containing P, mainly ashes or sewage sludge. But, there is a risk of low P bioavailability (ashes) or content of trace elements and organic pollutants,
 - iii) Other possibility is the application of microorganisms and active natural substances (seaweed extracts, humates) to increase the mobility of P from applied fertilizers. The risk of this strategy is sometime low efficiency compared to high costs. Supporting of P release can be also realized using cover crops and organic fertilizers (composts, farmyard manure) and
 - iv) Using the GPS systems and geostatistic allows the development of “precision farming”, where P is applied only at places, where it is really needed and in adequate amounts.

All mentioned techniques are limited mainly with soil-climatic conditions and P interactions with other elements. Therefore, it is a long way before us to understand P in soil-plant systems and optimize the P fertilizing.

Supported by projects: TAČR TJ 01000454 (2018-2019) and CASEE: Determining the influence of cover crops on soybean production and environmental life cycle assessment (2017 - 2019).

1a.02

Alginate microparticles loaded with biofertilizers and macro or micronutrients for agroecological production

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The use of agrochemicals in agriculture had substantial repercussions for the environment, food security as well as human health because some of them are persistent organic pollutants. To diminish the overall exposure to agrochemicals that may end up in the environment, the worldwide intention is the restriction of their use and application of environmentally friendly systems like biofertilizers and/or biopesticides (pesticides derived from natural materials). Biofertilizer formulations usually contain a living microorganism (bacteria, fungi) and a suitable carrier together with additives. Efficient formulation demands a carrier material which must preserve or maintain living organisms in a viable condition during storage and transport as well as must keep its functional properties after application. Encapsulation in microparticles (microspheres/microcapsules) is an advanced technology which is superior to other formulations in terms of living organism protection from the environment, improvement of their viability and possibility of controlled release into the field. Trends of encapsulation in agriculture are focused on the preparation of microparticle formulations involving biological and chemical agents. The main problems that should be solved here are: (i) to choose microparticle that can incorporate biological and chemically active agents and (ii) the presence of active agents in the same compartment should not diminish their activities. Due to benefits of crop protection and nutrition as well as high compatibility, *Trichoderma viride* spores (biofertilizers) and copper or calcium cations (micro- or macronutrient) were taken as a suitable couple of the chemical and biological agent. We have developed and characterized alginate microspheres and microcapsules (with chitosan layer) prepared by the ionic gelation using

copper or calcium cations as a crosslinking agent and loaded with *T. viride* spores. Simultaneous loading in microparticles revealed that presence in the same compartment does not inhibit bioactivity either of *T. viride* spores nor gelling cations. Controlled release, that is the successful delivery of bioactive agents to the plants and at the right time is necessary characteristic for all bioactive agents' delivery systems. To obtain the well-designed delivery system efficient for simultaneous loading and release of bioactive agents to plants at the rate that closely approximates plants demand, it is important to optimize parameters during microparticles preparation. The concentration of gelling cation, microparticle size, and presence of chitosan layer were considered as variables with possible influence on the essential microparticle parameters. The gelation at a fixed amount of sodium alginate and at different concentrations of gelling cation in solution resulted in distinct kinetics and release mechanisms. The increase in the concentration of gelling cation promoted, but the presence of the chitosan layer on microcapsule surface and increase in their size reduced the rate of a bioactive agent release. Fitting to simple Korsmeyer-Peppas empirical model revealed the underlying release mechanism depends on the concentration of gelling cation and the presence of *T. viride* spores as well as on the chitosan layer. The investigation pointed out that proper selection of formulation variables helps in designing microparticles with the controlled release of biofertilizer and micro- and macronutrients for plant protection and nutrition.

1a.03

Correlations between soil microbiological and agrochemical parameters in an organic edible rose plantation

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Roses are complex plants, from ancient times their nutraceutical properties, besides beauty, being appreciated. Using roses both in medicine and as food, an important priority is to be cultivated organically. The aim of this study is to present the results of the important part of the organic technology, improving and maintaining the biological soil activity. In 2015, in the Experimental Field of Faculty of Horticulture within USAMV Bucharest, an organic edible rose plantation with three edible climbing varieties from David Austin collection: Crown Princess Margareta, Falstaff and Brother Cadfael was established. Before and after planting, three ameliorative species: *Sinapis alba* L., *Phacelia tanacetifolia* L. and *Tagetes patula* L. were sown in seven variants for increasing the soil biological activity. After flowering the plants were mowed and after 14 days incorporated into the soil. Two types of mulches, woodchips and wool, were applied on the rose rows. Soil samples were taken at the beginning of the experiment and every year after using the ameliorative plants. The results showed important correlations between the microbiological and agrochemical parameters. Significant correlations between P_{Al} and soil respiration coefficient in the 0-20 horizon were registered. On the wool and control rows were highlighted significant correlations between soil bacteria number and humus content. On the control rows, correlations between soil respiration coefficient and soil content in potentially assimilable potassium and humus were noticed. A negative correlation between soil bacteria number and soil supplying with mineral nitrogen was observed. The conclusions of the study detailed the importance of using ameliorative plants in improving the soil parameters and the interconnection between them.

1a.04

New technology for winter rape growing and control using varietal differences in pests and their natural enemies preferences

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This paper deals with new technology in cultivation and control of winter rape using differences in attractiveness of individual varieties for pests and their natural Hymenopteran enemies. The technology described in this paper explores the higher attractiveness of yellow – flowering hybrid varieties (DK Exssence and DK Senzei) compared to the white – flowering lineage variety (Witt). In addition, the difference in the winter rape pests preference between two yellow – flowering varieties was examined based on their different phenology. The experiments were carried out between 2015 and 2018 on the experimental fields of Crop Research Institute in Prague (Czech Republic). *Brassicogethes aeneus*, *Ceutorhynchus obstrictus* and Hymenopteran parasitoids were captured using an entomological sweeping net. Based on this capture method, differences in varieties preference and suitability for pests and parasitoids development were evaluated. The results of the analyses of variance (ANOVA) in the occurrence of *Brassicogethes aeneus* ($F_{5,51} = 13,269$; $P < 0,0001$), *Ceutorhynchus obstrictus* ($F_{5,51} = 7,655$; $P < 0,0001$) and Hymenopteran parasitoids ($F_{5,51} = 6,523$; $P < 0,0001$) confirms the higher attractiveness of the yellow – flowering varieties compared to the white – flowering variety in all the examined years. The variety with earlier phenology (earlier stem extension, development of buds and beginning of flowering) in the spring (DK Exssence) was more preferred by the *Brassicogethes aeneus* than the variety with later phenology, which was, on the contrary, preferred by the *Ceutorhynchus obstrictus* (DK Senzei). The least preferred variety for these pests was the white – flowering one (Witt). The most Hymenopteran parasitoids were captured in all years on the variety with earlier spring phenology (DK Exssence). The least number of these natural enemies was captured on the white – flowering variety (Witt). The knowledge of the different preference of varieties of winter rape by *Brassicogethes aeneus* and *Ceutorhynchus obstrictus* are suggested to be used in the current technology of selective pest control. Chemical pest control is advised only on the preferred variety at the edges of the field. On a non – preferred variety with different flowering colour or later phenology, chemical control can be omitted. The knowledge of the different preferences of oilseed rape varieties by its pests, could be useful for targeted breeding of new varieties and hybrids of oilseed rape.

Session 1b: Modern agriculture and rural development (including landscape planning)

1b.01

Vegetative growth of some new apricot varieties cultivated in București area

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In the present study, is presented the behaviour of 27 new apricot varieties, cultivated in an integrated orchard in București area. The apricot orchard it was planted in 2017 in the Experimental Field of Faculty of Horticulture within University of Agronomic Sciences and Veterinary Medicine of București, using Romanian and foreign varieties grafted on Myrobalan 29C, Saint Julien A and GF 677. The planting distances varied from 4.5 x 1.5 m to 3.5 x 2.0 m and two canopies were formed: Parallel U and Trident. High concrete poles was made as trellis system, with 4 lines of wires. The land was maintained covered with a mixture of perennial grasses on the inter row and clean with herbicide on the row. Micro sprinklers were used for the new orchard. The results showed differences in growth correlated with the canopy and used rootstocks. The average trunk cross sectional area, varied from 29 to 66 mm and the average tree height from 218 to 421 cm. Congat variety grafted on Myrobalan 29C, grew with 20% more vigorous than grafted on Saint Julien rootstock. At Trident, the difference given by the rootstock to the same variety are insignificant, varying from 2 to 4% for the Myrobalan 29C. Primaya grafted on Saint Julien rootstock, registered a bigger trunk cross sectional area at Trident than Parallel U. A correlation between analysed parameters and a comparative study of the fruiting annual shoots was done and is presented. The planting distances and the applied technologies have obvious influences on the growth of trees. Conclusions are given according to the registered data by presenting the comparative parameters of the two canopies that show promise regarding ease of management, sustainability and their efficiency for the new apricot cultivars introduced in Romania, with advantages and disadvantages for apricot orchards.

1b.02

Comparison of the farmers age structure in the EU and in the Russian Federation

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The position of young farmers in the member countries of the European Union and in the Russian Federation differs. According to results of Agricultural Census, there were 10.84 million agricultural holdings within the EU-28 in 2015. In the Russian Federation there were 18,1million agricultural holdings. Most farms in EU 28 are located in Romania (3.63 million farms), Italy (1.01 million farms) and in Poland (1.43 million farms). On the other hand, the small number of farms is in Luxembourg, Malta, and Estonia. Combining these basic indicators for the number of farms and the utilized agricultural area, the average physical size of each farm in the EU-28 stood at 16.1 hectares in 2013. In 2013, the largest average farm size (in physical terms) was recorded in the Czech Republic, at 133.0 hectares of utilized agricultural area, followed at some distance by the United Kingdom (93.6 hectares) and Slovakia (80.7 hectares). There were six EU Member States that reported their average farm size was less than 10.0 hectares in 2013: Hungary, Greece, Slovenia, Romania, Cyprus, and Malta (where the lowest average was recorded at 1.2 hectares per farm). The aim of the paper is to analyze the position of young farmers in the European Union countries and in the Russian Federation. In 2013, only 6.0 % of farm managers in the EU-28 and 5,2 % in the Russian Federation were young farm managers (managers up to 35 years of age). From the EU countries had Poland the highest proportions of young farm managers (12.1 % of all Polish farm managers), while Austria (11.0 %) was the only other EU Member State to report that more than one-tenth of its farm managers were younger than 35. By contrast, in Portugal half (50.1 %) of all farm managers were aged 65 or over, while in Romania, Cyprus, Italy, Bulgaria, Lithuania and Spain at least one-third of all farm managers were aged 65 or over. The paper solves dependency between groups of farmers under 35 years of age and group of farmers above 55 years of age in three analyzed years: 2007, 2010 and 2013. Results of research proved significant differences between the share of young farmers and old farmers in the European Union and also in the Russian Federation in evaluated periods. There is a very strong negative correlation between both groups of farmers (between young farmers - under 35 years of age and group of old farmers - above 55 years of age). The strong negative correlation was noticed in all evaluated years also in the EU and also in the Russian Federation.

1b.03

Conceptual Framework for Improvement of Farmers' Capability to benefit from Agri-food Value Chains

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The purpose of the study is to create easy-to-use decision support tool aimed for SME's and farmers involved in the agri-food value chains at emerging economies. The study combines literature review and empirical case studies in order to develop a framework/tool designed to help the value chain actors and policymakers to promote policies which support the strengthening of farmer's market position. The study is exploratory in nature. The literature review and analysis of two value chains (case studies) was used to deliver a conceptual framework which enables an easy assessment of farmer's abilities to capture value chain benefits in various types of GVC. Two empirical case studies included 50 SME's and farmers, and this is research limitation as more case studies are needed in order to test the fast-track tool. Nevertheless, no similar study has been done before, while this study offers a unique and valuable insight into topics and contribute to the body of knowledge. Positive externalities experienced by value chain actors are highly

dependent on the capabilities of value chain actors (internal and external) and its specific type of governance. The predominant type of value chain governance in the agri-food sector is a hierarchy, within which farmers have little to none decision making power due to lack of leverage. The inability of farmers to create new values and innovate in hierarchy type value chains is impairing their motivation to grow and take a more active role in the value chain. The adoption of the framework will have impact on academic, policymakers and value chain actors, helping them to have a fast track, easy-to-use tool for initial fact retrieval as a basis to develop and implement effective policies and governing practices which will identify and open tailor-made business opportunities for small farmers and decrease risk of value chains failure.

1b.04

A Study of the Threats to the Labour Market of the UK's Horticultural Sector

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There are many fundamental issues affecting the labour market within the horticultural sector, primarily, the sector's reliance on migrant labour is having a direct impact on the production levels within the sector. Further affect by the industries is the poor perception by domestic workers, which is often seen as, hard, physical work, long hours and poor wages. Additionally, the restructuring of the supply chain has resulted in retailer dominance thereby creating increased pressure in the supply chain. With the uncertainty of Brexit looming there has been exhaustive discussion surrounding the future of the labour sector which relies so heavily on the input on migrant workers. This paper looks to answer why the industry has come to rely so heavily on migrant workers and how the industry can review matters and seek to improve the perception of the sector with domestic workers and help to provide a secure and fair labour sector for the future. The methods used for this research are based on an in-depth literature review surrounding all the accumulative issues involved within the horticultural sector and the formulation of three case studies of UK vegetable crop producers. The research shows that the pressures created by the supply chain impact heavily on the industry and the consequent dependency upon a flexible, productive workforce to meet the demanding deadlines created by the retailer sector. The migrant workers, often arriving from Central and Eastern Europe, under vulnerable conditions cause them to be exploitable to meet the required demands. In this instance, the reliance on migrant workers and their social positioning are fundamental to the current operational practices of the food production industry. Horticulture is a vital cornerstone of food policy and healthy food production. Policy changes can be implemented to reduce work hours, improve pay and great better equality within levels of management.

Session 2: Renewable resources – possibilities and constraints (including forests and biotechnology)

2.01

An Innovative Concept for Energy Producing Green Roofs and Building Integrated Recreational Space: *Photovoltaic Roofgardens* Developed, Approved and Implemented at University of Natural Resources and Life Sciences, Vienna.

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Thinking of sustainable buildings, flat roofs become an important area for installing photovoltaics, while at the same time the wish for a green roof and all its ecological and environmental benefits is stated. Current solutions deal with extensive greenroofs and photovoltaics in low height and all the resulting problems of those systems: if plants are getting too big, they will shade the panels, also the space is lost for human recreation.

In the project "*Photovoltaic Rooftop Garden*" an interdisciplinary team developed a new system combining an intensive green roof with a pergola-like canopy of translucent photovoltaic (PV) panels. The system staples all the advantages of green roofs, like storm water retention, CO₂ sequestration, noise and particular reduction and habitat function and green photovoltaic energy production on the same square meter and provides also sun protection for humans.

For the development of the construction comprehensive analyses regarding user needs and investigations to legally bases were done. Out of this, user scenarios were defined and examples for roof landscapes were shown generically. Also a basis prototype-system was designed, and the statics calculated.

For a holistic testing of the concept an examination site was constructed on a rooftop terrace of Franz Schwachhöferhaus at University of Natural Resources and Life Sciences, Vienna. Therefore, 54 m² of translucent PV-panels were installed on a wooden sub construction with a height of about 2,60 m. Two intensive green roof fields and a resting zone with table and benches in the middle were set under the photovoltaic canopy. The terrace also contains extensive and intensive green roof fields and sitting areas, which are unsheltered. A detailed investigation of this prototype model was done: shortwave and longwave radiation, air temperature, humidity and wind speed, were measured, energy production was recorded, as well as different plant species and their water demand were surveyed over three years.

The observation showed that the energy, produced by the 60 m² Photovoltaic-Rooftop Garden test site, covers almost the annual power consumption of one household.

A calculation of the mean radiant temperature and Universal Thermal Climate Index (UTCI) showed that thermal stress under the shelter is reduced on a very hot day from very strong heat stress to one class lower compared to the bare flat roof. This was also approved in a survey showing a broad user acceptance of the terrace.

Inspired by the great results of the project, last year, the University of Natural Resources and Life Sciences, Vienna integrated the the PV-Rooftop concept in their new campus building using a subconstruction of steel and 50,7 m² PV- panels equipped with desks and pot plants, as a learning rooftop garden open for public.

2.02

The effect of pre-treatment of poplar wood with liquid hot water and soaking aqueous ammonia on its chemical composition and enzymatic hydrolysis

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Nowadays, despite of the worldwide petroleum dependence novel energy carriers based on biomass are the subject of constantly increasing interest in the fuel industry. This is due to fact that conventional fuels represent a deficient non-renewable resource and cause unfavourable effects on global climate. Therefore it is crucial to find new effective ways of obtaining green energy. For instance, fast-growing poplar *Populus trichocarpa* wood is an innovative and very attractive material for environmentally friendly production of bioethanol and what is most important it is a non-food material, contrary to biofuels of so-called 1st generation derived from food crops. Bioethanol, on the other hand, is an example of significant substitute for conventional road transport fuel. This biofuel's production is based on sugar fermentation and poplar wood as a lignocellulosic material, can be treated as a valuable sugar resource for such conversion. However, the matrix of cellulose, hemicelluloses and lignin, of which wood is formed, is resistant to initial phase of bioethanol procurement, that is enzymatic degradation. Therefore to maximize the effectiveness of industrial biofuel production process certain pre-treatment is required. The raw biomass must be pre-treated in a way that enzymatic accessibility would be enlarged, for example with liquid hot water (LHW) or soaking aqueous ammonia (SAA) method. The shredded poplar wood with a chip size 0.43 - 1.0 mm was treated accordingly with liquid hot water process for 15 minutes at 160°C, 175°C, 190°C, 205°C and with soaking aqueous ammonia process for 6 and 24 hours at 50°C and 90°C. The analysis of chemical composition of wood feedstock was carried out both before and after LHW and SAA pre-treatment. For both materials the content of extractives in organic solvents was determined. Kürschner-Hoffer method was performed to cellulose isolation and content determination, while lignin and holocellulose content were examined according to PN-92/P50092 standard. Moreover, the enzymatic hydrolysis was carried out for both LHW and SAA processed materials. Feedstock was treated with an enzyme in aqueous environment and than the hydrolysis was performed for 72 hours in 50°C. Finally, the glucose and xylose contents in obtained hydrolyzates were determined by high performance liquid chromatography. The results of initial material chemical composition analysis confirmed that considering bioethanol production, fast growing poplar wood has favorable chemical composition. Furthermore, research outcome implied that LHW pretreatment highly changed the characteristics of native biomass in positive manner considering enzymatic accessibility. Likewise SAA treatment desirably altered the yield of enzymatic hydrolysis of the poplar wood, however in lesser degree. Increase of temperature in both thermal treatments resulted in increase of glucose and decrease of xylose content.

2.03

Long-term performance and potential of law enforcement in West African protected areas

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Law enforcement in protected areas is critical for ensuring the long-term conservation and viability of specific conservation targets. Hence, in 2004, a new adaptive management system of law enforcement was implemented in protected areas in Ghana. The aim of this study was to assess the long-term trends and dynamics of patrol staff performance and the effectiveness of the law enforcement system in the Kogyae Strict Nature Reserve in Ghana. The assessment was based on patrol data collected between January 2006 and August 2017. Along the patrol routes, the patrol officers recorded all encounters with illegal activities associated with hunting, capturing or harming animals, and all mammals within the visual range of the observer. These encounters were examined in terms of monthly man-days of patrol effort and distances walked (km), providing indices of encounter. Across all years, staff performance was lowest in 2006 but highest in 2010 as a result of learning the management system's routine and motivation through logistics support from international donors. Staff performance subsequently decreased due to annual leaves taken by most patrol staff. Neither rainfall nor seasonal activities had any influence on patrol performance. The encounter rate of illegal activities was highest in the first years after the implementation of the new law enforcement management system as a result of improved staff performance and longer distances patrolled. After six years (2011), the encounter rate of illegal activities decreased and remained stable. Snares were the most common illegal activity type because it is silent, time-efficient, and less risky than other forms of hunting. Encounter rates of mammals followed the dynamics of patrol staff performance. The long-term assessment indicates that the effective and high-performing patrol system is apt to achieve desired conservation targets through logistics support, motivation and experience of staff.

Session 3a: Sustainable food systems and quality

3a.01

The production and sales of venison from farmed deer in Serbia in relation to European Union legislation

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The aim of the paper As a result of the increasing red meat, interest in venison meat has grown. Cervids represent meat-producing species that exist in both wild and domestic (farmed) form. Generally, in Serbia, consumption of wild game meat has a great economic (hunting) and nutritional significance, as well as deep roots. On this basis, we find important to conduct a short analysis of the existing regulations in the field of veterinary and sanitary control, in relation to the meat hygiene from farmed deer animals. Essential results and discussion When it comes to European Union legislative documents, the Directive EC No. 853/2004, and parts of the Directives EC No. 852/2004 and EC No. 854/2004 are the most useful in the regulamentation of farmed animals and meat production. Within the EU Directive 853/2004 there are many provisions applied to the production and the placing on the market of meat from even-toed farmed game mammals, unless the competent authority considers them inappropriate. Also, where small quantities of primary products or of certain types of meat are supplied directly by the food business operator producing them to the final consumer or to a local retail establishment, it is appropriate to protect public health through national law. This, particularly applies because of the close relationship between the producer and the consumer. This paper analyzes the regulations concerning the production of meat from farmed deer in the Republic of Serbia in relation to European Union legislation. So far, in Serbia exists only the regulation about game meat hygiene, with the following legislations: Law on game and hunting (2010), Veterinary medicine law (2010), the Law on food safety (2009). It is important to notice that so far in Serbia there are not existing detailed law and/or by -law act, that allow the production and sell of venison from farmed deer. It has been very recently created: The regulation on small quantities of primary products used for the supply of consumers (2017). This by-law legal act regulates only meat from farm (domestic) animals and hunted game animals. There is clearly stated that all provisions are valid for a.m. meat „except registered facilities for keeping of wild game on farms“. That means, the possible owner of deer farm in the future could not be able to legally slaughter their animals. Thereafter, it would be many difficulties to process of venison from farmed deer, and particulary to sell on the market in Serbia. A brief conclusion Existing legislation about deer farms in Serbia should be fully harmonized with those the EU, especially regarding the official registration of farms and intention for venison production. The results of our investigation should help the development and implementation of consistent national laws and regulations related to deer breeding, based on the existing EU legislation and best practice currently implemented in EU member States. In particular, the adoption of consistent simplified procedures in Serbia should support the development of the deer breeding sector in Serbia where utilization of poor grade agricultural land located in remote rural areas needs to be encouraged, where there is an absence of meat processing infrastructure, and where the future deer breeding sector offers an eco-friendly way to enhance farm income.

3a.02

The future of the Common Agricultural Policy: discourse analysis on a paradigm shift towards a sustainable European food system

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This paper performs a discourse analysis on the future of the Common Agriculture Policy. The documents from the European Commission (EC) and from the International Panel of Experts for Sustainable Food Systems (IPES) were scrutinized in detail to achieve the goal of this text to demonstrate if the paradigm shift towards sustainable EU food system takes place. Indeed, a reform of the CAP is now being negotiated by the EU Commission while IPES is advocating for a shift towards a Common Food Policy for Europe. Both stakeholders share the idea of a transition to sustainability, with, however, very different backgrounds and goals. The inductive thematic analysis highlighted nine themes, recurrent in both texts with different languages and narratives: environment, social issues, health, food security, technology and innovation, policy effectiveness, integration, economy and governance. The discourses of EC and IPES that appeared from the analysis where fundamentally different in focus and goal of the policy, change required, solutions presented, actions needed and framings of the concept of sustainability - in particular of the link between sustainable production and consumption. EC discourse appeared to rotate around agriculture and rural development, with the aim to improve the efficiency of the system; while IPES one, to focus on a more systemic vision aiming at improving the integration of the entire food system. This analysis highlighted the differences between the two stakeholders' discourse but also some similarities. Indeed, the analysis helped confirm that, although the differences between the two discourse are still very strong, there are some features of IPES discourse which are starting to become part of EC one. Moreover, the comparison with the existing literature on the topic helped reconduct those discourses to broader paradigms. The analysis demonstrated that EC discourse is layered and follow multiple contrasting paradigms, depending on the theme. This last part of the analysis has been helpful to determine whether or not EC discourse represents a paradigm shift from the unsustainable "business as usual".

3a.03

Revealing the cereal production in Portugal: a time-series analyses for sustainable agriculture

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Nowadays, the distinguishing of the inequalities of European regional agriculture is an aspect that is being re-evaluated, in order to trace the large and small divergences which have been alienating the economies of Northern and Southern Europe since the 17th century. In Portugal, the westernmost country on the European continent, several policies and measures, for example, the “Common Agricultural Policy” have been applied and therefore they have impacted the rural areas and agricultural activities over the last century. Much research has been conducted to analyze the several dimensions of these impacts and to identify the main trends in public policies and national authorities. Portugal was the last country in Western Europe where the main activity was agriculture. Considering this fact and the various changes that have affected the rural areas and have challenged the sustainable production of food, the interest in Portuguese agriculture becomes even more pertinent. Over the last decade, the transformation of individual crops, influenced by natural and human factors, has been affecting the first stage of the sustainable food system; the agricultural production of cereals. Despite the fact that the wheat, rice, and corn are the food base since together provide the 42% of all the calories consumed by humanity, in Portugal their production is in deficit and therefore it is necessary to import these cereals to supply its population. In this study, we intend to gain a historical perspective of the cereal production, evaluating the production changes and understanding the importance of the cereal production for each Portuguese region. Statistical techniques such as smoothing and curve fitting techniques and autocorrelations, are applied to identify the Portuguese agricultural patterns in time series data. The statistical data used in this study are collected by the “Agriculture in Portugal: food, development and sustainability (1870-2010)” project research team. The data represent the annual and regional productions of the most economically relevant Portuguese cereals; wheat, maize, rye, barley, oats, rice from 1850 to 2009. The results show the rhythms of regional agricultural growth and the most suitable areas for each cereal production. Thus, over the last years, maize has been the more representative cereal in Portugal. The expansion of this cereal to the south of Portugal and the increased of its production values are *being* noticed. The data regarding the wheat, show high production between 1930 and 1979, which is significantly decreasing in the following years. Together the rye, barley, oats, rice productions are the cereals with less expressiveness in the Portuguese cereal production. Overall, this methodology facilitates the reading of time series data of the agricultural production for about 160 years. It is a powerful tool to support decision making for a sustainable agriculture in order to provide food security for present and future increasing population minimizing the environmental impact of the pressure on non renewable resources.

3a.04

Definition of indicators for a sustainability assessment of a legume based agri-food chain in Slovenia

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What the producers choose to grow and what the consumers want to eat is effecting the world today and it will affect the future. Increasing public demand for food and the increase in global population has led to extensive growth in plant and animal production. For decades, our food has been produced through industrial agriculture, damaging soil and our health. This system is not any more sustainable. Transformation is needed and we have to move towards more sustainable food systems. In Slovenia, there is a major problem of plant protein self-sufficiency. Because of that, Slovenia depends on the import of plant proteins as well as fossil energy required for the production of nitrogen fertilizers. It is necessary to increase the production of legumes grown in Slovenia. Legumes contribute to ensuring global food security at all levels. They have a high nutritional value, as they are an important source of protein, amino acids and other essential nutrients. Legumes bind nitrogen, so they improve the fertility of the soil and leave a smaller carbon footprint. In addition, legume production encourages sustainable agriculture and contributes to mitigating climate change. Several models of sustainability assessment based on indicators have been proposed. However, when talking about sustainability of food production, we need to assess the sustainability of the whole agri-food chain. In order to assess the sustainability of an agri-food chain, we integrate the main sustainability pillars: social, economic, and environmental sustainability, as well as their interactions (bearability, viability and equitability). A large number of indicators obtained from literature survey have been obtained and categorised to define the interactions between the main sustainability pillars in order to assess the main legume agri-food chain in Slovenia according to the 17 goals of the 2030 Sustainable Development Agenda. The research will serve as a guideline for further development of the model for assessing the sustainability of legume agri-food chains and designing a trademark for Slovenia, enabling growers and processors to be competitive in terms of quality, allowing them economic presence on the market of sustainable legume products.

Session 3b: Sustainable food system and quality

3b.01

Shellfish meat safety on Montenegro coast

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Exploitation of natural resources of the marine ecosystem to feed a growing human population has led to the possibility of their application in the future. In order to solve this problem, mariculture develops and the creation of adequate conditions for the breeding of marine organisms which are using in human nutrition and one of them and shellfish are known as nutritionally valuable food. Microbiological composition of marine organisms, and therefore shells largely depends on environmental factors such as time of year, temperature of the sea water and the like. Thus, in the winter period, at lower temperatures, the sea water of the microflora of shellfish is much poorer compared to the summer period when the sea, and therefore marine organisms, are richer with a variety of microflora. This work was focused on growing shells on the Montenegrin coast, and a special emphasis was put on placing health-safe shells on the Montenegrin food market. In addition to meat shells, physical and chemical parameters of sea water were studied: water temperature, salinity, oxygen saturation, pH, transparency, nitrate concentration, nitrite, total nitrogen, total phosphorus and silicates. Examination of these parameters is related to the period from September 2017 to August 2018. On the basis of microbiological test number of grown colonies of *E. coli* can be concluded that the shells were grown in six production area located along the Bay of Kotor of safe for human consumption, and that the test shellfish in Montenegro meet the criteria prescribed by the quality of seawater. However, the results of the test indicate that certain environmental factors as well as the characteristics of some locations can be very variable and the parameters thus monitored can reach a risk level for the safety of the product.

3b.02

The concurrent use of hedonic test, J.A.R. and ranking test on Romanian brine cheese increase product discrimination

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Romanian brine cheese (telemea) is highly appreciated by consumers due to its high nutritive value, rich flavour, versatility in preparation of a variety of dishes. It is prepared from milk from various species but mostly from cow milk and buffalo milk. Various brands of brine cheese are available on the Romanian market. They present slightly different sensory characteristics especially regarding the taste (intensity of salty and / or sour taste) and texture which further leads to consumer preference. It was the purpose of this study to evaluate the consumers' perception about the sourness and texture of brine cheese. The study was performed at USAMV Cluj-Napoca, Laboratory of Sensory Analysis of Foods. Four different brine cheeses available on supermarket were prepared by labelling with three-digit codes (201, 426, 553, 636) and sampling 2 square pieces (20g/piece). Each consumer (n=100, age 18-55 years old) received the samples randomly. Consumers evaluated the sourness and creaminess of samples on 5 point hedonic test (e.g. hedonic scale for evaluation of sourness: 1 - very unpleasant, 2 - unpleasant, 3 - indifferent, 4 - pleasant, 5 - very pleasant) and 5 point Just About Right test (e.g. J.A.R. scale for evaluation of sourness: 1 - not at all sour, 2 - slightly sour, 3 - ideal for me, 4 - too sour for me, 5 - extremely sour). Data were interpreted using Consumer Check Software. The values of hedonic scores for sour taste ranged from 3.65±0.96 to 4.06±0.83, while creaminess 3.21±1.00 to 3.60±0.85. Although the hedonic scores for both sourness and texture were in the range of pleasant area of the scale (above 3), the general J.A.R. scores for each attribute were slightly lower than the value "ideal for me" (2.44-3.12). A close look at the distribution of the J.A.R. scores shows that above 40% of the consumers considered the samples either too sour or too creamy. PCA analysis revealed that sample 201 was perceived completely different than all samples tested, while samples 636 and 462 were perceived similar in terms of sour taste and creaminess. Sample 636 was placed first on ranking test although it did score the lowest on hedonic test, but it was the first on J.A.R test. Samples 201 and 462 were both on the second place in ranking test. In conclusion, an ideal brine cheese in the mind of consumers is slightly sour and harder in texture.

3b.03

Environmental impact assessment of mealworm (*T. molitor*) production for human nutrition in Austria

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Global food production will need to almost double by 2050 to provide enough food for over 9 billion people living by then, at least under the current consumption patterns. As conventional animal production is among the leading causes for climate change and occupation of land, alternative protein sources need to be found. Edible insects might be a sustainable protein supply, but environmental life cycle assessment (LCA) studies on them are scarce. This study is the first to show cradle-to-gate LCA results of mealworm larvae (*Tenebrio molitor*) produced for food in Austria. A combined ReCiPe midpoint (H) and CED method is used to estimate the potential environmental impacts. Impact categories include global warming potential (GWP), energy use, agricultural land occupation, terrestrial acidification and freshwater eutrophication. The robustness of the results is tested via sensitivity analysis and Monte Carlo simulations.

GWP from the production of 1 kg of edible mealworm protein amounts to 20.4 kg CO₂-eq, which is mainly due to feed supply (49%) and on-farm heating (41%). These two processes are also the main contributors to all other studied impact categories and are identified as environmental hot-spots. The production system is contrasted with a selected Austrian broiler production system (GWP of 26.6 kg CO₂-eq kg⁻¹), to which it compares favourably (18-72% lower impacts depending on category), with the exception of freshwater eutrophication (6% higher impacts). As the Austrian production system operates on a small scale and obtains organic feed ingredients,

however, it cannot compete with more efficient large-scale *T. molitor* production systems for the impact categories covered herein. Nevertheless, it is suggested that Austrian mealworms represent a sustainable protein supply for human nutrition. The biggest advantage of insects lies in their ability of converting human-inedible by-products or waste, hence contributing to overall food availability. Food safety issues, culture-bound disgust and legislative barriers have to be overcome, yet insects are becoming increasingly popular as a promising protein source potentially added to the menu of Western cultures.

3b.04

Framing forest ecosystem services across country policies - Conflicting perspectives on synergies and trade-offs

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Forest and forest-related policies and laws are supposed to address forest ecosystem services (FES). However, the way those services are (not) incorporated into policies is underexplored in the literature. Since this matters in order to know what is prescribed and how action is to be taken (e.g. more intensive forest use versus stricter biodiversity protection), it is important to study how policies and legislation frame forest ecosystem services both directly and indirectly.

This paper consequently analyses and compares how forest-related policy documents from five policy areas (forest, biodiversity, climate, energy, and bio-economy policy) frame FES in two countries (Austria and Catalonia, Spain). The research furthermore scrutinises whether different framings result in conflicting views on synergies and trade-offs between them. It is expected that diverging frames of forests and their services result in different perspectives on synergies and trade-offs between single FES or sets of FES. The paper presents a highly relevant case analysis as both Austria and Catalonia are particularly rich in forests. The paper is based on qualitative research methods, which mainly consist of policy document analysis with the support of Atlas.ti.

Our analysis finds that in general FES are less directly addressed. In addition, identified dominant policy frames refer to the multi-functionality of forests, forest protection, address forests as a renewable resource and energetic potential, and lastly point at climate change implications of and for forests. The conflict between synergetic views, that claim all functions of and demands towards forests can be served equally, and those that foresee trade-offs becomes most evident. Synergetic thinking is also widely observed for framings of forests e.g. as a renewable resource, mostly referring to opportunities for climate change mitigation and a better appreciation of forests. Connecting these important insights and conflicting views on FES, the paper concludes, that frame analysis applied to forest and forest-related policy documents can help make conflicts visible by identifying priorities and perspectives.

Session 3c: Sustainable food system and quality

3c.01

Dissipation of anthranilic diamides in peach fruits

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Anthranilic diamides are a new class of insecticides with a novel mode of action. They provide exceptional control through action on the ryanodine receptor, potentially activating this receptor. They are highly efficient in the control of many pests, with low toxicity to beneficial arthropods and mammals. From the aspect of the safe use of plant protection products and the production of healthy food, data relating to degradation and residual behaviors of insecticides after their application are very important. However, there is a lack of studies reported on the dissipation of anthranilic diamide insecticides in fruits. In this study, cyantraniliprole and chlorantraniliprole were applied at recommended rates for control of the oriental fruit moth (*Cydia molesta*) to evaluate the dissipation, the residue levels and half-lives for these insecticides in peach fruits. The trials were set up complying with the principles of good agricultural practice, and OEPP/EPPO methods were used for experiment design and data processing. The extraction of insecticide residues was carried out by using QuEChERS method, while the determination of residual levels was performed by high performance liquid chromatography coupled with diode array detector (HPLC-DAD). Immediately after deposit drying, the concentration of cyantraniliprole in peach fruits was at the EU MRL of 1.5 mg kg⁻¹, while MRL level of 1 mg kg⁻¹ for chlorantraniliprole was obtained between fifth and seventh day after insecticide application. Cyantraniliprole and chlorantraniliprole dissipation rates in peach followed first-order kinetics, $C=1.46e^{-0.26t}$ ($r^2=0.964$) with a half-life (DT₅₀) of 2.5 days and $C=2.32e^{-0.22t}$ ($r^2=0.942$) with a half-life (DT₅₀) of 3.2 days, respectively. Obtained results of the dissipation study showed that the cyantraniliprole and chlorantraniliprole in peach fruits decline rapidly and have low half-life values.

3c.02

Physico-chemical parameters of some Romanian kiwifruit hybrids influenced by different cold storage technologies

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Kiwifruit is recognized as highly nutritious having many biochemical characteristics that deliver a range of health benefits. In Romania, kiwi is a new fruit specie and the creation, testing and introduction of winter hardy genotypes, adapted to the local harsh climate conditions is a priority. A common Italian-Romanian kiwifruit breeding program was initiated in 1993 and during the time, several hybrid genotypes were obtained and introduced to be tested. After more than two decades of research, it was demonstrated that *Actinidia deliciosa* and *A. chinensis* can be grown in Romania in peach favourable areas, while *A. arguta* (hardy kiwi, baby kiwi) can cover larger areas, suitable for plum cultivation. At the Faculty of Horticulture within the University of Agronomic Sciences and Veterinary Medicine of Bucharest, an experimental field with kiwifruit hybrid genotypes, was established. The plants were grown under an organic orchard management, on a T-bar trellis, being irrigated with micro sprayers. The fruits were harvested starting with mid-October, in 2017 and at beginning of November, in 2018. Harvesting moment was established when the fruit flesh firmness was lower than 7.0 kg force/cm². After harvesting, kiwifruits were stored in two different cold storage conditions: normal atmosphere at 3°C and 95% humidity and controlled atmosphere with 1.5% Oxygen, at 1-2°C and 95% humidity. The aim of this study was to analyze the fruit quality characteristics of some new kiwi hybrid genotypes at harvest and during storage with the final goal to select few elites. Fruit weight and shape index have been determined after harvest. Different fruit characteristics were measured and evaluated in dynamics: firmness, soluble solids, dry matter, acidity and ascorbic acid. All the determinations and analyses were made at the Research Center for Studies of Food Quality and Agricultural Products laboratories. Using the results of the study regarding the fruits physico-chemical characteristics after harvesting and during the storage, but also some other plant parameters, several kiwi hybrid elites were selected. They will be propagated and planted for the production test.

3c.03

Influence of the ratio of sugar and total acid concentrations to sensory perception of sweetness of still white wines

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Wine taste, as an important indicator of its sensory quality, is influenced by a large number of substances dissolved in a wine. Although by its complexity far beyond the smell, the evaluation of the wine taste, combined with tactile sensations that wine triggers entering the mouth, needs highly trained wine testers. Wine consumers usually and with no doubts correctly detect acidity and bitterness of the wine, while usually facing some problems with correct interpretation of its sweetness. The primary objective of this research was to determine the threshold of sensory detection of wine sweetness modelled by adding a sucrose solution in dry white wines and identification of possible influence of acidity on the sensory detection of sweetness.

The study was done on 14 samples of regional still white wines of different sweetness. The sugar content (g/L, Lane-Eymon method) and acidity of wines (g/L as tartaric acid, neutralization with 0.1 M NaOH) were measured in a laboratory, followed with sensory evaluation of their quality (OIV pointing scale up to 100 points). Seven experienced wine consumers tasted untreated dry wines and the same wines with modelled sugar concentrations trying to find the lowest concentration of sugar by which the sweetness of wine was undoubtedly recognized.

The obtained results showed that sugar content in all analysed wines corresponded to the declared categories of their sweetness. The wine tasters have registered wine sweetness at relatively low concentrations of sugar (the lowest 3.79 g/L, the highest 6.07 g/L). It should be stressed that in accordance to regional regulations wines with content of sugar bellow 4 g/L must be declared as dry (no sweet) wines. Analysis of the relations between the acid content of the wines and the thresholds of sensory perception of their sweetness pointed out the high positive correlation (correlation coefficient +0.786). This is in accordance with some previously published researches concluding that the sensory recognition of the sweetness of wine is conditioned by their acidity, i.e. that wine acidity to some extent suppress its sweetness.

3c.04

Resistant grapevine varieties from Serbia and their response to bunch thinning on the grape quality in organic production

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Areas under fungus resistant grapevine varieties have significantly increased over the last few decades. Multiple backcrossing with *Vitis vinifera* varieties allowed the development of resistant varieties with a high percentage of *V. vinifera* genes (more than 85%). However, these varieties are usually unknown to consumers even if they have the quality almost at the level of remarkable *V. Vinifera* varieties. The goal of the research was to improve the grape quality of Bačka and Panonia in Fruška Gora wine region (Serbia). Bačka and Panonia are resistant grapevine white varieties released in Sremski Karlovci in 2001 and 2003, respectively. Bačka is highly vigorous variety with mid-compact bunches while Panonia is less vigorous compared to Bačka with loose bunches. Panonia has ideal shoot positioning in the canopy with small laterals. Yield reduction treatments were applied in 2017, sixty days after flowering. Treatments with four and eight bunches per vine were applied. Yield parameters, grape and wine quality were examined. The results confirm that Bačka and Panonia are suitable for organic grape production in Fruška Gora wine region. Hot and dry conditions in July and August accelerated grape ripening and the grapes were harvested at the end of August. Panonia accumulated more sugar in the must compared to Bačka. Titratable acidity was lowest in Bačka in the treatment with four bunches per vine (5.8 g/l) and highest in Panonia control treatment (7.8 g/l). However, the canopy management operations had no satisfied impact on the grape quality of the

resistant varieties. Tukey HSD test showed no significant difference between the treatments and control. The wines obtained from the treatments with yield reduction were more alcoholized compared to control.

Session 4a: Environmental safety and climate change

4a.01

The impact of drought on water quality of Ludaš Lake, Serbia

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The effects of climate changes are being more evident during the last decade all around the world. Areas with preserved biodiversity, declared protected and with restricted human influence, are especially vulnerable to climate change. However, although protected, these areas are not absolutely free from pollution and influences from outside borders of protection. For example, air deposition and impaired underground water might degrade water quality of surface water bodies. In such circumstances climate change can even worsen the situation and the goal of our research was to verify correlation between the drought and water quality and to check how big is the impact of drought. As a case study we have selected one of the most important lakes in Vojvodina Province, Serbia - Ludaš Lake. Ludaš Lake is designated as Ramsar site and an Important Bird and Biodiversity Area (IBA), but severely polluted by excess nutrients originating from Palić Lake through the canal that connects the two lakes, by agricultural runoff, etc. Water quality was controlled on monthly basis, from April to September 2017 on three sampling points: Ludaš North, Ludaš Middle and Ludaš South. Monitoring included measurement of the following parameters: air and water temperature, dissolved oxygen and % of dissolved oxygen, conductivity and pH. These parameters were measured in situ using handheld sensors, while concentration of suspended solids were analysed in the Laboratory for water analysis, at the Faculty of Agriculture, University of Novi Sad, applying photometric method. Extremely dry weather in 2017, concerning the sum precipitation for the vegetation period, was major reason for choosing this particular year. Data about climate for the same period in the form of drought indices (SPI - standardized precipitation index), and precipitation and percentiles were taken from the website of the DMCSEE (Drought Management Centre for Southeastern Europe). According to the maps of SPI calculated for different time scales, moderate drought was recorded in April (SPI 6), June (SPI 1, SPI 6), July (SPI 3, SPI 6) and August (SPI 1, SPI 3, SPI 6, SPI 12). Only on the map for SPI 6 for May at the vicinity of the Ludaš Lake severe drought was recorded. The similar phenomenon is also supported by the maps where percentiles and precipitation are presented, for period April-August, where values were below 50, and that is an indication of drier periods. Values of monitored oxygen parameters were high at all sampling points, indicating supersaturation with oxygen, whereas pH values were above 8,5 up to 10 showing alkaline conditions. In addition, BOD₅ values were quite high, ranging from 10,9 - 39,4 mgO₂/L. Although, Ludaš Lake is known as a saline lake, the drought conditions even more contributed to intensify characteristics. Average values of conductivity from Ludaš North to Ludaš South were 1101 μS/cm, 1497 μS/cm and 1949 μS/cm, respectively. The highest conductivity of 2390 μS/cm was recorded at Ludaš South in September. Overall conclusion about water quality of Ludaš Lake, for the vegetation period in 2017, is that along with the increase of temperature water quality deteriorates. Drought conditions amplified deterioration, especially if increase of saline character of the lake is considered.

4a.02

Changes in the water balance of Bosnia and Herzegovina as a result of climate change

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The analysis of meteorological data from the period 1961–2014. show the rise in the mean annual temperature in the entire territory of Bosnia and Herzegovina. The changes are more pronounced in the central – hilly part of the country. The increase in annual air temperature ranges from 0.4 to 1.0°C, whereas temperature increases during vegetation period were up to 1.2°C. Additionally, increases in air temperature over the last fourteen years are even more pronounced. Changed distribution of precipitation, significant variations and the increasing soil moisture deficit during vegetation period (April – September) are also evident in Bosnia and Herzegovina. The increase in air temperature combined with changes in the distribution of precipitation has resulted in a change of evapotranspiration and annual water balance. The main objective of this study was to determine, spatially interpolate and compare the severity of changes in mean annual water balance components between different regions in Bosnia and Herzegovina. Monthly weather data from 26 weather stations in Bosnia and Herzegovina, for the time period of 50 years (1967 – 2016) were used to determine and analyze impact of climate change on the following water balance components: temperature, precipitation, reference evapotranspiration, actual evapotranspiration, total runoff, soil moisture deficit and amount of snow. The results indicate that climate change has a significant effect on the all water balance components. Reference and actual evapotranspiration show an increasing trend over the entire territory of Bosnia and Herzegovina with the strongest increase in the central part of the country. The soil moisture deficit also shows a significant increase, while the amount of snow decreases on most weather stations.

4a.03

Land management effects on soil erosion and degradation in Croatian vineyard obtained by rainfall simulation

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Soil degradation and erosion are a major concern in the world today. Eroded lands have deteriorated soil physical, chemical, and biological properties and reduced productivity which is a great threat to environmental safety and ecosystem stability. Thus, it is important to adopt suitable land management. The aim of this work is to study the land management effect on soil erosion caused by intensive rainfall of soil properties in vineyards by comparing freshly tilled vineyard (VT) and permanently grass covered vineyard (VG) plots. The study vineyard is located in Sisak – Moslavina County, Croatia (45°31' N, 16°43' E; average elevation 194 m) on the roughly 8° slope with the E exposition. Fieldwork comprised of 8 rainfall simulations (58 mm/h for 30 min over 0.785 m² plot surface), and collection of overland flow per treatment. The analyzed properties were: 1) Soil water content (SWC), 2) Mean weight diameter (MWD), 3) Water stable aggregates (WSA), 4) Ponding time, 5) runoff time, 6) infiltration rate, 7) total outflow yield, 8) sediment yield, 9) soil pH. The results showed that significant differences were observed in all analyzed properties with exception of SWC and pH. VT plots had lower ($p < 0.05$) MWD (2.56 mm), WSA (53.1 %) and infiltration rate (41.4 %) compared to VG. Conversely, significantly higher MWD (3.02 mm), WSA (88.1 %) and infiltration rate (98.4 %) values were determined on VG in addition to VT. Ponding time and time to runoff were lower on the VT which caused longer outflow time and increased total outflow yield and sediment yield. The tilled vineyard had 745.4 times more sediment loss than grass-covered (VT 6.87 t/ha compared to VG 0.0092 t/ha). Tillage is recognized as unsustainable practice on study area and key factor for absence of vegetation, deteriorated soil structure and decreased aggregate stability. Altogether, tillage has resulted in drastically higher soil loss by rainfall compared to grass-covered treatment. Grass covered vineyards on the slope is recognized as an appropriate form of land management for sustainable vine production.

Keywords: Land management, soil erosion, vineyard

Acknowledgments

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4a.04

Land use in Zagreb altered soil quality properties

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Land use changes can have negative or positive effects on soil quality. Therefore, soil management impacts should be carefully evaluated, especially in urban areas. The study objective was to assess the effect of long-term Land use and soil management practices by evaluating selected soil properties: water holding capacity (WHC), bulk density (BD), air-filled porosity (AFP), aggregate stability (AS), water infiltration (KFS) and soil CO₂ emissions in urban and peri-urban soils in Zagreb (Croatia). Soil samples (10 per treatment, 40 in total) were collected at depth 0 - 10 cm within an intensively tilled cropland (cropland) and vineyard, natural forest (forest) and organic grass covered orchard (orchard). Land-use effects were significantly ($p < 0.05$) pronounced at all studied soil properties. The assessment showed substantial compaction (higher BD, lower AFC) and soil degradation (lower AS and KFS) in cropland and vineyard soils compared to forest and orchard soils following long term period of cultivation. Soil BD was significantly higher at cropland (1.50 g cm⁻³), while forest show significantly lower BD (1.02 g cm⁻³) in addition to other treatments. Water infiltration is significantly higher at forest soils (377.1 mm h⁻¹) in addition to vineyard (124.1 mm h⁻¹) and cropland (71.0 mm h⁻¹) soils. In addition to highest CO₂ emissions were determined at cropland (269.5 kg ha⁻¹ day⁻¹) and vineyard (209.4 kg ha⁻¹ day⁻¹) soils, while lowest at forest soils (110.8 kg ha⁻¹ day⁻¹). Tillage, pesticides, and fertilizer applications were presumably the reasons for altered soil quality properties. Overall, we conclude that long term cultivation and use of agrochemicals has caused soil quality to decline to a point that threatens the sustainability of the investigated soils. **Keywords:** soil management, land degradation, water infiltration, aggregate stability, soil compaction

Session 4b: Environmental safety and climate change

4b.01

Contributing to the implementation of Land Degradation Neutrality targets in Bosnia and Herzegovina

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Land Degradation Neutrality (LDN) is defined as "a state whereby the amount and quality of land resources necessary to support ecosystem functions and services and enhance food security remain stable or increase within specific temporal and spatial scale and ecosystems" (decision 3/COP12, UNCCD, 2015). The goal of LDN is to maintain or enhance the land resource base - the stocks of natural capital associated with land resources and the ecosystem services that flow from them.

Bosnia and Herzegovina (BiH), participate in the LDN Target Setting Program and has recently finalized the target setting process. The information collected in the process shows very specific trends in land degradation in comparison with the trends worldwide recognized. A summary of LDN baseline data is currently available, and mostly based on the global dataset provided by the UNCCD reporting process: decrease in forest areas 24,365 hectares, mainly converted into shrubs, grassland, cropland, sparsely vegetation area; decrease in croplands areas 6,347 hectares, mainly converted in artificial areas.

Global Environment Facility (GEF) is committed to help countries to implement convention guidance and facilitate coordinated investments in sustainable land management (SLM) as a mean to achieve LDN. This is fully aligned to objective of land degradation focal area - "Creating an enabling environment to support voluntary LDN target implementation".

Climate Change Mitigation and LDN provides significant benefits for the mitigation of climate change. Halting and reversing land degradation can transform land from being a source of greenhouse gas emissions to a sink by increasing carbon stocks in soils and vegetation. Simultaneously, LDN plays a key role in strengthening the resilience of rural communities against climate shocks by securing and improving the provision of vital ecosystem services.

A back of the envelope calculation has been made using EX-ACT to estimate potential benefits of reducing land degradation and engaging in sustainable management of land. The sequestration potential from a set of activities that can be developed at the country level is very substantial. The analysis was conducted on a 20 year period in accordance with IPCC methodology. For instance, it is estimated that roughly 15,133 hectares of forest in the entity Federation of BiH were converted from forest lands to shrubs, grasslands and sparsely vegetated areas between 2000 and 2012. If this change could have been avoided, then the country would have avoided -4.7 Mt CO₂-eq over a period of 20 years, or -0.23 Mt CO₂-eq per year. The latter amount is about one-third of the commitment for the whole country under its Nationally Determined Contributions (NDC) relative to the baseline. Similar exercises for afforestation/reforestation efforts or for interventions to reduce degradation indicate that land based activities could be a cost-effective way to support mitigation commitments while providing other co-benefits (such as global environmental benefits linked to ecosystem services, biodiversity and land degradation).

National experts from BiH currently closely work with the FAO Global Soil Partnership (GSP) Secretariat to support development of the Soil Organic Carbon (SOC) map, using national soil profile data, existing soil and terrain maps, CORINE land cover and climate data, as well as satellite imagery products.

4b.02

Medieval hillfort as "hotspot" of extraordinary fertile Archaeological Dark Earth in Central Europe

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Archaeological Dark Earth (ADE), a category of Anthrosols, has gained a lot of global attention as it exhibits high nutrients content, organic matter stocks, characteristic dark color, and enable high crop yields. However, not much is known about the chemical properties of ADE in many parts of Central Europe. We studied ADE in the territory of an early medieval hillfort Dřevíč in Czech Republic aiming to compare the chemical properties of ADE with control soils from a fertilizer experiment (unfertilized, and N, P, NP, NPK fertilized soils) not affected by settlement activities. Black color of ADE highly contrasted with reddish color of Cambisols in the surrounding. Soil reaction and total content of Nitrogen (N), Phosphorus (P), Calcium (Ca), Manganese (Mn), Iron (Fe), Aluminium (Al), Copper (Cu), Zinc (Zn), Strontium (Sr), and Rubidium (Rb) was substantially increased in ADE in comparison to the control soil on the same marl-stone geological substrate in the surrounding and *vice versa* in the case of C:N. Total content of N, P, Ca, Mn, Fe, Al, Cu, Zn, Sr, and Rb was enriched by 30, 350, 900, 100, 140, 100, 30, 90, 35, and 40% respectively in the soil from the internal area of the hillfort in comparison to the unfertilized control treatment and 1 to approximately 28 folds enriched than the use of N, P, and K fertilizers. Enhanced contents of these elements together with charcoals visible in the soil indicate deposition of organic wastes and biomass ashes during the existence of the hillfort. Ancient hillforts can thus represent extraordinary nutrient-rich islands in the cultural landscape of Central Europe. The chemical signatures generated by ancient settlement activities are such prominent that they cannot be masked by modern mineral fertilizers application.

4b.03

Preliminary results of 30 common tree species tolerance to urban environment, case study two parks in Novi Sad (Serbia)

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Climate has been changing rapidly in the 21st century. Urbanized areas, like a cities, are recognized as highly vulnerable to aforementioned changes. Also, highly urbanized and build-up areas significantly changed and degraded their surrounding environment. Urban forestry is one of the most important tool to neutralize climate change as well as to improve urban environment. However, only healthy, high decorative and high tolerate trees can be useful and provide benefits to the urban environment. This research analyze tree tolerance to high urban environment of common tree species in middle-sized cities across temperate climate zone, case study of Novi Sad (Serbia). This research analyzed two factors (Vitality value and Decorative value) which define tree tolerance to surrounded habitats. The sample included two parks in Novi Sad (Liman's park and University park). In total, 30 species are determined in analyzed parks and 899 trees are valorized. Parameters Vitality and Decorative values were scored from 1 (poor) to 5 (excellent), and their meaning are defined as tolerance to surrounded environment. Out of 30 analyzed species, five species are recognized as high tolerant, with value greater than 4, and they are *Acer pseudoplatanus* 'Atropurpureum', *Carpinus betulus* 'Fastigiata', *Tilia grandifolia*, *Tilia tomentosa* and *Cedrus atlantica*. The medium tolerant species (mark 3.5-4) are *Acer pseudoplatanus*, *Carpinus betulus*, *Juglans regia*, *Morus nigra* and *Sophora japonica*. Aforementioned high- and moderate-tolerant species can be intensively used in park areas. On the other hand, species *Prunus myrobalana*, *Robinia pseudoacacia*, *Salix alba*, *Salix matsudana* 'Tortuosa' and *Quercus robur* 'Fastigiata' are recognized as non-tolerant and should be avoided in the future. Statistically significant differences were noted to Species in contrast of Locality as grouping variable. In conclusion, in the future, based on this case study, five tree species marked as high tolerant should be favored and non-tolerant should be avoided. Following these results, urban forestry quality can be enhanced, i.e. their vitality, decorativeness and tolerance to surrounding urban environment and their services in urban areas can be achieved in its entirety.

4b.04

Customized education as method for Higher Education Institution for implementing the goals of Sustainable Development Goals in sustainable regional development using the example of Academia Danubiana

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Normal 0 21 false false false DE-AT X-NONE X-NONE /* Style Definitions */ table.MsoNormalTable {mso-style-name:"Normale Tabelle"; mso-tstyle-rowband-size:0; mso-tstyle-colband-size:0; mso-style-noshow:yes; mso-style-priority:99; mso-style-parent:""; mso-padding-alt:0cm 5.4pt 0cm 5.4pt; mso-para-margin-top:0cm; mso-para-margin-right:0cm; mso-para-margin-bottom:10.0pt; mso-para-margin-left:0cm; line-height:115%; mso-pagination:widow-orphan; font-size:11.0pt; font-family:"Calibri",sans-serif; mso-ascii-font-family:Calibri; mso-ascii-theme-font:minor-latin; mso-hansi-font-family:Calibri; mso-hansi-theme-font:minor-latin; mso-bidi-font-family:"Times New Roman"; mso-bidi-theme-font:minor-bidi; mso-fareast-language:EN-US;} At the UN Summit in New York in September 2015, all member states committed to work towards the implementation of the 17 Global Sustainable Development Goals (SDGs) at international, national and regional levels until 2030 ("Agenda 2030"). The European Union (EU) described the SDGs as important to implement in both its internal and external policies. It emphasises that sustainable development is at the heart of European values and therefore an overarching goal of the EU and the entire Danube region. As institutions of higher education (HEIs), universities assume a central role in the implementation of Agenda 2030 and the SDGs. This present paper calls into question how HEIs can contribute to the implementation of the SDGs and presents the Academia Danubiana, which facilitates sustainable spatial development in line with Agenda 2030. With the Academia Danubiana, a new continuing education institution is implemented, which promotes a scientific and pedagogical network in various disciplines and paradigms of planning and natural sciences. This initiative was initiated by the University of Natural Resources and Life Sciences, Vienna (BOKU). Primary objective is to develop visionary research concepts, apply new didactic models in knowledge transfer, and promote mutual learning in dialogue between the political administration system, civil society, and HEIs. It implements the new and innovative concept of customized education programmes, which base on action research perspectives by forcing society learning processes. Within this framework it encourages a better exchange between universities and authorities in science and administration to support regional integration in the countries of the Danube basin. The main objective of the presentation and the paper is to show how the SDGs relate to the sustainable Development in the Danube region and how they can be used to support the activities of the Academia Danubiana. Another goal is to present the concept of Academia Danubiana to the CASEE members and to win potential partners for a network. The aims of the Sustainable Development Goals are compared with those of the Academia Danubiana and linked together. On this basis, thematic areas are derived which point out options for action for Academia Danubiana to implement the SDGs. It will be shown that customized educational in the context of sustainable development and SDGs as well as the cooperation of scientific and regional actors are an important basis to deal with real sustainability problems comprehensively.

Session 5: New challenges in animal sciences and veterinary medicine

5.01

The influence of gender on growth performance, carcass and meat quality traits for Simmental bulls and heifers from the intensive fattening system

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The effect of gender on growth, carcass composition and meat quality traits of *musculus longissimus lumborum* were investigated for Simmental bulls (n=12) and heifers (n=12). They are reared before fattening period at different conditions and produced during finished fattening phase under identical management conditions. The calves entered the experiment at an average similar age (2.5 months old) and were slaughtered with 17 months of age. All cattle (male and female) were produced under an intensive system during fattening at a commercial beef farm and fed ad libitum with the same diet. The fattening period ends when the animals reach an average body weight up 475 to 670 kg. Body weights and total gain were measured at the beginning and at the end of the experiment so post-slaughter evaluation was carried out. Bulls gained more rapidly (P<0.001), total gain was higher than heifers and according to that, bulls also had higher slaughter weight. Bulls produced higher hot carcass weight with a higher dressing percentage (P<0.001) than heifers. Physical (pH₂₄, parameters of instrumental color, water holding capacity and Warner-Bratzler shear force-WBSF), sensory (marbling, color) and chemical (proximate composition: moisture, protein, total fat and total ash) analyses were performed. Gender affected significantly at cooking loss and WBSF (P<0.001). Bulls showed significantly higher content of a cooking loss and WBSF than heifers. Heifers achieved higher content of total fat (intramuscular fat) in meat samples (P<0.001) of *musculus longissimus lumborum*, but moisture and ash content did not differ significantly between groups of bulls and heifers. This research focused on ascertaining the effect of gender with the fattening and slaughtering qualities, as well as chosen meat quality parameters after fattening phase for bulls and heifers from the same commercial beef farm. The quality of slaughtered animals is a subject of interest for primary production as like as the meat industry.

5.02

Comparison of methods for the rehabilitation of dogs with advanced changes in the spine

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Animal rehabilitation is increasingly used in Poland. In particular, it is helpful in the case of diseases such as: hip dysplasia, spondylosis, discopathy, degenerative diseases of the joints and spine, injuries of the nervous system, chronic nerve and muscle diseases, balance disorders, weak muscle coordination, limb injuries and pain from various causes. Rehabilitation is primarily aimed at supporting veterinary treatment, pain relief and improving physical and mental condition.

The methods most commonly used in diseases of the spine include:

1) Hydrotherapy

Water treadmills are used for this method. Movements in the water engage all muscles for work, they do not overload the spine or joints, and they also improve the work of the circulatory and respiratory systems.

2) Laser therapy

Laser therapy improves blood flow through the capillaries, thus leading to better nutrition of tissues. The beam of energy reaches the depth from the surface of the skin to 5 cm deep into the tissues, which gives us a wide spectrum of impact on the patient's body.

3) Electrotherapy

It is used in patients experiencing severe pain or in the case of muscle paresis. It involves the use of electric current flowing through electrodes attached to the body of the animal.

4) Magnetotherapy

Used mainly as a therapy supporting treatment. It helps in relieving pain, accelerating tissue healing, reducing inflammation and swelling. It is based on the use of the magnetic field for a diseased place.

5) Ultrasounds

These are mechanical vibrations (sound waves) at a frequency that is inaudible to the human ear. The frequency range used for therapeutic purposes varies from 1 MHz to 3MHz. The biological action of ultrasound is based on micromassage, generation of endogenous (internal) heat and increased permeability of cell membranes.

6) Medical massage

Massage stimulates blood and lymph circulation by improving the oxygenation and nutrition of all tissues and systems. It helps in the elasticity of ligaments, tendons, joints, supports the growth of muscle mass and muscle endurance.

The type of surgery performed in the zoophysiotherapy cabinets depends on the patient's problem. Rehabilitation is mainly based on supporting surgical and veterinary treatment.

The aim of the study was to evaluate individual rehabilitation methods. The study involved dogs with advanced changes in the spine.

The dogs were divided into two groups. The first group included animals with changes in the spine related to age. The second group included dogs with changes associated with malformations.

5.03

The role of antioxidants in boar semen preservation

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The aim of the research was to test the biologically active substance obtained by the Institute of Microbiology of the Science Academy from Moldova. It was introduced in the basic medium as an additional component for boar semen dilution. The obtained experimental data showed that the introduction of 7% of the biologically active substance in the basic medium had positive results in the preservation of the semen material quality at 16-18° C. After 96 hours of conservation at 16-18° C the sperm motility of the spermatozoa was 54,3%. For the first time, it has been demonstrated that the capacity of the biologically active substance has demonstrated specific and non-specific characteristics to increase the preserved sperm resistance at 16-18° C. There was studied the average speed of the sperm with velocity average path (VAP), the average speed of the sperm with straight linear velocity (VSL) and curvilinear velocity (VCL) during the preservation at the hypothermic temperatures. The proposed medium for the dilution and preservation of the boar sperm at 16-18° C contains: glucose, sodium citrate, helaton, ammonium sulphate and the biologically active substance. The application of this medium allows to use more efficiently valuable reproduction characteristics of boars in the artificial insemination system.

5.04

Impact of BioR and Butofan on some parameters of lipid metabolism in adult quail placed in reconditioning

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At present, the positive effect of BioR remedy obtained by original technologies from the biomass of cyanobacteria *Spirulina platensis* was demonstrated at the Academy of Sciences of the Republic of Moldova on pigs, rabbits and broilers. Considering the fact that remedies of vegetal origin are not harmful to animals, people and environment, they are of particular interest to the most developed branch of animal husbandry - the aviculture, including for the production and exploitation of quail. . Until present, studies on the action of the nominated preparation on the physiological-metabolic status, including lipid metabolism in quail for reconditioning have not been conducted. The biological material was 150 quail at the end of the laying cycle divided into 3 batches of 50 birds. The tested preparation was administered intramuscularly to the quails two times consecutively at the onset of the study and secondly at 14 days after the first administration at a dose of 0.5 ml / head. In another experimental batch, the commercial product Butofan was administered in order to compare the obtained results. Birds of the control group received 0.5 ml of solution of NaCl of 0.9% in both terms. The birds included

in the study were analogous in terms of race, age, body weight and physiological status. During all time of the study, quails were monitored: clinical parameters, body weight, and number of eggs. . In addition, for laboratory investigations, blood was collected from five quails at the start of the study before the tested preparations were administered and then 2 times during the study. It has been established that the tested remedies do not cause adverse reactions or deviations in quails' health. Moreover, BioR showed adaptive properties, reflected in body temperature lower by 0.32 °C than the control group and 0.18 °C than the group treated with Butofan. Similar manifestations were also found in birds' breathing. Biochemical researches performed on quails that have benefited from the BioR remedy reveal a true decrease in total lipids in one investigation and an increase in triglycerides at this stage and their decrease at the end of the study. Additionally, both BioR and Butofan remedies induced an increase in the blood serum of β - lipoproteins at both stages of research, while cholesterol values did not show any essential changes. In conclusion, we can state that the BioR product has a beneficial effect on quail, including their lipid metabolism.

Session 6: EFFnet workshop

6.01

Long term field experiments of Czech University of Life Sciences

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Experimental trials were established in 1996 at five sites of the Czech Republic with different soil-climatic conditions: Červený Újezd, Hněvčevy, Humpolec, Lukavec, Praha - Suchdol. Within the trials three crops are rotated in the following order: potatoes, winter wheat, spring barley. Because of the agrotechnical conditions of the Červený Újezd site, potatoes as the experimental crop were replaced there by silage maize. The size of experimental plots is 60 m², at Červený Újezd site it is 80 m². The trial comprise 9 treatments: 1. no fertilization (control); 2. and 3. sewage sludges (SS1 and SS3); 4. farmyard manure (FYM); 5. half dose of farmyard manure + N in mineral nitrogen fertilizers (FYM + N); 6. mineral nitrogen fertilizers (N); 7. NPK in mineral fertilizers (NPK); 8. straw of spring barley + N in mineral nitrogen fertilizers (ST + N) and 9. NPK with trace elements corresponding to content applied with sewage sludge. Organic fertilizers sewage sludge (SS), farmyard manure (FYM) and straw (ST) are always applied in autumn (October) to potatoes (maize). Mineral phosphorus and potassium fertilizers are applied to each crop in autumn; mineral nitrogen fertilizers are applied to potatoes and spring barley in spring prior to crop establishment. In the case of winter wheat the nitrogen dose is divided into halves, the first one is applied as regenerative fertilization, the second one as productive fertilization. The content of nitrogen is 140 kg N/ha for wheat and 70 kg N/ha for spring barley. The NPK treatment of winter wheat and spring barley including phosphorus at a rate of 30 kg P/ha (Triple Super Phosphate) and potassium at a rate of 100 kg K/ha (60% potassium muriate). At the other treatments, the dosage of P and K depends on the content of nutrients in applied organic fertilizers. At all sites, the sewage sludges from the Waste Water Treatment Plant in Prague-Troja are used. Plant harvesting was done with an experimental harvesters. The average size of harvested to estimate the yield plots is 20 m² in Humpolec and Hněvčevy, 40 m² in Lukavec and Suchdol and at Červený Újezd site it is 60 m². Every year are taken up the soil samples, and samples of grain, straw, potato tubers and maize silage. All samples are archived, so it is possible to do the additional analysis from the samples taken up during the experiment. The contents of nutrients in all plant samples are measured every year as well as Mehlich 3 soil extraction is realized. There are also evaluated nitrogen contents in soil determined by 0.01 mol/L calcium chloride. The aim of this submission is apprise workshop participants with management and some results of our experiments.

6.02

The advantage of implementing a demonstration field into teaching- A case study from Austria

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For the international master programme 'Organic Agricultural Systems and Agroecology' at the University of Natural Resources and Life Sciences, Vienna (BOKU), Austria a new course ('Procedure of plant production in organic agriculture') was developed. This course is designed to impart advanced agricultural knowledge and processes in organic agriculture. Therefore, this course is being held in the winter and the summer semester as 'Lecture with field trip' and 'Seminar with field trip', respectively. Per semester two full-time excursions to the experimental farm are included. The farm is located close to Vienna in sub-humid Pannonian Plain and offers a seminar room and a demonstration field.

This organic demonstration field was especially set-up for the course, and contains a comparison between intensive and reduced soil tillage within a six-year crop rotation. The field is splitted between ploughing versus reduced soil tillage and each side has six plots with an area of 18 x 21 m (no replication). The crop rotation includes: 1) lucerne (*Medicago sativa*), 2) grain crop (e.g. spelta (*Triticum aestivum* subsp. *spelta*), rye (*Secale cereale*) or wheat (*Triticum aestivum*)), 3) cover crops-soybean (*Glycine max*), 4) cover crops-maize (*Zea mays*; intercropped with white clover (*Trifolium repens*), 5) white clover-sunflower (*Helianthus annuus*) and 6) winter grain crop (intercropped with lucerne).

The objective of this demonstration field is to illustrate the differences between intensive and extensive soil tillage, foremost in soil structure, soil moisture, weed pressure, and plant development. The main topics of the winter term are, soil tillage and cover crops. Students are receiving a two-hour introduction per chapter and subsequently a 2-hour practical unit in the demonstration field. In this practical part students are asked to conduct simple experiments and check on e.g. water infiltration, soil moisture, aggregate stability, earthworm abundance, plant biomass, and root development. During the summer term students conduct repeated measurements and do statistical analyses.

Both semesters end with an oral examination, where students discuss a research paper or present their own findings (winter, respectively summer semester). It was found that students are enthusiastically discussing the advantages and disadvantages of both tillage systems and gain insights of the applied procedures. Due, to their different backgrounds the discussions are always lively and fruitful. The knowledge gap between the students, which could be observed at the beginning of the course, decreases within a semester. Due to the applied approach, students combine their textbook knowledge to practical procedures in organic and conventional farming.

POSTER PRESENTATIONS

Poster Session 1: Modern agriculture and rural development (including landscape planning)

P1.01

Vegetation on green roofs, cultivation, maintenance and selection of plant materials (case study of Novi Sad)

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Green roofs help to provide additional green areas in urban areas with limited open space and increase the value of buildings. Affordable roofs can be designed as public gardens, business or recreation areas that offer many possibilities for use. This study analyzed three factors that determine which species can be selected for planting on a green roof - cultivation, maintenance and selection of plant material. The sample included the analysis and proposal of the biological aspect of the revitalization of the east side of the flat roof of the Faculty of Agriculture, case study of Novi Sad (Serbia). By graphic attachments, it is possible to understand the transformation of this examined area more clearly. Planting seedlings must be done in autumn at the end or before spring before the beginning of the vegetation period. The planting material must be free of entomological and phytopathological diseases. The seedlings should be oriented towards the marked side of the world or the way it grew in a nursery to ensure proper further development of the plant. A large amount of water is required if planting occurs in the spring, while in autumn a small amount of water. One of the prerequisites for successful planting green roofs is the long-lasting and high-quality insulation. Plants on the roofs are exposed to strong insolation and heat, as well as wind, and they need more water than in the garden on the ground. Due to the need for increased watering, there are rinsing and swelling of necessary nutrients of plants which should be prevented. It is important that plants are often stored, protecting them from freezing, because a thin layer of soil does not protect them from frost. It should be ensured good drainage of water, which requires extensive preparatory work. Fastening plants as wind protection is also one of the measures used during the cultivation of greenery on the roofs. The quality of the plant materials must be very high. Planting without bushes, even in plants of small dimensions, poses a great risk. In the selection of plants, autochthonous and other resistant plant species are used. It should be noted that the selection of plants requires care that regulates the rate of water evaporation from the soil in which the plants grow (roof exposure, plant's relation to light). In total 8 species are selected that are resistant to the climatic and general conditions of the analyzed area (*Acer palmatum*, *Armeria maritima*, *Sedum spectabile*, *Aster alpinus*, *Anacyclus pyrethrum var. depressus*, *Buxus sempervirens*, *Cornus mas*, *Rosa rugosa Thunb.*). Graphic works show the place of planting for each selected species. Modern architecture, urbanism and construction are developing in the direction of sustainable development. Roof gardens, represent a brand of urban design, not only modern cities, but also rural areas. The idea of revitalization of the eastern part of a flat roof of the Faculty of Agriculture, cultivation, maintenance and selection of plant materials will contribute to popularity and further research of green roofs.

P1.02

Impact of Intensity of Production on Possibility of Risk Reduction at Berry Fruit Farms

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Summary

In last decade there is an increasing number of family farms in Bosnia and Herzegovina dealing with the production of berry fruits. These farms have different intensity of production, with different technology of production and different amount of inputs used. This directly impacts on expected yield and expected gross margin and influences also possibility of risk reduction on these farms. Namely, they face different challenges in decision making and the purpose of the analysis is to observe how intensity of production impact on risk reduction. The main approach is based on mathematical programming technique. A linear program was developed to prepare an optimal production plan for each analysed farm, while quadratic risk programming served to minimize the total variance as a measure of risk. We analysed three typical farms, with same available inputs, but with three different intensity of production: highly intensive, intensive, and semi-intensive. The farms have 2 ha of arable land, 4,400 h family labour with possibility of hiring additional labour if needed and 25,000 EUR of working capital available. Further, we have analysed how unfavourable weather conditions (hail, frost, etc.) may impact on optimal production and on risk reduction strategies at these farms, mainly through diversification of production plan. For these purposes we have defined four scenarios, different for each farm, what makes 12 scenarios in total. The first one considers that there is no unfavourable weather conditions and expected yields are not deteriorated. Second scenario considers minor unfavourable weather impact, and expected yields are on average decreased for 15%. Third scenario considers medium impact of

unfavourable weather condition with expected 30% loss of expected yield, while in last scenario weather impact is high and expected yields are decreased on average by 45%. Obtained results show, that without unfavourable impact of weather highly intensive farm achieves 36,067 EUR of EGM, with an average normal production and market risk of 36.6% of EGM. EGM for intensive farm is 24,679 EUR and very high share of possible risk which is 36.1%, while semi-intensive farm has the lowest EGM (19,601 EUR) and also lowest share of expected risk (21.5%). Regarding the risk reduction efficiency, the most efficient is intensive farm. This holds down to 53% of risk reduction, where further highly intensive farm become more efficient. Semi-intensive farm has very low efficient of risk reduction. Highly intensive and intensive farm are especially efficient in risk reduction at the beginning points of efficiency curve. So, for highly intensive farm it is possible to lower risk for 46%, while EGM is reduced only for 20%. While on intensive farm this ratio is even bigger and lowering EGM for 20% will enable risk reduction for 58%. Semi-intensive farm has lowest ratio and for 20% EGM reduction risk is decreased only for 26%. In scenario when is expected yield deteriorated for 30%, EGM is reduced for 37% on highly intensive farm, for 39% on intensive farm and for 48% on half-intensive farm. In all scenarios, optimal production is different, but possibility of risk reduction is similar, what will be presented in the paper.

Key words: berry fruits, production plan, risk reduction

P1.03

New & modern tools for investigating pest resistance

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Resistance to pesticides is a serious and growing problem in agricultural production. Western corn rootworm (*Diabrotica virgifera virgifera* LeConte) (WCR), Colorado potato beetle (*Leptinotarsa decemlineata* Say) (CPB) and Codling moth (*Cydia pomonella* L.) (CM) are the most important pests in Croatian agriculture that have developed resistance to many insecticides and established management strategies as well. Therefore, there is a need for some new tools and methods (such as geometric morphometrics and SNPs) to investigate pest resistance which development and optimization are main objective of a new project on Faculty of Agriculture Zagreb. Metric properties of insects are under the influence of environmental and genetic factors and they are first physical characters to change in an organism. Geometric morphometric (i.e., size and shape analysis) is a new technique which can be used to detect and monitor resistant variants. Geometric morphometric markers can be used to detect smaller and subtler changes in population structure that have occurred more recently. By analyzing the body/wing size and shape it is possible to show the invasive adaption of the adults' traits to the different environmental influences. The use of WCR, CPB and CM wing shape and size measurements will be explored as a population marker for detection of differences between non-resistant and resistant variants. Another possible technique for detection of resistance, which is under our survey, is single nucleotide polymorphisms (SNPs) method. SNPs are single base substitutions found at a single genomic locus. SNPs have lower allele diversity and provide less statistical power to discriminate unique genotypes but have a denser and uniform distribution within genomes which make them useful for population and mapping studies. SNPs has become an affordable and readily accessible means of generating important data on a species. Detail genomic description could give us an answer about genetically conditioned resistance development. Combining genetic and geometric morphometric populations monitoring, we will try to identify the addition or deletion of alleles and different haplotypes, and the genetic and morphometric patterns which has developed under resistance process. The use of these modern and innovative techniques (i.e. population genetics and geometric morphometric) for detection of resistant variants is a completely novel approach and presents new insights into this important pest management area.

P1.04

Selection of *Rpi-Smira2 R8* differential plants for late blight (*Phytophthora infestans*) resistance phenotypization

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Potato (*Solanum tuberosum* L.) is the fourth most important food crop in the world and its production is highly threatened by *Phytophthora infestans*, a causal pathogen of late blight. The genetic resistance to *P. infestans* in potato has been classified as race-specific or vertical (qualitative) and race-nonspecific or horizontal (quantitative) resistance. The vertical race-specific resistance is associated with dominant resistance (*R*) genes and conventional breeding for *P. infestans* resistance relies on the use of genotypes with different sources of *R* genes. Eleven dominant *R* genes were initially identified in the Mexican species *S. demissum* and introgressed by crossing and backcrossing into cultivated potato. However, deployment of these single genes did not provide durable resistance in the field due to the rapidly changing populations of *P. infestans* and appearance of new virulent strains. Therefore a new approach of combining several *R* genes into single variety, gene pyramiding, was introduced. With recent discoveries of yet unreported resistance genes against *Phytophthora infestans* - *Rpi* genes in wild *Solanum* species and improved breeding techniques, new durable resistant varieties emerged. One of these varieties with high quantitative resistance to late blight is Sarpo Mira, with five major *R* genes: *R3a*, *R3b*, *R4*, *Rpi-Smira1* and *R8* gene. The goal of presented research was to obtain differential *R8* plants to study the quantitative resistance of Sarpo Mira caused by *R8* gene. 1230 progenies of crosses between Sarpo Mira and five late blight susceptible varieties (Rioja, Lusa, Colomba, Bikini and Sylvana) were screened using molecular markers for presence of the *R3a*, *R3b*, *Rpi-Smira1* and *R8* genes. Final screening for presence of the *R4* gene was performed using effectors and agroinfiltration. The principle of effector-based identification of *R* genes lies in gene-for-gene interaction between pathogen avirulent factors (Avr effectors) and plant proteins expressed by *R* genes, which results in plant immune response of programmed cell death - hypersensitive response (HR). *Agrobacterium tumefaciens* containing plasmid with *Avr4* effector was infiltrated into the whole plants with presence of *R8* gene and *R4*. Since whole plant agroinfiltration in potato proved to be technically challenging and did not provide reliable results, we have

combined agroinfiltration and detached leaf assay (DLA). With improved agroinfiltration method we have successfully selected final collection of potato plants containing only *R8* gene - differential plants. These plants will be used for additional crossing with late blight susceptible varieties to obtain F1 population. To examine the mechanisms underlying quantitative resistance to *P. infestans*, the F1 population will be genotyped using molecular markers and phenotyped with a variety of *P. infestans* isolates using infected DLA and whole infected plants. Resistance tests will be performed on plants grown in green-houses and experimental fields. Assessment of the late blight severity will be performed by visually estimating percent coverage of foliar late blight lesions. Combining these approaches will enable us to determine linkage between *R8* gene and quantitative resistance of Sarpo Mira.

P1.05

Attracting insectivorous avifauna in orchards with artificial nests

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One of the important and difficult activities in the fruit growing area is to create and maintain an efficient ecosystem where biodiversity to keep in balance the main parts of it. Attracting useful avifauna is one of the methods used in the integrated and organic orchards to control fruit tree specific pests. The aim of this study is to present the results of the researches conducted during the 2015 - 2017 period when 64 artificial nests located in different orchards were monitored. The majority of small passerine need a hollow for nesting which in orchards, under normal conditions, is almost impossible to find. In the integrated and organic orchards, a solution for attracting and maintaining the insectivorous avifauna is to build and place suitable nesting places. In 2015, artificial nests were built according to regulations and placed in three orchards from three different locations in the South and South - East part of Romania: Faculty of Horticulture within USAMV Bucharest, Moara Domneasca Ilfov County and Nursery and Fruit Growing Farm Istrița. The monitored parameters were: distance between nests and the closest road, the height on the nests mounted on the support, type and diameter of the support and nest orientation. The results detail, for each orchard, the nests occupation rate and the bird species with a comparative analyze of the occupation rate according to the monitored parameters. Significant correlations were observed between occupation rate with nests type, support diameter 0-15 cm and support height. Conclusions stated that the nesting density and diversity of occupied species were influenced by the orchard habitat but also by the technical parameters of nest construction and position of nests. The highest nests occupation rate in the analyzed period was registered in Moara Domneasca orchard and the lowest in the Bucharest orchard, due to the windbreaks presence. In time, all the horticultural ecosystems registered an increase in the occupation rate of the artificial nests, the wild birds getting used with them and the new generations grown in artificial nests accepted them more easily.

P1.06

Fruits pomological characteristics of several paw-paw hybrid genotypes (*Asimina triloba* Dunal)

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Paw paw or Northern banana (*Asimina triloba* Dunal) is the representative of the Annonaceae family that can be cultivated in temperate areas. Originated from the Eastern part of USA, it is a nearly unknown fruit with high nutraceutical potential. The increasing demands from the consumers in the recent years require specific researches in the local conditions. Introduced since 1926 by Ioan Suci family in Romania, it is studied for 25 years in the Faculty of Horticulture within USAMV Bucharest. The experimental plot has 23 genotypes from different collections, planted at 4.0 x 2.0 m. The aim of this study is to present the fruits pomological characteristics for the genotypes analysed. All the fruits were harvested between August and October 2018. For each genotype yield, average weight per fruit, size, average number of seeds per fruit, average weight of seeds and seeds size were calculated. Biochemical analyses like total soluble solids, dry matter, acid ascorbic content, fruit acidity were done for several genotypes. Fruit quality evaluation through sensorial analyses was conducted for 13 genotypes. The results present a complex pomological characterization for the 23 Northern banana genotypes including the harvesting period, correlation between fruits assessment by the consumers with morphological and biochemical analyses. Positive significant correlations were noticed at the attractiveness parameter with the size and colour of the fruit. A strong negative correlation was registered between the taste parameter and total soluble solids. Conclusions highlighted the most valuable genotypes from the Experimental Field according to the analyses performed and also to the consumer's preferences. Its qualities recommend the paw-paw as a promising fruit for diversify the present fruit species consumed in Romania and also in Europe.

P1.07

Application of alginate microparticles simultaneously loaded with *Trichoderma viride* and calcium or copper cations on tomato cultivation

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Trichoderma species are known as important biocontrol agents as well as a promotor of plants growth. Loading in biopolymer matrices has been recognized as an effective method for controlled release of *T. species* used for plant protection and nutrition. Calcium and copper are essential plant nutrients and their lack causes a significant plant physiological disorder. Simultaneous loading of calcium or copper cations with *T. viride* spores in alginate microparticles (microspheres/microcapsules) can improve the activity of *T. viride* and presents novel formulations for plant protection/nutrition in the path of ecological and sustainable agriculture. The main aim of this investigations is to present benefits of novel agroformulation application on tomato cultivation in the open field. We have developed and characterized alginate microspheres and microcapsules (with chitosan layer) prepared by the ionic gelation using calcium chloride or copper sulfate as a crosslinking agent and loaded with *T. viride* spores. The *in vitro* results pointed out remarkable differences in the release behavior of *T. viride* spores and calcium or copper ions on concentration of gelling cations and the presence of chitosan layer on microcapsule surface. The increase in gelling cations concentration promoted, but the chitosan layer on microcapsule surface slowed both, *T. viride* spores and calcium or copper release. Applications of novel microspheres/microcapsules during tomato cultivation in the open field revealed the better development of seedlings, buds and fertilization, number and weight of fruits, and maturation. The most significant effect of the application was observed in the increasing number of tomato fruits. The amount of most important active components in tomato fruits (lycopene, beta-carotene, calcium ions, total phenol content and their DPPH/ABTS antioxidative profile) was also investigated. Tomato fruits reached a significant increase in almost all measured parameters compared to the control. According to our findings, this is also a unique attempt to apply biologically (*T. viride* spores) and chemically (calcium or copper ions) bioactive components on tomato cultivation that would be of particular importance to ecological growth and in the process of functional food production.

P1.08

Fruit quality evaluation of some new Romanian disease resistant pear genotypes through sensorial analyses

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The aim of this study is to present the fruit quality evaluation using sensorial analyses of some new Romanian disease resistant pear genotypes, produced at the Voinești Research Station for Fruit Growing and planted in the Experimental Orchard of the Faculty of Horticulture within the University of Agronomic Sciences and Veterinary Medicine of Bucharest. Four varieties (Corina, Euras, Orizont, Romcor) and two new hybrid selections (R3-146-F, H12-83-79) grafted on quince (CTS 212), on pear (Farold 40) and on own roots, *in vitro* propagated, were analysed. The planting distances varied from 3.0 x 0.8 m, for Parallel U to 3.0 x 1.6 m, for Trident canopy. An integrated technology is applied, including drip irrigation. The researches were conducted in 2018 period. The sensorial analyses parameters monitored were: fruit size, fruit colour, attractiveness, firmness, pulp juiciness, pulp colour, taste and flavour. The target group was formed by the general public. The basic analyses like average weight, size, total soluble solids, dry matter and firmness were calculated and correlated with the sensorial analyses parameters. The results presented a comparison between the tested fruits according to the consumer preferences. The best appreciations were received by the R3-146-F hybrid and Euras grafted on quince and also on pear. Significant correlation were observed between the appreciation of the fruit size and the measured one, the attractiveness parameter and the measured fruit size, the parameter taste and the total soluble solids measured. Conclusions stated that some of the new Romanian disease resistant pear genotypes can be promoted for being cultivated on large orchards. Interesting results of the sensorial evaluations revealed that the bigger fruits with a higher quantity of sugars were more appreciated by the consumers.

P1.09

Fruit quality evaluation of some apple scab resistant varieties through sensorial analyses

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One of the important challenges for apple growers is to obtain high quality fruits respecting the rules regarding the pesticides limits, which are continuously changing due to the consumers requests. The aim of this study is to present the fruit quality evaluation through sensorial analyses of some apple scab resistant varieties cultivated in Bucharest area. Apple scab (*Venturia inaequalis*) is one of the most important pathogen for apples, specific treatment being required. Every year, new resistant apple scab varieties are released by breeders that need to be tested in specific growing conditions. In the Experimental Orchard of the Faculty of Horticulture within the University of Agronomic Sciences and Veterinary Medicine of Bucharest more than 25 apple varieties are cultivated and monitored. Most of the trees are grafted of M9 rootstock, planted at 3.5 x 1.0 m and led as Vertical Axe. An integrated technology is applied, where the soil is maintained covered with a mixture of perennial grasses on the inter-row and clean with herbicide on the row. Drip irrigation is installed. The researches were conducted in 2018 period in two stages, monitoring the quality of fruits for two seasons, autumn and winter. The apples varieties were tested with different types consumers by gender and age including size, colour, attractiveness, firmness, pulp juiciness, pulp colour, taste and flavour. The basic biometrical analyses like average weight, total soluble solids, and firmness were calculated and correlated with the sensorial analyses parameters. The results show that tested fruits received good appreciations from the consumers. The parameters: fruit size, colour, pulp juiciness and colour received the biggest notes. Conclusions

stated that several apple scab resistant varieties can be proposed to be introduced in large orchards for production, due to their fruit quality evaluation.

Poster Session 2: Renewable resources – possibilities and constraints (including forests and biotechnology)

P2.01

Impact of biogas residues (digestate) on C dynamic and N mineralization in soil

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Anaerobic digestion (AD) is a biological process that, in the absence of oxygen organic matter is transformed into biogas which can be used for the production of energy and heat. The use of biomass in AD results in the production of organic biogas residues, also known as digestate and can be used in agriculture as an organic fertilizer. The goals of the study were to determine the C dynamic and N mineralization potential after application of digestates to the soil. Biogas residues (DS - digestate solid and DL - digestate liquid fractions) were collected from three bioenergy production systems, using cattle manure as the main substrate, and other substrates are residues from sugar and oil industry, corn and wheat silage, etc. In incubation experiment, the impact of six digestates (DS1, DS2, DS3, DL1, DL2, DL3) on soil C dynamic and N mineralization were studied, and compared with the impact of manure (MS - manure solid and ML - manure liquid). In the experiment, digestate-soil mixtures were incubated under controlled conditions of moisture (70% of the water-holding capacity) and temperature ($26 \pm 1^\circ\text{C}$). The digestates and manures were added in the amount of 5 mg N and mixed thoroughly with the 50g of soil. Total duration of incubation was 56 days. Periodically, three replicates per treatment were removed from the incubator (at 0, 7, 14, 28, and 56 days) for analysis of inorganic-N ($\text{NH}_4\text{-N}$ and $\text{NO}_3\text{-N}$). The total soil C content was measured at the beginning and end of the experiment. The N-mineralization from the digestates (N_m) was calculated as: $N_m (\%) = [(inorg\text{-}N_{56d} - inorg\text{-}N_0d) \text{ treatment} - (inorg\text{-}N_{56d} - inorg\text{-}N_0d) \text{ soil}]/\text{added TN} \times 100$. The results show that all digestates and ML mixed with soil supplied $\text{NH}_4^+ + \text{NO}_3^-$. At the end of the incubation, except DL1 and DL3, all digestate samples and manure mixed with soil led to immobilization of N. Digestate added to soil due to high C/N ratio can induce a quick development of the microbial population, immobilizing inorganic-N for their biosynthesis. Also, all digestates and manures mixed with soil supplied soil organic C at the beginning of the incubation. However, at the end of incubation, soil organic C was decreased only with DL3 digestate and was lower than control treatment. Considering that the application of digestates to soil increased the C and N at the beginning of incubation, and after immobilization, it is necessary to examine how these processes will occur in field conditions in order to make better use of digestates as organic fertilizers.

P2.02

Stabile and dynamic landscape patches of woody vegetation

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We deal with the topic of forest and non forest woody vegetation (NFWV) in two previously unstudied representative study sites in Bohemia region of Czechia. We conducted three analyses. First, we compared the area of woody vegetation in two time horizons, mid 19th century and present state represented by the year 2015. We used the categories of forest and non-forest woody vegetation, the latter divided into subcategories according to context and further by shape. Secondly, we compared the distribution of patch sizes over the 170 year study period, and the presence of lost/continuous/new patches in the study sites. Lastly, we calculated the rate at which were the lost NFWV patches transformed into forest. The results show the expansion of woody vegetation in the studied landscapes as there was recorded an considerable increase in all categories. Moreover, the forest patches were shown as very persistent in its position, on the contrary NFWV patches changed its location almost completely. Thus, the landscape here is a combination of stabile forest and dynamic NFWV patches. Both monitored categories of forest and non-forest woody vegetation increased considerably but there is an opposite trend in continuity of these landscape features. Forest, increasing for 30% is in most of its extension continuous, but the NFWV features were almost completely lost and gained as a new landscape patches. The stability of forest is caused by cadastral category, management, nature conditions, and current forestry and zonal planning regulations. In the category of NFWV we recorded continuous patches very rarely, most of these infrequent fragments were adjacent to infrastructure. Because the majority of lost NFWV patches were transformed into a forest, NFWV could be seen as source of future forest patches in the landscape. There is not a single source of new NFWV patches, the increase is caused by the combination of decline of agricultural intensity, change in technologies in both, forestry and agriculture, and also by the development of human society and its needs such as crops and fire wood.

Poster Session 3: Sustainable food systems and quality

P3.01

Compatibility of insecticides, fungicide and fertilizer depending on water quality

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Application of plant protection agent mixtures is commonly used in order to broaden the spectrum of activity, slowing down or delay the appearance of pesticide resistance etc., in order to reduce production costs and ensure high quality level of agricultural products. One of the basic requirements for making plant protection products mixtures is physico-chemical compatibility of the active substances or formulations and extension of the protection range. A lot of data about pesticide preparations is available, however, there is almost no data on the impact and importance of water quality to the pesticide application. In laboratory conditions was tested the compatibility of spray liquids of insecticides (cyantraniliprol - Exirel, chlorantraniliprol - Coragen 20 SC), fungicide (kaptan - Merpan 50 WP) and foliar fertilizer (Folia Stim Mix TE), their double and triple mixtures depending on the water quality (well water from the Mala Remeta and Čerević). The quality of well water and their properties were determined: pH, water hardness, electroconductivity, chloride, nitrate, nitrite, ammonia, calcium and iron content, according to standard methods. Physico-chemical properties (pH, suspensibility, dispersibility, surface tension and electrical conductivity) of spray liquids, insecticides, fungicide and fertilizer, as well as their dual and triple mixtures are also determined. A high concentration of ammonium was established in both tested water samples, while the other values were below the maximum allowed values for the second class of water. Physico-chemical properties of working fluids changed depending on the quality of the water and the components included in their composition. All tested working fluids of insecticides, fungicide and their mixtures exhibited consistency and compatibility, from the mixing moment to the expiration of 24 hours.

P3.02

Effects of bioregulators on fruit size, yield and fruit quality of plum cv. "Čačanska rodna"

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The achievement of high yields in fruit production is often followed by a reduction in fruit quality and especially in fruit size. To that end, the use of bioregulators is considered to be simple and effective method to achieve balance between fruit quality and yield. Experiment on the use of bioregulators was carried out during 2016 and 2017 at the Experimental Field for Fruit Growing of the Faculty of Agriculture Novi Sad at Rimski Šančevi, in an orchard of "Čačanska rodna" grafted on vegetative rootstock WaVit and generative rootstock *Prunus cerasifera* with black thorn (*Prunus spinosa*) as an interstock. The following bioregulator treatments were applied when the fruit diameter reached a size of about 10 mm: 200 mg L⁻¹GA₃ (gibberellic acid), 50 mg L⁻¹BA (6-benzyladenine), 100 mg L⁻¹BA and untreated control.

The treatment of BA exhibited the largest effect on the yield and weight of the fruits on both rootstocks. Treatment with 100 mg L⁻¹BA exhibited the highest yield regardless of the rootstock or the year of the study. Yield per tree on WaVit was 46% higher than the control, while for *Prunus cerasifera* × black thorn was 67,3% higher in the first experimental year. Increase of the fruit weight was observed in all applied treatments while the highest increase was achieved using 50 mg L⁻¹BA. All treatments affected the increase of soluble solids content (° Brix) in fruits, while titratable acidity content was increased only with 100 mg L⁻¹BA treatment. Skin elasticity and fruit firmness were measured at the time of harvest, after 20 days storage at 0°C and three days at room temperature (shelf life). The influence of the bioregulators on the elasticity of the skin was manifested on the fruits of "Čačanska rodna" grafted on WaVit rootstock with the highest values using 200 mg L⁻¹GA₃. The highest fruit firmness at harvest time on WaVit rootstock was measured in 100 mg L⁻¹BA treatment, while in the case of *Prunus cerasifera* × black thorn it was in GA₃. After the storage, the fruits treated with GA₃ had significantly higher fruit firmness than all the other samples.

Based on the presented results, the use of bioregulators can be recommended as a regular measure in the orchard of the "Čačanska rodna" for improving the yield, fruit size, soluble solids content and increase fruit firmness after the storage.

P3.03

Impact of different forms of vanilla aroma on sensory parameters of hard biscuits with different fat content

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The aim of undertaken research was to examine the impact of different forms of vanilla commercial aroma (2 liquid and 2 powder forms) and aroma concentrations on physical, chemical and sensory parameters of hard biscuit samples. Aroma forms were added in different concentrations and obtained samples with minimum, average and maximum level of concentration recommended by producer. Samples without vanilla aroma were made as control samples. Samples were produced under standard industrial conditions with 10 and 12% fat added (on flour basis). Among physical and chemical parameters, moisture content, water activity, titratable acidity (TA) and pH value were analyzed. Sensory analysis of hard biscuit samples included evaluating of odour, melting, aroma intensity and typicality, as well as overall impression by panel of 10 well trained members. The samples were evaluated by Quantitative Descriptive Analysis (QDA) using a scale of 1-5 scores. Study revealed that chemical composition of samples is quite heterogeneous and mostly affected by fat content. Sensory evaluation showed that aroma type and fat content are significant factors influencing sensory perception, while aroma concentrations are not highly significant impact factors. Generally, odour and aroma intensity were more expressed in hard biscuit samples with higher fat content (12%). Those results were probably caused by high fat solubility of used vanilla aroma forms. Although samples with liquid aroma form had better sensory grades, but the cost of these aroma utilization should

be taken in consideration as well. However, in order to meet consumer's preferences, recommendation can be made for liquid vanilla aroma utilization, at minimal concentrations due to the profitability of production.

P3.04

The antioxidative activity of alcoholic mediums enriched with Chaga (*Inonotus obliquus*)

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Inonotus obliquus, commonly known as Chaga mushroom, was considered as medical fungi for centuries and it takes a high place among folk medicaments. This mushroom belongs to the family Hymenochaetaceae and parasites mainly on birch trees. Its sclerotium, a dark-brown or black mass is already recognised in science as a potential source of antimicrobial, anticancer, antioxidative and other health promoting bioactive substances.

This study investigated antioxidative properties of alcoholic mediums (plum brandy, grape brandy, wine distillate and refined ethanol) enriched with Chaga compounds (collected from natural habitat). All alcoholic medium parameters were certified according to the current Regulation in Serbia (Službeni glasnik RS, 74/2010 i 70/2011). The aim of this experiment was to determine how different extraction parameters (different concentrations of chaga – 1%, 2,5% and 4% and different extraction duration – 7, 14 and 21 days) influenced on antioxidative properties of these mediums, using CUPRAC (CUPric Reducing Antioxidant Capacity) and DPPH (2,2-diphenyl-1-picrylhydrazyl) assay.

The CUPRAC analysis values were in the range of results ranged 0,52 – 1,64 mM Trolox equivalents per L. Under the same extraction parameters (4% of Chaga, 21 days of extraction), three samples showed the best antioxidant properties. The three samples with best antioxidant properties had same extraction parameters (4% of Chaga, 21 days of extraction). The ability to scavenge free DPPH radicals varied between 21,57 and 80,18%. Results of DPPH analysis vary 21,57 – 80,18%. For every type of alcoholic medium, the best results were achieved using 4% of Chaga for 14 days of extraction duration. This suggests that between second and third two and three week possible degradation of antioxidative substances occurs, which has to be confirmed in further studies.

Since Chaga mushroom improves antioxidant properties of alcoholic mediums and considering that extraction of Chaga's compounds is more appropriate in ethanolic solutions than in hot water, this mushroom could be used as a useful supplement in the production of alcoholic beverages.

P3.05

Content of harmful chemical compounds in plum spirits

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A large number of different chemical compounds are normally present in fruit spirits. They are responsible for sensory quality of drinks, but some of them are harmful. In this study the three major toxic volatile compounds, methanol, acetaldehyde and hydrocyanic acid (HCN) in plum spirits were determined. In addition, the concentrations changes of those compounds during distillation were investigated. Three plum variety used for the production plum spirits, Pozegaca, Stanley and Bilaska rana. Distillation of fermented plum mush was performed with traditional copper pot of 10 L without dephlegmator. Distillation was performed twice and in the re-distillations three fraction were obtained: head, heart and tail. The content of toxic volatile compounds was analysed in the all of three fractions. Acetaldehyde is a potent flavor in many alcoholic beverages and foods but in higher concentration it is toxic to man. Methanol is a highly toxic compounds. Ingestion of higher concentration of methanol can caused many health problems such as blindness. In extremely higher concentration methanol can caused a death. Hydrocyanic acid is also highly toxic compounds. Hydrocyanic acid is found especially in stone fruit spirits. Acetaldehyde and methanol were determined using a gas chromatography system, a Varian 3400, equipped with 6.6% Carbowax 20 M column on Carbopack B80/120. HCN content was analysed spectrophotometrically using pyridine-pyrazolon reagent. Content of HCN was the highest in tail fraction of Požežgača (31,21 mg/L a.a.), while acetaldehyde was concentrated in the head fraction. Methanol was distilling in almost equal concentration in all three fractions reached higher value of 9668 mg/L a.a. in hart fraction of Bilaska rana. All of three analysed harmful compounds in plum brandy samples did not exceed maximum level fixed by EU Regulations No. 110/2008.

P3.06

Bioregulators affect fruit quality and chemical composition of apricot

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Owing to its attractive appearance, outstanding aroma and harmonious content of nutrients, apricot is considered one of the most valuable stone fruits among temperate zone fruit trees. Apart from the environmental impact, the proper selection of the variety and the choice of appropriate treatment before harvest can greatly improve the quality of the fruit. The aim of the experiment was to determine the impact of the bioregulator treatments on fruit quality, storage capacity, chemical composition and the maturity stage of apricot cultivar "NS-4". The study was carried out in two experimental years, 2016 and 2017 at the experimental field for fruit growing of the Faculty of Agriculture, Novi Sad, Serbia. Myrobalan seedlings were used as a rootstock with blackthorn (*Prunus spinosa* L.) as an interstock. The following treatments were applied by backpack sprayer: 10 mg L⁻¹ NAA (α-naphthaleneacetic acid), 20 mg L⁻¹ NAA, 50 mg L⁻¹ BA (6-benzyladenine), 100 mg L⁻¹ BA, 200 mg L⁻¹ GA₃ (gibberellic acid) and an untreated control. In 2016, the treatments

were applied at the moment when the average fruit diameter was 5 mm, while it was 10 mm in 2017, except for the α -naphthylacetic acid applied at both stages of fruit development in 2016. During 2016, bioregulator treatments did not affect fruit weight. In 2017, all treatments caused an increment in fruit weight which imposes the later stage of fruit development as an appropriate moment for the application of bioregulators. The highest fruit weight was achieved by the application of NAA 20 mg L⁻¹, which is caused an increase of 28% compared to the control. It was followed by NAA 10 mg L⁻¹ and BA 100 mg L⁻¹ which increased fruit weight by 24% compared to the control. In 2016, NAA 10 mg L⁻¹ and NAA 20 mg L⁻¹ applied at 5 mm stage, increased the share of fruits with I_{AD} value up to 0.4 at harvest, meaning the advanced maturity stage of fruits. On the other hand, BA 100 mg L⁻¹ caused a delay of maturation process regardless of the time of application. In both experimental years the highest total acid content was detected in 100 mg L⁻¹ BA treatment. Bioregulators treatments did not affect the content of soluble solids. In our research, positive impact of bioregulators was achieved in the phase when the apricot diameter was about 10 mm.

P3.07

Effects of baking temperature on sensory and colour properties of wheat and spelt biscuits

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The aim of this study was to examine sensory and colour properties of biscuits produced from wheat (*Triticum aestivum* L.) and spelt (*Triticum spelta* L.) flour in relation to baking temperature. Wheat and spelt flour samples were analysed on granulometric composition and physical properties: water and oil absorption capacity, bulk density and swelling capacity. Biscuits were produced according to the procedure described in AACC method 10-52. The temperatures used for baking were 150 and 205 °C for 15 and 11 min, respectively. Total of 4 biscuit samples were made in duplicates, while all analysis were performed in triplicates. Biscuits were evaluated by Quantitative Descriptive Analysis (QDA) using scale 1-5 scores on 4 properties: taste, aroma, melting and overall acceptability. Colour was determined by the Chroma Meter CR 300 (Konica Minolta, Japan). Measurements of colour properties were conducted on upper and lower surface of biscuits. Obtained results for granulometric composition showed that spelt flour contained higher amount of large particles than wheat flour. Among analysed physical properties of flours, flour samples significantly differed only in terms of oil absorption capacity. Baking temperature significantly influenced on all examined sensory as well as all colour properties of both, upper and lower biscuit surface. On the other hand it has been showed that used flour had no influence only on overall acceptability, while significantly influenced on all examined colour properties of both, upper and lower biscuit surface. Sensory evaluation of biscuit samples revealed that in a 5-scores scale, all sensory results were in range of 3.10-4.05 indicating that all biscuits were moderately acceptable. The best sensory profile was observed in sample with spelt flour baked on 205°C. It had a more intense aroma, as well as taste and melting, and showed the highest score for overall acceptability.

P3.08

Influence of drying method on the polyphenolic content of the grape skin after the vinification process

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Wine is traditionally made from fermented grapes, although it can be made from other sources, such as rice, plum, cherry, pomegranate, currant, blackberry, etc. After wine production, the significant quantities of the by-products (such as pomace, stems, etc.) are obtained. Recently, the grape pomace and its constituents such as skin and seed have been in focus of food scientists as a valuable source of polyphenolic compounds. Although during winemaking process phenolics are extracted into wine, a large amounts of these compounds remain in the grape skin. To preserve grape skin, different drying methods can be applied. Therefore, the aim of this study was to determine the effect of different drying methods of grape pomace skin on its polyphenolic content.

After vinification, the skin of Serbian autochthonous red grape variety „Prokupac“ was treated and extracted with acidified methanol. The total phenolics content (TPC) in the different extracts was determined according to the Folin-Ciocalteu method using gallic acid as a standard. The obtained results were expressed as mg of gallic acid equivalents (GAE) per g of dry matter (DM). TPC in the prepared extracts was 17.109 mg GAE/g, 17.820 mg GAE/g and 22.634 mg GAE/g of DM for the extracts obtained from oven dried, lyophilized and untreated grape skin, respectively. The TPC content in the extracts of dried and lyophilized skin that originated from the pomace was lower compared to untreated skin and did not statistically differ ($p < 0.05$).

It can be concluded that the best utilization of phenolics from the skin was achieved if the extraction was done immediately after the vinification process, while any treatment such as oven drying or lyophilization led to the loss of a part of these bioactive compounds.

P3.09

Distribution of polyphenolic compounds in apple juices produced using traditional and commercial apple cultivars

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Many epidemiological studies have shown strong linkage between apples and apple products consumption with decreased risk of different diseases, such as various types of cancer, cardiovascular diseases, diabetes, etc. Healthy effect of apples ascribed their significant antioxidative potential which is mainly correlated with polyphenol content. Due to the fact that these compounds are highly unstable and sensitive to degradation, their content during the processing is decreasing, which is particularly evident during the production of clear apple juices. Therefore, the aim of this study was to analyze the distribution of polyphenol compounds in clear and cloudy juices made of traditional (Prijedorska zelenika, Limunika and Butulija) and commercial (Idared and Golden delicious) apple cultivars. Among polyphenolic compounds in apples (skin and pulp) and juices, phenolic acids, dihydrochalcones, flavonols and anthocyanins were analyzed by HPLC-MS. The obtained results showed that traditional apple cultivar differ from commercial ones in the notably higher polyphenols content. These differences are more evident in the different parts of the fruit, whereas apple peels from all analyzed cultivars contained more polyphenols than pulp. Traditional cultivars (Prijedorska zelenika and Limunika) were dominantly determined by higher content of all analyzed polyphenols while commercial ones were determined by lower content of these compounds. On the other side, traditional cultivar Butulija was determined by anthocyanins and flavanols. All analyzed polyphenols were identified in fruits as well in obtained juices with exception of anthocyanins which were detected only in apple skin. The produced cloudy apple juice had higher levels of total polyphenols in comparison to clear juices. Polyphenols were recorded in cloudy and clear juices in this order: phenolic acids > flavanols > dihydrochalcones > flavonols. Juices made from traditional apple cultivar 'Prijedorska zelenika' showed higher content and stability of polyphenols in relation to those made from commercial cultivars. This traditional cultivar is indeed promising and valuable raw material to juice industry which requires greater attention on the market.

P3.10

Microbiological, physicochemical and sensory characteristics of cow's and soya milk probiotic drink with *Lactobacillus casei* (Lc01) with yoghurt cultures

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The aim of this research was to determine functional, nutritional, microbiological and sensory characteristics of probiotics fermented drinks produced from various contents of cow's and soya milk. Proportions of soya and cow's milk were 25:75%, 50:50% and 75:25%, while milk and soya drink were used as a control. Samples were fermented by probiotic bacteria *Lactobacillus casei* (Lc01) with added yoghurt cultures. Fermentation of cow's and soya milk samples was performed at 43°C until coagulum appears, of about 4.6 pH value. Characteristics of obtained drinks were observed during and at the end of fermentation in order to choose the most suitable proportion, based on the results of microbiological, physicochemical and sensory characteristics of probiotic product. Number of viable cells Lc01 in all samples of produced drinks was in the ranging between 7.72-8.99 log CFU/mL which is above probiotic minimum from 10⁶ CFU mL⁻¹, therefore, the samples could be considered to be a probiotic product. The main nutritional content was similar, but the lactose content was reducing as the percentage of soya milk in the cow's milk was increasing. The most common organic acid in produced samples was a lactic acid. Fatty acids profiles of fermented cow's and soya drinks were qualitatively and quantitatively different. The content of fatty acids was in the range from 21.6 - 92.4%, while the ranging of unsaturated fat was between 17.7 - 78.7%. Based on the proportions of produced drink, ratio of polyunsaturated fatty acids was in ranging from 13.1 - 66.7%. The results of the content of oligosaccharides, as the main soya sugars, were quite well transformed into lactic acid. Sensory characteristics of samples were mainly influenced by type and proportion of milk. Mixing of cow's and soya drink significantly improved sensory characteristics of the product, particularly smell, taste and colour. Acceptance measurement showed good acceptance of fermented drinks samples by the potential consumers accept from the sample produced by a 100% soya drink.

P3.11

Trends in the Structure and Business Performances of Fruit and Vegetable Processors in Bosnia and Herzegovina and Vegetable Processors in Bosnia And Herzegovina

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Fruit and vegetable production have always been important segment of agriculture in Bosnia and Herzegovina. Bosnia and Herzegovina is characterized by very favourable climate, orographic and other natural conditions for production of various fruit and vegetable. Yet, low yields and poor management makes the sector uncompetitive on both domestic and international market contributing to remarkably high negative trade balance. On the other hand, increase in production of certain fruit and vegetable has been observed over the last decade. This particularly applies for berry fruit production and fruit international trade. According to the recent research findings, fruit sector has been showing better production results and competitiveness than the rest of the agricultural sector, indicating fruit and vegetable sector' capability of taking important role in agricultural production development. Developed and stable processing companies are one of precondition for further development of primary production. Therefore, the aim of this paper was to analyse fruit and vegetable processing sector in the whole country, and to assess its capacity to offer support required to

increasing production. The number, the size and business performances of all existing companies (av. 47) dealing with fruit and vegetable processing in Bosnia and Herzegovina over the seven years period (2008-2014) were analysed. Financial reports, balance sheet and income statements were collected for all companies. Analysis covered the structure of the sector (small, medium, large enterprises) and business performances were analysed on the basis of productivity, liquidity, indebtedness, efficiency, return on assets and return and equity indicators. All obtained results were compared according to company size and location, and the trends in indicators were analysed. The analysis has shown that the structure of the sector is not favourable, with domination of micro and small enterprises. Furthermore, all business indicators shows that sector as the whole may present poor loop in the fruit and vegetable value chain. The high share among fruit and vegetable processors are those companies with over indebtedness (av. 47%), poor liquidity (79%), negative financial result (34%) and very poor profitability indicators (47% below 5%). Unless structural changes and managerial practice improves significantly happen in near future, existing fruit and vegetable processing sector can not support current and future fruit and vegetable production. Moreover, it can endanger development of this perspective and important agricultural sector.

Key words: fruit, vegetable, business, analysis, sector

Poster Session 4: Environmental safety and climate change

P4.01

Determination, analysis and results of allergenicity of tree species- case study University and Liman's parks (Novi Sad, Serbia)

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Urban forestry is one of the most important tool to neutralize climate change as well as improve urban environment. But, only healthy, high decorative and high tolerate trees can be useful and provide benefits to the urban environment. Pollen is cause of more than 20% allergic reaction in human population. Some of the major causes of allergenicity: low species biodiversity at planting is reflected as the overabundance of certain species acting as pollen sources; male individuals utilization in dioecious species; the presence of invasive species; lack of garden management and maintenance and interaction between pollen and air pollutants. This research analyze allergenic plant presence in urban environment of common tree species in middle-sized cities across temperate climate zone, case study of Novi Sad (Serbia). Urban green areas in Novi Sad, Liman's and University parks were examined. The aim of the research is to detect and point up very allergenic and toxic trees in urban areas near residential blocks, schools, kindergartens and the city squares. In these locations, 13 out of 30 analyzed species, were allergenic trees, mainly belonging to genera *Aceraceae*, *Betulaceae*, *Salicaceae* and *Tiliaceae*. Our results indicated that in both parks were noted that more than 50% of the trees are allergic species. In the investigated area of the Liman's Park, 72% of allergenic species were founded, and the most common species are: *Populus x euramericana*, *Populus alba*, *Betula pendula*, *Robinia pseudoacacia*, *Acer sp.* While in the University Park are 62% (*Acer platanoides*, *Populus x euramericana*, *Populus alba*, *Tilia sp* and *Celtis australis*) there is a significantly higher number of allergens. Presence of allergic species is high. In the future this number must be reduced. Urban tree forestry management can give more attention to this problem, which could be overcome with adequate strategies and frame work. In case of removal allergenic species, human health could be improved. Gradual removal might temper the public reluctance to this actions, but finally only joint efforts and complete abandonment of high allergy species can convert problematic urban areas into ones that are safe and allergy-free.

P4.02

UNFCCC and Conferences of Parties review: From the expected to the observed Outputs

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From the UN conference at Stockholm in 1972, through the creation of the UNFCCC (1988), Rio Earth Summit (1992) and Berlin COP1 (1995), up to the most recent Katowice COP24 - CMP14 - CMA1.3 (2018), our society has witnessed an unprecedented period where international politics has focused on worldwide cooperation aimed at fighting against climate change. A consistently growing number of countries have been sending their representatives to find a common solution intended to mitigate the ecological impact that humans are causing all over the world and in their own respective ecosystems. After almost five decades since the first time the subject of environment was considered, multiple implementation plans, agreements and technical guidelines for application, have been adopted in order to move in the direction of reducing the damage caused by climate change, global warming, destruction of ecosystems around the world, and pollution. Land and forest cover assessment has also been a key element of this process, where landscape planning analysis became one of the main tools used. Nevertheless, it's important to see and analyze, from an objective point of view, the real impact of measures carried out so far. The actions taken so far, although optimistic, do not seem to fully accomplish the requirements needed to avoid the worst projected future scenarios. The uncertainty of the effectivity or even the achievement of the 1.5 °C goal, as well ignorance surrounding the real changes that our activities may cause over the global climate, has brought us to a time where there is no longer room for hesitation. Nevertheless, there are many factors which seem to affect the agreement and the application of measures suggested in each conference held till now. Therefore, it is necessary to understand the reasons for why those conferences and their results are not becoming a real solution to the current environmental situation. The differences between countries in regards of development, the weakness and inefficiency of current democratic institutions, the lack of proper consciousness across society, economic interests, and the lack of empowered arbitration, seem to be the main reasons behind this lack of results that is hindering the implementation of effective actions. Hence, the analysis of the difference of expected outputs and observed outputs, as well as determining the main obstacles that generate these differences, is the essential element in identifying the social, economic and politic

features of our society causing this and, thereby, correct its effect. This is the key element in creating a world in which ecological principles and their derived methods can be properly applied.

P4.03

Reducing use of glyphosate: Development of new eradication methods of Fallopia invasive taxons

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This study is focus on the issue of safe use of glyphosate pesticide during eradication of knotweed taxa (*Fallopia*, syn. *Reynoutria*) which spreads uncontrollably in the Czech Republic and another parts of Europe despite of nature conservation management efforts. The all of knotweed taxa represent significant danger for global environment including wilderness, human made habitats and agricultural land because of its competitive abilities. Spread of these invasive species causes loss of biodiversity, decline of agricultural production and limitation of many ecosystem services. One of the main causes of such a successful spread is taxon's high ability of regeneration from rhizomes. Spraying in autumn by systemic herbicide – glyphosate is used in the Czech Republic as the most effective control method although little is known about its effectiveness and a large amount of glyphosate is used, mostly in protected areas. The work shows results of the ongoing project whose target is to evaluate the effectiveness of spraying by glyphosate in different periods of vegetation season (spring, summer, autumn). Tested methods are based on comparison of reactions of invasive taxons *Fallopia japonica* var. *japonica* and *F. sachalinensis* incl hybrid *F. xbohemica* to spraying by Roundup Aktiv (8 % of glyphosate active substance) and Garlon New (4 % of triclopyr active substance). The goal of the research is to answer following questions: (i) Does the plant reaction results differ by different herbicide spray usage? (ii) Is the effect of herbicide influenced by vegetative season? (iii) Are there any differences between taxa in reaction to spraying and in their ability of subsequent regeneration?

Preliminary results show strong differences of herbicide effects between studied taxons. *F. xbohemica* and *F. japonica* regenerates by 20 % less after Roundup Aktiv than after application of Garlon New. On the contrary, for eradication of *F. sachalinensis* Garlon New is more effective (regeneration is lower by 10 % compared to Roundup). Analysed data show that tested summer sprays reduced growth approximately by 60 %. Despite of negative influence of both sprays to studied taxons, it is obvious that they are not able eradicate knotweed growth totally – at least in terms of tested summer period spraying and in terms of used herbicide concentrations. Overall results will be known after autumn and spring field works.

P4.04

The effect of cover crops on the nutrient availability: an assessment by incubation method

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Cover crops (CC) protect the soil from erosion, providing habitat for soil biota, stabilizing the soil structure and consequently secure main crop yield. The aim of the field experiment set at BOKU was to investigate a variety of CC and their potential to provide macronutrients such as nitrogen, phosphorus and sulphur for subsequent soybeans, whether by solubilizing, fixation, accumulation or mineralization. In order to determine the rate of decomposition and nutrient release patterns, soil and fresh biomass of the different CC (Mustard (*Sinapis alba*); Buckwheat (*Fagopyrum esculentum*); Grass pea (*Lathyrus Sativus*); Sudan grass (*Sorghum sudense*); Black oat (*Avena strigosa*)) taken from the field experiment were tested. Cover crops were sown in September and samples for was taken in April before CC incorporation. The rate of decomposition and nutrient nitrogen (N) and phosphorus (P) release patterns of CC was tested in the incubation experiment at 28 °C for 56 days. Incubation tubes were filled with 50 g of soil and CC were added in amounts which contain 5 mg of the total N. Soil samples from the fallow plots (bare soil) were used as a control to monitor the amount of soil organic carbon and P mineralization without addition of CC. After filling the containers, distilled water was added to obtain a moisture content of 60 % of FWC (Field Water Capacity) and containers were covered with a single layer of gas permeable parafilm to minimize water loss. Decomposition of CC was very much dependent on total N and on the C/N ratio of residues. Legume CC residues, due to low C/N ratio, decomposed more rapidly than grasses, cereals and crucifers residues. Regarding nitrogen, only Grass pea release mineral N to soil while non-legume crops immobilized soil mineral N. Concentration of available P was decreased on bare soil after 56 days of incubation due to high calcium carbonate content and corresponding unfavorable high pH-value. However, all CC incorporation decreased soil pH and increased P availability compared to bare fallow soil. Sudan grass and black oat had positive impact on concentration of available potassium. Introduction and selection of appropriate CC depends on the climatic conditions and preceding crop. The effects of CC could be evident for stabilization of soil physical properties and weeds suppression but partially nutrient provision. Therefore further testing is necessary to better understand their relationship.

P4.05

Application of vegetation in rock crevices and screes in the monitoring of climate changes (Case Study Bjelašnica Mt.)

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Paper presents the result of long-termed field investigations of classes *Asplenietea trichomanis* Br.-Bl. 1934 corr. Oberd. 1977 and *Thlaspietea rotundifolii* Br.-Bl. 1948 on the Bjelašnica Mt. (Sarajevo) in terms of monitoring of its distribution and coverage. The repeated phytocoenological investigations according to the Braun-Blanquet methodology (1964) were conducted in the reference sites that were split in three spatial groups. Due to its geographic position, in terms of climate, Bjelašnica Mt. belongs to supra-mediterranean and continental pluviometric regime. In total, investigated were 180 sites in the subalpine and alpine belt of the Bjelašnica Mt. whereby 19 phytocoenoses of carbonate rock crevices and screes were recorded. The sites with significant changes in distribution, structure and dynamics of analysed phytocoenoses were recognised. The floristic differences were calculated in R 3.3.2 by application of the Bray-Curtis index (1957). The most significant differences, comparing to the period before ten years, were identified at the locality Kotlovi which is considered to be the refugium of glacial flora and vegetation on the Bjelašnica Mt. It was detected trend of movement for the phytocoenosis *Saxifragetum prenjae* Horvat 1941 to higher elevation, while the phytocoenosis *Achilleteum abrotanoides* Bjelčić 1972 has gone through significant changes in its structure and floristic composition. All aforementioned was interpreted as a consequence of global climate changes that have affected the vegetation types which integrate processes in the lithosphere and atmosphere the most. Due to undeveloped type of soils, the vegetation in rock crevices and screes, first of all other vegetation types, indicates changes in microclimate conditions and, therefore, is suitable for its monitoring.

P4.06

Determination of salicylic acid in poplar leaves under drought stress

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Poplar species (*Populus* L.) represents ecologically and economically important tree species. These species are well known by their fast growth rates, abundant vegetative propagation, and adaptability to various ecological conditions etc. Poplars have become a model organism for the study of tree biology, and after the publication of full genome of *Populus trichocarpa* they attracted more and more attention in recent years. According to the latest scientific predictions, severe droughts are likely to become more common, and scientists all over the world are challenged to solve problems related to drought effect on plant growth and yield. Salicylic acid, a phenolic compound produced endogenously in plants, represents very important signal molecule. It has a crucial function in the induction of tolerance against several abiotic stresses. In many studies have been emphasized the positive effects of exogenous applications of salicylic acid, but little information is available for describing amount of endogenous salicylic acid, as well as its determination in plants and its relationship to drought stress. Here, an effective approach based on high-performance liquid chromatography (HPLC) method was established to separate and determine the endogenous salicylic acid in poplar clones exposed to drought stress provoked by PEG 6000. Dry plant material was extracted with 50% (v/v) aqueous methanol. HPLC analysis were performed on Shimadzu Prominence chromatographic system, which consisted of LC-20AT binary pump, CTO-20A thermostat and SIL-20A autosampler connected to the SPD-20AV UV/Vis detector (Shimadzu, Kyoto, Japan). Chromatograms were recorded using 300 nm wavelength. The results showed that different poplar clones contained different level of salicylic acid. Clone M-1 was highlighted by the highest salicylic acid content followed by clone B-229 and clone PE 19/66 (26.6, 13.3 and 12.6 mg/100 g DW respectively). The endogenous salicylic acid decreased under drought treatment, but in clone PE 19/66 detected changes was not statistically significant. The present results indicated that abiotic stress factors, particularly drought, have a marked influence on the content of the salicylic acid, suggesting that salicylic acid performs a vital function in poplar's response and resistance to drought stress. The studies potentially provided useful reference for the cultivation and breeding of poplars.

P4.07

Influence of different tillage methods to mitigate climate change

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Agricultural production or colloquially known as "industry under the open sky" is certainly influencing climate change. Recent research has shown that the conventional method of tillage, more precisely ploughing, is closely related to the negative climate impact, through a significant CO₂ emission, which is released into the atmosphere. Reducing CO₂ emissions can be carried out with customized soil tillage methods (conserving, minimizing or omitting), while encouraging carbon sequestration. Soil tillage is a significant agrotechnical procedure that affects the biological, chemical and physical properties of the soil. Finding the best method that will reduce the negative impact on soil, water, and air, while maintaining stable yields and preserving soil fertility, is a challenge for researchers and scientists around the world. In the 1950s, the United States began exploring the minimum soil tillage, some decades later in the 1970s in the Western European countries, soil tillage was divided into three groups: conventional, reduced and no-tillage. In Croatia, prof. Butorac; prof. Mihalić and prof. Žugec, begin their first research, and over the next decades, together with associates and colleagues from other institutions, they recorded opposite results, especially in terms of yield. Alternative reduced soil treatment measures include unification, combining or abandoning tillage systems with the aim of reducing processing costs and preventing further degradation. One of the alternative methods is conservation soil treatment, according to which harvest residues cover more than 30% of the soil surface. Soil coverage along with appropriate soil tillage method can mitigate climate damage and maintain the economic viability of production. The choice of any method of tillage should not be based on tradition or some general axioms, but on agroecological field characteristics and specific crop, under the condition, it provides a stable and biologically active arable layer of favorable fertility. Today conservation

measures are being applied to almost 120 million hectares in the world, while in the Republic of Croatia only 15 000 ha. In the area of the City of Zagreb, there is 5000 ha of agricultural land, and with the County of Zagreb, it grows to 60 000 ha. The City of Zagreb as a major trading and transit point represents an important factor in product placement. Therefore, setting up research at the Experimental Field Šaštinovec in the City of Zagreb is an adequate location that will procure the best tillage method within agroecological conditions. The variants included in the study would contain conventional tillage, conservation tillage with stubble (Gruber) and conservation tillage with deep ploughing, and each treatment combined with 3 t/ha straw and without. The study would be based on obtaining data on the physical and chemical properties of the soil and on the yield components. Investigation of a complex interaction of soil treatment and climate change should be conducted out in multi-annual continuity in order to make certain conclusions with greater certainty.

P4.08

Energy transition in rural communities in Ireland

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Ireland is committed to reduce its greenhouse emissions and increase its energy efficiency and the use of renewable energy sources under the 2009/28/EC Renewable Energy Directive. Currently most of the electricity generated in the country is produced in large power stations from fossil fuels such as gas, coal, peat, and oil. Micro-scale electricity and heat generation is generally defined as the production of electricity by installations involving either a renewable energy source such as wind, solar, hydro and biomass or a combined heat and power (CHP) technology. This type of generation is usually referred to as micro-generation. Normally, micro generators are suitable for domestic electricity production or for small businesses and it is used as an alternative or supplement to traditional centralized grid-connected power. Some of the benefits of micro-generation are lower energy prices, ownership of participatory decision-making processes, boosting of the local economies through new employment opportunities, reduced fossil fuels dependence, lower greenhouse gas emissions. Despite the attractive positive aspects perceived from a bottom up perspective, numerous challenges surrounding the implementation of community energy include political, regulatory, financial, legal and social barriers. One of the main barriers has been identified as the lack of feed-in tariffs and lack of information. In order to decarbonise the economy by 2050, Ireland needs to produce one million fewer tonnes of carbon per year, which would require a complete reversal of the current trend. To tackle this problem and fight climate change and resource scarcity this poster suggests the implementation of micro-generation in rural communities in Ireland, involving in the process different stakeholders.

P4.09

State and perspectives of aquaculture in the municipality of Bužim

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Based on natural resources, Bosnia and Herzegovina has a significant potential for aquaculture, especially for the production of freshwater fish species. The municipality of Bužim occupies the far northwestern part of Bosnia and Herzegovina and belongs to the Una-Sana Canton. The significant wealth of the cantons is natural beauty, because this area abounds with rivers, smaller and larger watercourses, warm springs, caves, forests and cultural and historical monuments. This paper analyzes the existing state of aquaculture in the Una-Sana Canton, as well as the prospects of this canton for increasing production. The objective of the ichthyological research is to examine the structure of fish populations, ie distribution of fish populations along the longitudinal profile of the investigated catchment area of the river Baštra, its tributaries and standing waters in the territory of the cadastral municipality of Bužim. Also, the paper deals with physical and chemical parameters. The first and larger sub-basin of the river belongs Bužimnici and its tributaries, whose waters flow into the Sava River Glina. Approximately 1/3 of the municipal territory belongs to the sub-basin of Baštra, ie the Una River Basin. From physical parameters, the analysis included: water and air temperature, pH value and conductivity. The analysis of chemical properties of water at the investigated sites included next parameters: the concentration of dissolved oxygen, hydrogen carbonate, nitrite, ammonia, sulfates, etc. The main problems in the catchment areas of Una and Bužimica are related to organic pollution. At the site of the Baštra river - village Baštra, 6 species of fish were registered, 172 pieces of fish caught with an electro aggregate, total weight of 6.6 kg. During the harvesting of fish at the location L / 1 temperature was 14 ° C, the water temperature of 6.5 ° C, and the oxygen content in water of 10.7 mg / l.

P4.10

The assessment of shoot to root ratio at intercropping triticale (*Triticosecale*) and winter pea (*Pisum sativum*)

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Sustainable agriculture through safe food production has significant goals in preserving soil, its fertility and biological activity. However, the improvement of the soil production properties is commonly a long term process. Due to insufficiently developed livestock production in the Republic of Serbia and lack of animal manure, there is a growing need for adaptation of current cropping systems toward economic and ecological benefits. By introducing cover crops (CC) into the sowing structure, through carefully defined crop rotation, while respecting the principles of good agricultural practice, it is possible to protect the soil during the winter months, as well as the using plant mass in the spring as a green manure. However, during plowing, little importance is given to the mass of rhizosphere and

underground plant remains (roots). For the purpose of finding optimal time and the relationship between CC Triticale (*Triticosecale*) variety *NS Odisej* and winter pea (*Pisum sativum* ssp. *Arvense* L.) variety *NS Kosmaj* for plowing as green manure, the experiment was set up in a semi-controlled conditions of the vegetation shed of the Faculty of Agriculture in Novi Sad in 1 m³ containers on the Chernozem. The aim of the research was to determine the ratio of the mass of the shoot and the root of the CC (monocrop Triticale T, winter pea P and intercrop T + P). Sowing of winter CC was carried out in October, and the first sampling of above-ground and ground plant material at the beginning of April, where every two weeks (06.04.; 20.04.; 04.05.; 18.05.), the plant material was sampled in three replications until the moment of the flowering winter pea and triticale. After sampling, fresh plant material was put in the drying oven at 105°C to obtain the total dry mass (DM) of the above and below mass. The study encompasses the analyses of the mass of the root (R), the mass of the shoot - above ground plants (S) and the mass ratio of the shoot to root (S/R). The study finds that the lowest S/R ratio was obtained for T (1.36) at the first sampling, and the largest in combination of T + P (11.9) at the last sampling in May. Results indicate that the highest mass of triticale root was 1.7 t/ha, and field pea 1.3 t/ha sampled on May 4th. By comparing different treatments, it was found that the largest amount of new vegetative mass of the above-ground part was formed at the moment of flowering in the intercrop (T + P) and amounted 10.1 t/ha, while the root mass was 0.85 t/ha. The obtained results can be related to the height of the plants and the morphology, but also favorable combination of two different crops, which leads to the production of higher DM yields per unit area. The obtained results can be used to determine the time of plowing and the agro-technical measures that precede and follow the cover crops.

Poster Session 5: New challenges in animal science and veterinary medicine

P5.01

The efficiency of whole blood transfusion therapy conducted on dogs

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The therapeutical procedures of blood transfusion in human and veterinary medicine are required for the recovery of patients with major tissue oxygenation deficits, namely in patients with advanced anaemia or circulatory shock. The objectives of this study were to demonstrate the efficacy of whole blood therapy by evaluating the safety of whole blood supply on canine patients, and to monitor the clinical evolution of patients and their haematological parameters at 6 hours and then 5 days post-transfusion. The study was conducted over a period of 12 months (November 2017-November 2018) at the Emergency Hospital at the Faculty of Veterinary Medicine Cluj-Napoca, Romania. The study included 22 patients of different breeds and different age, therefore their weight was between 2 and 86 kg. Those patients went through at least one blood transfusion therapy based on clinical consult and haematological parameters. The diagnoses of patients were internal or external haemorrhage caused by the attack of other animals, by firearms during hunting parties or car accidents, haemorrhagic gastro-enteritis caused by various infectious diseases or parasitic diseases and coagulopathy. The amount of administered blood was determined using a formula found in many bibliographies. Only 7 patients (31.81%) achieved the desired haematocrit value at 6 hours after transfusion. In patients who failed to reach the desired haematocrit level, no post-transfusion adverse reactions or intra or extra-vascular haemolysis reactions were observed. Compatibility of the blood product was established by performing blood group tests, crossmatch tests, or by receiving their first transfusion (dogs did not have preformed alloantibodies). Five days after transfusion, we were able to get access to only 13 of the enrolled patients in this study because 5 of them were discharged during this time and did not return to re-evaluation, 4 patients died and for 2 of them was made the decision to have them euthanized due to the complexity of existing pathologies. The evolution of haematological parameters was statistically analysed using MS Excel and GraphPad and their evolution is statistically significant and confirm the efficacy of transfusion with WB. The efficiency was demonstrated for the patients with coagulopathy for which we used fresh whole blood (because platelets are inactivated at low temperature) and we managed to restore the bleeding and clotting time to the physiologic values in short time. Transfusion therapy in dogs could be lifesaving in several emergency situations, especially when you do it in accordance with the basic principles of blood transfusion, when it is performed in time and is based on the corroboration of the clinical and haematological data of the patient.

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U

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Y

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