AGRORES

8th INTERNATIONAL SYMPOSIUM ON AGRICULTURAL SCIENCES

AGRORES 2019

BOOK OF ABSTRACTS

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VIII INTERNATIONAL SYMPOSIUM ON AGRICULTURAL SCIENCES

16-18 May, 2019
Trebinje
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SECTION:
HORTICULTURE

	Poster Presentations	Large Hall, Hotel Leotar
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P2_31	Andela Vranic, Ksenija Hiel DECORATIVE PLANTS ON THE EXAMPLE OF A FLAT GREEN ROOF (CASE STUDY NOVI SAD)
P2_32	Jasmina Balijagić, Aleksandra Despotović, Veselinka Zečević, Ranko Prenkić, Irfan Mujanović, Ajsela Spahić GERMINATION OF SEEDS OF CALENDULA (*Calendula officinalis* L.) IN ECOLOGICAL CONDITIONS OF POLIMLJE, MONTENEGRO

P2_33	Svjetlana Zeljković, Jelena Davidović Gidas,Vida Todorović, Milica Pašalić GERMINATION OF FLORAL SPECIES DEPENDING ON THE APPLIED BIOSTIMULANT	
P2_34	Jelena Davidović Gidas, Svjetlana Zeljković, Gordana Đurić EFFECT OF DIFFERENT BAP CONCENTRATIONS ON MULTIPLICATION OF *Lavandula angustifolia* Mill. EXPLANTS	
	Oral Presentations	Large Hall, HET
	Working Committee: ***Klime Beleski, Sanja Radonjić, Dragan Nikolić***	
	Part I	
10:00-10:15 O2_01	Ivan Glišić, Tomo Milošević, Gorica Paunović, Aleksandra Korićanac, Radmila Ilić CHARACTERISTICS OF NEWLY-BRED DOMESTIC AND INTRODUCED APRICOT CULTIVARS (*P. armeniaca* L.) GROWN IN THE REGION OF ČAČAK	
10:15-10:30 O2_02	Miljan Cvetković, Nikola Mićić, Velibor Trifković, Aleksandar Životić RASPBERRY PRODUCTION IN BOSNIA AND HERZEGOVINA – CHARACTERISTICS AND CHALLENGES	
10:30-10:45 O2_03	Zlatan Ristić, Sanda Stanivuković, Boris Pašalić, Gordana Đurić THE EFFECT OF HYDROCOOLING TREATMENT OF SWEET CHERY ON HARDNESS DURING STORAGE	
10:45-11:00 O2_04	T. Karadeniz, T. Bak, L,Kirca, M. İşler EFFECTS OF OLIVE OIL APPLICATION ON MATURITY IN FIG	
11:00-11:15 O2_05	Mladen Kalajdžić, Dragoslav Ivanišević, Predrag Božović, Cassandra Collins DIFFERENCES IN SOME CHARACTERISTICS BETWEEN PRIMARY (N+2) AND SECONDARY (N+3) SHOOTS OF PROBUS (*Vitis vinifera* L.)	
11:15-11:30	**Coffee break**	
	Part II	
11:30-11:45 O2_06	Sanja Radonjić, Snježana Hrnčić, Ilma Kalač TWO YEARS MONITORING OF SPOTTED WING DROSOPHILA - *Drosophila suzukii* IN NORTHERN MONTENEGRO	
11:45-12:00 O2_07	Branimir Nježić, Petar Nikolić PROBLEM IN MANAGEMENT OF THE NORTHER ROOT-KNOT NEMATODE - *Meloidogyne hapla*	

12:15-12:30 O2_08	Turan Karadeniz, F.E.Tekintaş, S.M.Şen, E.Güler PRIVATE AND BEAUTIFUL FRUIT OF OUR COUNTRY: CRAMP BARK (*Viburnum opulus* L.)
	Discussion of oral and poster presentations
	Moderators of the discussion on oral presentations: ***Klime Beleski, Sanja Radonjić, Dragan Nikolić*** ***Moderators of the discussion on poster presentations:*** ***Miljan Cvetković, Đorđe Moravčević, Branimir Nježić***
14:00	**Lunch**

SECTION:
ANIMAL SCIENCES

	Poster Presentations	Small hall, Hotel Leotar
9:00-10:00	**Poster tour in the poster exhibition hall, in the presence of the authors**	
	Moderators of poster presentations: ***Božo Važić, Marinko Vekić***	
P3_01	Miloš Ž. Petrović, Zoran Ž. Ilić, Radojica Đoković, Marko Cincović, Miodrag Radinović, Branislava Belić, Milun D. Petrović RELATIONSHIP BETWEEN THE METABOLIC STATUS AND THE REPRODUCTIVE EFFICIENCY OF DAIRY COWS IN THE TRANSITION PERIOD	
P3_02	Biljana Veljković, Ranko Koprivica , Dušan Radivojević , Zoran Mileusnić, Aleksandar Kuč TECHNOLOGICAL PROCESS OF MILKING AND QUALITY OF MILK ON A COMMERCIAL FARM	
P3_03	Dragan Dokić, Maja Gregić, Vesna Gantner DETERMINATION OF THE RELATIVE ADVANTAGES IN THE CATTLE PRODUCTION OF MILK AND MEAT BY COMPARATIVE ANALYSIS OF PRODUCTION IN OSIJEK-BARANJA COUNTY AND KRAPINA-ZAGORJE COUNTY	
P3_04	Đorđe Savić, Stoja Jotanović, Miroslav Borojević, Marinko Vekić, Zora Čolović-Šarić CHEMICAL COMPOSITION OF MILK AS AN INDICATOR OF NUTRITIONAL STATE OF COWS	
P3_05	Milenko Šarić, Mišo Vejin, Zora Čolović-Šarić, Dragana Rujević INFLUENCE OF MASTITIS ON REPRODUCTIVE PARAMETERS IN HOLSTEIN-FREISIAN COWS	

P3_06	Dragana Rujevac, Milenko Šarić, Zora Čolović-Šarić THE MICROBIOLOGICAL STATUS OF AUTOCHTHONOUS DAIRY PRODUCTS
P3_07	Maja Gregić, Dragan Dokić, Tina Bobić, Vesna Gantner GENOMIC SELECTION IN HORSE BREEDING
P3_08	Marinko Vekić, Živko Klincov, Stoja Jotanović, Đorđe Savić BASIC PRODUCTION PARAMETERS OF BROILER FARMS IN BANJA LUKA REGION
P3_09	Stoja Jotanović, Stojan Marinković, Đorđe Savić, Ivan Stančić, Marinko Vekić SEASONAL CHANGES IN BOAR EJACULATE QUALITY PARAMETERS
P3_10	Goran Marković, Milomirka Madić USE OF SOME CEREALS FOR CARP (*Cyprinus carpio* L.) NUTRITION
P3_11	Nebojša Savić, Jerko Pavličević, Branko Glamuzina THE EFFECTS OF RATION SIZE ON CONDITION FACTOR AND LENGTH-WEIGHT RELATIONSHIP OF THE BROWN TROUT (*Salmo trutta* m. *Fario*)
P3_12	Dragan Mikavica, Nebojša Savić PREPARATION OF EXPERT STUDIES ON THE DAMAGE CAUSED TO THE FISH FUND
P3_13	Brankica Kartalović, Željko Mihaljev, Jelena Babić, Suzana Vidaković, Jelena Petrović, Nikolina Milošević HEXACHLOROBENZENE IN SMOKED SAUSAGE, YES OR NO?
P3_14	Jelena Nikitović, Bogoljub Novaković, Gordana Đurić PHENOTYPIC CHARACTERIZATION OF THE BOSNIAN BROKEN-HAIRED HOUND – BARAK ON THE TERRITORY OF BOSNIA AND HERZEGOVINA
P3_15	Stoja Jotanović, Milorad Sarajlić, Nenad Stojanović, Ivan Stančić, Đorđe Savić, Marinko Vekić INFLUENCE OF TAKING FREQUENCY ON BOAR EJACULATE QUALITY PARAMETERS
	Oral Presentations | Small hall, Hotel Leotar
	Working Committee: ***Daniel Falta, Milanka Drinić, Božidarka Marković***
	Part I
10:00-10:15 O3_01	Božidarka Marković, Milan Marković, Dušica Radonjić THE CURRENT STATUS OF TRANSHUMANCE LIVESTOCK FARMING IN MONTENEGRO

10:15-10:30 O3_02	Vesna Gantner, Mirna Gavran, Dragan Dokić, Božo Važić, Maja Gregić, Tina Bobić THE EFFECT OF BREEDING REGION ON DIFFERENCES IN PERSISTENCY OF HEAT STRESS EFFECT IN FIRST PARITY SIMMENTALS
10:30-10:45 O3_03	Božo Važić, Sara Popadić, Biljana Rogić, Vesna Gantner GOAT FARMING: STAGNATION AND DEVELOPMENT ON THE TERRITORY OF BOSNIA AND HERZEGOVINA
10:45-11:00	**Coffee break**
	Part II
11:00-11:15 O3_04	Sara Popadić, Biljana Rogić, Božo Važić THE AVERAGE RELATEDNESS COEFFICIENT IN LIPIZZAN HORSE FROM STATE-OWNED STUD VUČIJAK
11:15-11:30 O3_05	Milanka Drinić, Vojo Radić, Aleksandar Kralj, Zdravko Marković, Mladen Radinović THE PRESENCE OF HEAVY METALS, CD AND PB IN THE FODDER IN THE AREA OF BANJA LUKA
11:30-11:45 O3_06	Mirna Gavran, Maja Gregić, Zrinka Tolušić, Vesna Gantner THE FLUCTUATION IN WILD BOAR POPULATION IN HUNTING AREA IN EASTERN CROATIA
11:45-12:45	**Discussion of oral and poster presentations**
	Moderators of the discussion on oral presentations: ***Daniel Falta, Milanka Drinić, Božidarka Marković*** ***Moderators of the discussion on poster presentations:*** ***Božo Važić, Marinko Vekić***
14:00	**Lunch**

AGRORES 2019

SECTION:
AGRO-ECONOMY AND RURAL DEVELOPMENT

	Poster Presentations	Small hall, HET
9:00-10:00	**Poster tour in the poster exhibition hall, in the presence of the authors**	
	Moderators of poster presentations: ***Željko Vaško, Dragan Brković***	
P4_01	Jelena Stanojević, Bojan Krstić STRUCTURAL CHANGES IN AGRICULTURE: IMPLICATIONS FOR THE ECONOMY OF THE REPUBLIC OF SERBIA	

P4_02	Sreten Jelić, Tatjana Jovanović, Olga Gavrić HOUSEHOLDS AS MAIN FACTOR OF RURAL AND SUSTAINABLE DEVELOPMENT IN THE REPUBLIC OF SERBIA
P4_03	Petra Nikić Nauth, Gordana Roković, Željko Vaško, Tihomir Predić CRITERIA FOR THE DELINEATION OF AREAS WITH NATURAL CONSTRAINTS IN THE EUROPEAN UNION AND REPUBLIKA SRPSKA
P4_04	Grujica Vico, Zoran Rajić, Mile Peshevski, Radomir Bodiroga MULTI CRITERIA DECISION MAKING IN AGRICULTURE – A REVIEW OF USE IN BALKAN COUNTRIES
P4_05	Saïda Salah Mlaouhi, Saïf Nasri, Lassaâd Albouchi ANALYSIS OF CLIMATE CHANGE IMPACT ON PRODUCTION SYSTEMS IN THE REGION OF BIZERTE (TUNISIA) USING A BIO-ECONOMIC APPROACH
P4_06	Ljiljana Drinić, Gordana Roković, Aleksandar Ostojić, Branka Čobanović WOMEN ENTREPRENEURSHIP DEVELOPMENT IN AGRICULTURE
P4_07	Milan R. Milanović, Simo Stevanović OPPORTUNITY COST OF SERBIAN AGRICULTURAL EXPORTS
P4_08	Mihajlo Munćan, Jelena Đoković, Tamara Paunović COMPETITIVENESS OF MAIZE AND SUNFLOWER PRODUCTION IN THE CROP ROTATION OF FAMILY FARMS ORIENTED TOWARDS CROP PRODUCTION
P4_09	Miroslav Nedeljković, Aleksandar Maksimović ANALYSIS AND PREDICTION OF RAPESEED PRODUCTION INDICATORS IN THE REPUBLIC OF SRPSKA
P4_10	Aleksandar Ostojić, Nebojša Savić, Jerko Pavličević, Željko Vaško THE RELATIONSHIP BETWEEN IMPORT OF FEED FOR SALMONIDS AND EXPORT OF TROUT FROM BIH
P4_11	Tamara Stojanović COMPARATIVE FINANCIAL ANALYSIS OF CROP, LIVESTOCK AND MIXED AGRICULTURAL PRODUCERS' PROFITABILITY IN THE REPUBLIC OF SRPSKA (BOSNIA AND HERZEGOVINA)
P4_12	Edyta Brzęczek EIT FOOD ACTIVITY AS AN EXAMPLE OF SUPPORT FOR INNOVATION IN THE AGRI-FOOD SECTOR
P4_13	Krzysztof Frąsiak THE PROFITABILITY OF ENERGY PRODUCTION FROM THE CULTIVATION OF ENERGY CROPS
P4_14	Milena Świątek GLOBAL MARKET TRENDS IN ORGANIC FARMING

P4_15	Nataša Tomić, Nemanja Jalić, Nikola Bulović CONSUMER HABITS AND OPINIONS TOWARD ORGANIC PRODUCTS IN BANJA LUKA	
P4_16	Bojan Dimitrijević, Jelena Golijan, Slavoljub Lekić, Nada Lakić, Branka Bulatović THE IMPACT OF CERTAIN DEMOGRAPHIC FACTORS ON CONSUMER ATTITUDES TOWARD ORGANIC AGRICULTURAL AND FOOD PRODUCTS IN THE REPUBLIC OF SERBIA	
P4_17	Gordana Roković, Sandra Rover ANALYSIS OF RURAL TOURISM MANAGEMENT, AN INTEGRATED AND SUSTAINABLE APPROACH	
P4_18	Jovana Knežević, Tamara Dojčinović ANALYSIS OF THE POTENTIAL FOR AGRI-TOURISM DEVELOPMENT IN LAKTASI MUNICIPALITY	
	Oral Presentations	Small hall, HET
	Working Committee: ***Vesna Mrdalj, Vlado Kovačević, Nebojša Novković***	
	Part I	
10:00-10:15 O4_01	Dori Pavloska Gjorgjieska, Boban Ilić ENABLING EVIDENCE-BASED AGRICULTURAL AND RURAL DEVELOPMENT POLICY MAKING IN THE WESTERN BALKANS	
10:15-10:30 O4_02	Mirjana Bojčevski, Zorica Vasiljević, Vlado Kovačević, THE FADN' FARM NET VALUE ADDED AS A MAIN INDICATOR OF FARM INCOME IN EU AND SERBIA	
10:30-10:45 O4_03	Tihomir Novaković, Beba Mutavdžić, Dragan Milić, Dragana Tekić THE ANALYSIS OF SUBSIDY STRUCTURE ACCORDING TO TYPE AND ECONOMIC SIZE OF AGRICULTURAL HOLDING IN SERBIA	
10:45-11:00 O4_04	Vesna Mrdalj, Nemanja Jalić, Nataša Tomić, Aleksandar Ostojić, Željko Vaško COMPARATIVE ADVANTAGES AND INTRA-INDUSTRY TRADE FOR MEAT SECTOR IN BOSNIA AND HERZEGOVINA'S TRADE	
11:00-11:15 O4_05	Akupian Olga Stanislavovna, Kitaev Yuri Alexandrovich COMPETITIVENESS OF RUSSIAN GRAIN: STATE, PROSPECTS AND DEVELOPMENT TRENDS	
11:15-11:30 O4_06	Željko Vaško, Marko Ivanković THE LACK OF LABOR FORCE – A THREAT TO THE DEVELOPMENT OF AGRICULTURE	
11:30-11:45	**Coffee break**	
	Part II	

11:45-12:00 O4_07	Nebojša Novković, Mile Peševski, Beba Mutavdžić, Ljiljana Drinić, Šumadinka Mihajlović TOMATO PRICE – COMPARATIVE ANALYSIS: SERBIA, MACEDONIA AND REPUBLIC OF SRPSKA
12:00-12:15 O4_08	Nebojša Novković, Beba Mutavdžić, Otilija Sedlak, Borko Sorajić, Vasily Erokhin CABBAGE PRICE – COMPARATIVE ANALYSIS
12:15-12:30 O4_09	Delyana Marinova PERCEPTIONS TOWARD AGROTOURISM DIVERSIFICATION – THE CASE OF FAMILY FARMING IN PRESPA REGION, MACEDONIA
12:30-12:45 O4_10	Dragan Brković, Milenko Đurić, Miljan Cvetković POTENTIALS AND OBSTACLES OF AGRITOURISM DEVELOPMENT IN BOSNIA AND HERZEGOVINA AND SERBIA
12:45-13:00 O4_11	Lovro Sinkovič, Gregor Urek NATIONAL ACTION PLAN (NAP) FOR SUSTAINABLE USE OF PLANT PROTECTION PRODUCTS: AN EXAMPLE OF SLOVENIA
13:00-14:00	**Discussion of oral and poster presentations**
	Moderators of the discussion on oral presentations: ***Vesna Mrdalj, Vlado Kovačević, Nebojša Novković*** ***Moderators of the discussion on poster presentations:*** ***Željko Vaško, Dragan Brković***
14:00	**Lunch**

AGRORES 2019

SECTION:
SUSTAINABLE MANAGEMENT OF NATURAL RESORUCES

	Poster Presentations	Large Hall, Hotel Leotar
9:00-10:00	**Poster tour in the poster exhibition hall, in the presence of the authors**	
	Moderators of poster presentations: ***Mihajlo Marković, Petar Nikolić***	
P5_01	Barbara Pipan, Lovro Sinkovič, Marina Antić, Vida Todorović, Vladimir Meglič DIVERSITY OF GENETIC RESOURCES OF *Phaseolus coccineus* L. FROM BOSNIA AND HERZEGOVINA	

P5_02	Mirsad Ičanović, Mihajlo Marković, Husnija Kudić EVALUATION OF THE SOIL SUITABILITY OF THE BUŽIM MUNICIPALITY, FOR THE POTATO (*Solanum tuberosum*) CULTIVATION
P5_03	Vojka Babić, Tanja Petrović, Marija Milivojević, Milosav Babić, Petar Čanak, Natalija Kravić EFFECT OF SEED PRIMING ON SEED VIABILITY AND SEEDELINGS PERFORMANCES IN MAIZE GENE BANK ACCESSIONS
P5_04	Radovan Savić, Miljan Velojić, Atila Bezdan, Vesna Nikolić, Milica Vranešević, Radoš Zemunac, Nenad Antonić THE DOMINANT DIRECTIONS OF WIND EROSION IN VOJVODINA
P5_05	Dragana Drobnjak, Nenad Katanić CLIMATE STRATEGY AND ACTION PLAN IN THE REPUBLIC OF SERBIA
P5_06	Željko Mihaljev, Brankica Kartalović, Milica Živkov Baloš, Sandra Jakšić, Nenad Popov RADIOACTIVE RESIDUE BURDENS IN SOIL, FOODSTUFFS, ANIMAL FEED AND BIOLOGICAL MATERIAL
P5_07	Nadia Chammem, Amira Oueslati, Lamia Ayed, Asma Mejri, Moktar Hamdi SELECTION OF PROBIOTICS FROM TUNISIAN TABLE OLIVES : TOWARDS A BETTER CONTROL AND VALORIZATION OF A MEDITERRANEAN FERMENTED FOOD
P5_08	Ivana Radojević, Sara Todorić, Filip Mojsovski, Hristina Ivanovska ORGANIC GRAPE PRODUCTION
P5_09	Mirela Kajkut Zeljković, Borut Bosančić, Gordana Đurić DIVERSITY OF PEAR (*Pyrus communis* L.) ACCESSIONS IN THE *EX SITU* COLLECTION AT THE GENE BANK OF REPUBLIKA OF SRPSKA
P5_10	Sonja Rašeta, Mirela Kajkut Zeljković, Marina Antić, Gordana Đurić, Vida Todorović FRUIT CHARACTERISTICS OF TOMATO ACCESSIONS (*Lycopersicon esculentum* MILL.) FROM THE GENE BANK OF REPUBLIC OF SRPSKA
P5_11	Veronika Žitniak Čurná REPRODUCTIVE POTENTIAL OF JERUSALEM ARTICHOKE (*Helianthus tuberosus* L.)
P5_12	Ivana Čegar, Sanda Stanivuković , Boris Pašalić , Gordana Đurić POMOLOGICAL CHARACTERISTICS OF APPLE FRUITS FROM *EX SITU* COLLECTION

P5_13	Dijana Mihajlović, Svetlana Antić-Mladenović, Dragoja Radanović, Vaso Bojanić THE CONTENT OF COPPER IN THE SOILS OF DIFFERENT GEOMORPHOLOGICAL UNITS	
P5_14	Biljana Radusin Sopić, Biljana Lolić, Branimir Nježić, Milan Šipka, Gordana Đurić SOIL BIOGENITY OF THE BANJA LUKA REGION AS A RESULT OF THE INTERACTION OF BIOLOGICAL AND CHEMICAL FACTORS	
P5_15	Siniša Mitrić, Darko Golić, Vaskrsija Janjić, Dragana Božić, Zlatan Kovačević, Vladan Jovanović, Biljana Kelečević DEPENDENCE OF THE EFFICACY OF PRE-EMERGENCE HERBICIDES (PreEM) IN COMMON RAGWEED CONTROL OF THE DOSE AND NUMBER OF DAYS AFTER HERBICIDE APPLICATION (DAA)	
P5_16	Michalak Agata THE DEVELOPMENT OF THE BIOGAS SECTOR IN POLAND	
P5_17	Mirjana Vasić, Aleksandra Savić, Maja Ječmenica, Danica Mladenović, Milan Zdravković, Jelica Gvozdanović Varga , Slobodan Vlajić GRAIN CHARACTERISTICS OF THE COLLECTION *Lathyrus sativus L.* IN INSTITUTE OF FIELD AND VEGETABLE CROPS, NOVI SAD, SERBIA	
	Oral Presentations	Red Salon- Hotel Leotar
	Working Committee: ***Gordana Đurić, Duška Delić, Radovan Savić***	
	Part I	
10:00-10:15 O5_01	Steliana Rodino, Alina Butu, Marian Butu BIOECONOMY AS A DEVELOPMENT DRIVER FOR NATURAL BIORESOURCES STRATEGIES IN ROMANIA	
10:15-10:30 O5_02	Ranko Sarić, Vladan Ivetić ESTABLISHMENT OF SHELTERBELTS WITH AUTOCHTHONOUS TREE SPECIES	
10.30-10:45 O5_03	Marko Kuzman, Nikola Travar, Sunčica Bodružić, Rodoljub Oljača, Ljiljana Došenović, Gordana Đurić CURRENT CONDITION AND TRANSFORMATION OF DENDROFLORA IN PROTECTED AREA „UNIVERSITY CITY“	
10:45-11:00 O5_04	Petar Nikolić, Nikola Travar, Biljana Lolić DIVERSITY OF WILD BEES IN THE REPUBLIC OF SRPSKA AND POTENTIAL FOR THEIR USE IN AGRICULTURAL PRODUCTION	

11:00-11:15 O5_05	Dragan Brenjo, Džemil Hajrić EU POLICY ON FOOD QUALITY AND LEGISLATIVE FRAMEWORK IN BOSNIA AND HERZEGOVINA
11:15-11:30	**Coffee break**
	Part II
11:30-11:45 O5_06	Duška Delić DETECTION OF VIRUSES USING NEXT GENERATION SEQUENCING TECHNOLOGIES: EXPERIENCE WITH FRUIT TREE AND GRAPEVINE VIRUSES
11:45-12:00 O5_07	Mihajlo Marković, Dijana Mihajlović, Svetlana Antić-Mladenović, Milan Šipka LOCAL BACKGROUND VALUES OF THE LEAD IN THE SOILS OF THE BANJA LUKA AREA
12:00-12:15 O5_08	Walter Froelich, Milos Nozinic, Vojislav Trkulja, Vesna Bojic, Novo Przulj, Danijela Kondic, Marc Steinmann, Hannes Kurz, Benedikt Sauer, Mara Bojic, Robert Schmidtke RARE EARTH ELEMENTS IN ROCKS, SOILS, AND PLANTS OF BANJA LUKA REGION, REPUBLIC OF SRPSKA (RS)
12:15-12:30 O5_09	Dimitrije Marković, Gordana Đurić, Branimir Nježić, Boris Pašalić, Gvozden Mićić, Jovana Mastilović ECOSTACK FIRST HORIZON 2020 RESEARCH AND INNOVATION PROJECT AT UNIVERSITY OF BANJA LUKA
12:30-13:30	**Discussion of oral and poster presentations**
	Moderators of the discussion on oral presentations: ***Gordana Đurić, Duška Delić, Radovan Savić*** ***Moderators of the discussion on poster presentations:*** ***Mihajlo Marković, Petar Nikolić***
14:00	**Lunch**

AGRORES 2019		**SECTION:** **PANEL SESSION** **HOTEL LEOTAR – LARGE HALL**	

	AGRICULTURE AND CLIMATE CHANGE
17.00 – 18.30	***Moderator:*** ***Professor Mihajlo Marković, Faculty of Agriculture, University of Banja Luka***

	Panelists: Professor Goran Trbić, Faculty of Natural Sciences and Mathematics, University of Banja Luka Tomislav Šajić, MSc, Republic Hydrometeorological Service of the Republic of Srpska Duško Vujović, MSc, Water Production and Management Division, HET. Professor Mladen Todorović, Mediterranean Agronomic Institute of Bari
20:00	**GALA DINNER**

AGRORES 2019	**Saturday, May 18, 2019**

09:00 – 12:00	**Filed visit ("Popovo polje" company and Monastery "Tvrdoš")**
Large Hall, Hotel Leotar 9:00 – 12:30	**24 Conference of agriculture engineers of the Republic of Srpska and 10 Continuous education of agricultural engineers of the Republic of Srpska**
	Working Committee: **Siniša Mitrić, Borislav Milivojević, Jasenko Nedinić**

PLENARY LECTURES

PL_01

Integrated Freshwater Management from an Ecological Point of View

Mihael J. Toman[1]

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Abstract

The lack of competent management plans, intensive land use, and particularly the absence of environmental awareness and cooperation amongst different sector cooperation are the main reasons for pollution and loading problems in aquatic and terrestrial ecosystems at a local and global scale. The shortage of useful data, lack of personal and social responsibility increase our activities in providing useful information for policy makers. Different stakeholders, for example scientists, researchers, mayors, local authorities and private land users must participate in political decisions involving our living environment. Water resources management has become an activity of planning, developing, distributing and managing the optimum use of water. Nowadays the demand for sanitation water, drinking water, water for various industries and technological processes and especially water for agriculture is increasing. Worldwide agriculture is the largest user of the planet's freshwater resources consuming around 70% water. Moreover, it is the main source of disperse pollution causing high eutrophication of water bodies. Disperse pollution enriches the environment with nutrients, heavy metals, FFM, endocrine disrupters, drugs, medical substances and must be treated as a global problem. We have to change our practice and our way of life to connect land use and water management. It is not simply a question of nature and human health; but also a question of chronical effects to our environments and humans. Natural, social and law sciences are now crucial for sustainable management and environment protection. We are not managing nature, we are managing our living environment, the only one we have. Humans are again to become a part of Nature, not her supervisor. In the field of environment protection we need a change of our mindset.

Key words: freshwater management, water in agriculture, disperse pollution, eutrophication, environmental awareness

PL_02

Grapevine genetic resources in Croatia - old varieties for new wine market

Edi Maletić[1]

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Abstract

At the turn of 19th and 20th century there were more than 400 grape varieties under cultivation in Croatia. However, because of introduced pests and pathogens, modern economic pressure and introduction of world well known cultivars, a drastic germplasm erosion has occurred. During the last 20 years, detailed inventory of wine-growing regions has shown that lot of autochthonous cultivars still can be found but many of them are extremely underutilized and endangered. A thorough amphelographic description (according to OIV descriptors) and genetic fingerprinting (9 SSR loci) of cultivars have been carrying out. So far, more than 130 cultivars have been selected and preserved in National collection, data have been entered into the EU Vitis Database and most of them are considered as autochthonous varieties.

Microsatellites enabled clarification of synonyms and homonyms as well as analysis of parent-progeny relationships. In case of few neglected cultivars a high quality potential has been observed, and their economic revitalization has been started. Also, clonal and sanitary selection of major native varieties has been launched.

Key words: grapevine germplasm, autochthonous cultivars, SSR, clonal selection

PL_03

Heat stress and other stresses influencing milk production during summer

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Abstract

High summer temperatures can be a large problem in modern agriculture. Not only dry seasons in the plant production, but also the heat stress in animal production and reproduction is referred to as the future problem in the context of global warming. Ruminants does not have problems during low temperatures due to the production of large amounts of heat produced in the rumen; on the other hand, problem can occur when the ambient temperature exceeds 25 °C. From our findings in the Czech Republic, it is clear that high-yielding dairy cows are stressed when the temperature is higher than 21 °C. Even the cows that have bigger yield suffer from heat stress more. However, we must not neglect any further influence - relative humidity (RH), which negatively affects perception of high temperatures. Therefore, the so-called temperature-humidity index (THI) should be used in a humid environment.

For that reasons farmers try to cool down their animals by all available ways. The main ways to do so are: better air exchange in the stable, using different cooling systems based on mist, dew or shower animals, or even adding feed additives to suppress heat production in the rumen. Another, no less serious problem in the summer, is the extreme overgrowth of annoying ectoparasites, especially flies. We have proven that average milk production losses caused by fly infestation are 0.6 kg per cow per day.

To reduce production and reproduction losses and welfare deterioration effective prevention has to be done. It consists of the correct construction of the stable, the feeding system, the removal of excrements, the cooling of animals or the timely removal of flies at all stages of its development.

Key words: heat stress, cattle, dairy, humidity, temperature, THI.

Section 1: CROP SCIENCE

Poster Presentations

P1_01

Effectiveness of weed control in potato field

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Abstract

The aim of this work was to evaluate effect of weed control in the *Solanum tuberosum* L. under irrigation conditions during the 2017 and 2018 at the Agricultural Cooperative in Spišská Belá. In 2017 the cooperative grew potato chips on two plots. In 2018 on three plots. Weed control was done exclusively by herbicides. Weeds were counted on each plot before and after application of the herbicides and before the application of desiccants. The success of regulatory interventions was calculated by Abbott's formula. The most common weeds in potato field include the species: *Elytrigia repens, Galium aparine, Chenopodium album*. To a lesser extent, weed species occur as: *Cirsium arvense, Avena fatua, Amaranthus retroflexus* and *Solanum nigrum*. In 2017, the chemical control of weeds on the "Medza" plot was better where pre-emergence preparations Sencor Liquid, with the active substance *metribuzin*, and Command 36 CS, with the active substance *clomazone*, were applied. The effectiveness of the applied herbicides was 91.05%, thus ranking as the good herbicide efficiencies. In 2018, the chemical control of weeds was the most effective on the plot "Jareček", where the percent of herbicide efficiencies was 89.94% which is evaluated as sufficient. Garland Forte herbicide with *propaquizafop* was applied to this plot. Herbicide efficacy on other plots were in the range of 86.93 to 85.08%. In view of the possible formation of resistance to the frequently used active substance, it is necessary to rotate the active substance different mechanism of action.

Key words: potatoe weeds, herbicide efficiency

P1_02

Content of selected toxic elements in organic and conventional maize seed

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Abstract

Toxic elements presented in soil can be transferred and bioaccumulated in the plant root or in the above-ground vegetative plant parts resulting in numerous biochemical and physiological consequences for the plants. In the organic farming method, special attention is paid to the maintaining “healthy” soil in order to sustain minimal content of toxic elements. The aim of this study was to examine the content of Cd, Cr, Ni and Pb in maize seed (variety Rumenka) produced by conventional and organic farming methods, at the Maize Research Institute "Zemun Polje" during 2017. Also, the vigor of the maize seed obtained through the accelerated aging test was examined. Determination of selected toxic elements was conducted by using Inductively Coupled Plasma-Optical Emission Spectrometry (ICP-OES) with previous digestion of samples. The obtained results were expressed as mg/kg of dry weight (DW). Conventional maize contained higher amount of Cr (0.045 mg/kg DW) and Pb (0.414 mg/kg DW), while content of Ni (0.334 mg/kg DW) and Cd (0.028 mg/kg DW) was higher in the organic seed. After applied the accelerated aging test, the content of Cd was higher at the root of the conventional maize seedling (0.068 mg/kg DW), while the content of Cr (6.126 mg/kg DW) was the highest in the seedling axis and leaves of the conventional maize seedling. In contrast, the highest content of Ni (4.742 mg/kg DW) was determined in overhead part of organic maize seedling, while the highest content of the Pb (0.955 mg/kg DW) was found in the root of seedling

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Key words: organic production, conventional production, ICP-OES, heavy metals, maiz

P1_03

Maize yield in different systems of soil tillage and regime of fertilizer application

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Abstract

Appropriate soil tillage and fertilizer application are two prerequisites for successful maize production, especially in dry years. Research of different tillage systems on the chernozem soil type in Zemun Polje, Belgrade, Serbia was initiated in 1978. The effects of three tillage systems: no-tillage, rotary tillage and conventional tillage, and three levels of fertilization: F1- control, F2 - 330 kg ha^{-1} NPK and F3- 660 kg ha^{-1} NPK, on the maize yield and quality of grains were analyzed. The experiment was conducted under rain-feed and irrigated conditions as split-plot design with four replicates, during 2017 and 2018. In the no-tillage treatment, planting was performed by direct maize planting, John Deere 7200. In the reduced tillage treatment, tillage was performed with a rotovator in the autumn and planting with a conventional drill. The conventional tillage treatment consisted shallow plowing, immediately after wheat harvesting, primary tillage in the autumn and seedbed preparation in the spring. The plant density of ZP606 hybrid was 64.935 plants ha^{-1}. After the harvest, protein, starch and oil content in maize grains were analyzed. In 2017 in Zemun Polje the drought period was present (June-September) while 2018 was favorable for maize production and irrigation was not applied. The highest yields were obtained within conventional system of soil tillage and with application of mineral fertilizers. In 2017 the most effective was F2 under rain-feed (5.98 t ha^{-1}) and irrigation conditions (9.02 t ha^{-1}). During 2018, as a year with adequate amount and distribution of precipitation, more effective was F3 under rain-feed (10.50 t ha^{-1}) and F2 under irrigation conditions (10.43 t ha^{-1}). In both years, parallel with amount of fertilizer increasing, the protein content in maize grains increased, while starch and oil content showed opposite trend. The medium and high macronutrient supply to the soil, together with conventional tillage, are optimal for high yield achievement.

Key words: soil tillage, fertilization, maize grain, protein content

P1_04

Effects of production methods on the mycotoxin content in seeds of maize, spelt wheat and soya bean

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Abstract

Mycotoxins naturally contaminate crops, especially cereals and food used daily. In organic agricultural production, with the purpose of protecting crops against pathogens and weeds, the application of synthetic pesticides is not allowed, due to which crops are exposed to greater contamination with mycotoxins. In this regard, the aim of the study was to observe the content of mycotoxins in seeds of maize, spelt wheat and soya bean organically and conventionally produced in 2015, 2016 and 2017. Seed samples were analysed for the presence of deoxynivalenol, zearalenone and aflatoxins B1, B2, G1 and G2 (by using methods liquid chromatography - HPLC/DAD and HPLC/FLD). It was established that the highest number of samples was not positive for the presence of these mycotoxins. Deoxynivalenol (101.53 µg/kg) and aflatoxin B1 (1.16 µg/kg) were detected only in seeds of organic maize produced in 2015 in concentrations less than prescribed by the Regulation on the maximum allowable residues of pesticides in food and feed, and on feed and food for which the maximum allowable residue content is determined, Official Gazette of the Republic of Serbia No. 22/2018 and 90/2019. On the basis of the obtained results, since only one sample of organic maize seed was positive for the presence of mycotoxins, it can be concluded that different production methods did not significantly effect to the content of mycotoxins in investigated types of seeds.

Key words: organic production, conventional production, mycotoxins, seed

01_05

Effects of the production methods on vigour of soybean seed

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Abstract

The seed accelerated ageing test is one of the most important tests for the seed vigour determination that provides establishing of the degree of germination maintenance and the determination of the seed storage longevity. The objective of the present study was to observe the effects of different production methods (organic and conventional) on seed vigour of the soybean cultivar *Kaća* by the application of the seed accelerated ageing test (ISTA Rules, 2016). The soybean seed was exposed to double stress conditions (temperature 41ºC, air humidity 100%) for 72h. In organic soybean seeds, stress conditions affected the increase in the number of non-germinated seeds by reducing the germination percentage. The length of the above-ground part of seedlings (121.63 mm), fresh weight (8.9 g), as well as dry weight of the above-ground part of seedlings (1.05 g) were greater in the accelerated ageing test than in the standard laboratory test, while the length (100.25 mm), fresh (1.26 g) and dry weight (0.1 g) of the root were greater in the standard laboratory test. The percentage of off-type seedlings (10.75%) and non-germinated seeds (26%) was greater in the accelerated ageing test. More over the length of the above-ground part, root length and root fresh weight were reduced by 100.63 mm, 106.75 mm and 1.39 g, respectively.

Key words: vigour, organic production, conventional production, soybean seed

P1_06

Response of two-row and six-row barley to terminal drought and heat stress

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Abstract

Changing climates expressed through scarce rainfall and rising temperatures during grain development of temperate cereals have already negatively affected yield gains in regions of lower altitudes. Since spike architecture is one of basic footprints of barley domestication it could be hypothesized the importance of spike forms in adaptation to different environments or abiotic stress. Therefore, in order to compare different barley spike types in terms of kernel growth and yield components 15 two- and 10 six-row winter genotypes were tested in eight environments (year-site-treatment combination) where terminal drought was simulated by plants defoliation at seven days after heading, while control plants were grown intact. The ordinary logistic (s-shaped) model was found to be the most appropriate for kernels dry weight accumulation. Four parameters were estimated from the logistic model. Also, for each environment climatic factors were calculated and their effects on mean kernel growth rate were analyzed. To explore genotype × environment interactions for production per spike regression approach was adopted using climatic data as explanatory variables. On average, two-row genotypes out yielded six-rowed by 17% under control and by 33% under simulated late drought. Maximum kernel weight and mean rate of kernel growth (RG) was higher ($P < 0.05$) in two- than in six-row barleys. The number of days with moderately high (between 25 and 30°C) and high (over 30°C) temperatures had a higher negative effect on RG of two-row barley than six-row barley. On the other hand, minimum temperatures were more negative for RG of the six-row barley than two-row barley. In general, two-row barley showed better adaptation to low yielding environments, while six-row barley was more responsive to high yielding environments.

Key words: Hordeum vulgare L., defoliation, kernel growth, grain yield, s-shaped regression

P1_07

Effects of Fertilization on Yield and Yield Components of Maize (*Zea mays* L.) in Temperate Semiarid Region

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Abstract

Potential maize yields are determined by the interaction of genotype, environment, and management practices (G × E × M). The increase in crop yield during the past century is attributed to the selection of genotypes with higher yield potential and an increased amount of nutrients, particularly nitrogen (N) and phosphorus (P). Maximum maize yields are dependent on a balanced nutrition, with N nutrition as the main nutrient limiting maize yields and seed quality. Combined application of nitrogen (N) and phosphorus (P) fertilizer could significantly enhance crop yield. A three years field experiments was conducted at the research experimental station of Institute of Field and Vegetable Crops, Novi Sad, Serbia (N 45° 19`, E 19° 50`) to investigate effects of nitrogen and phosphorus fertilizers on yield and yield components of maize and to determine optimum levels of N and P for recommendation in agroecological conditions of South Pannonian basin. The trial was established on a chernozem soil (subtype: chernozem on loess and loess-like sediments; variety: slightly calcareous). Factorial combinations of six levels of nitrogen (0, 30, 60, 90, 120 and 180 kg N ha^{-1}) and three levels of phosphorus (0, 50 and 80 kg P ha^{-1}) were laid out in a randomized complete block design (RCBD) with four replications. Highly significant effects ($P < 0.01$) were observed on almost all agronomic parameters studied due to the pronounced effects of N and P and their interaction. Grain yield was significantly affected by year, fertilisation and year × fertilisation interaction. The highest grain yield (12.352 kg ha^{-1}) were obtained with the high rate of N (120 kg N ha^{-1}) and P (80 kg P ha^{-1}). Likewise, application of N and P significantly ($P < 0.01$) influenced 1000 kernel weight, harvest index, leaf area index and plant height. Nitrogen concentrations in grain tended to increase with increase in N rates. Combined with genetic improvement, fertilization has been a powerful tool for increasing maize yield.

Key words: maize, fertilization, nitrogen, yield, yield components, temperate semiarid region.

P1_08

Qualitative traits of *top cross* hybrids derived from Western Balkan maize landraces

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Abstract

Conservation of genetic diversity and efficient utilisation of available germplasm of Western Balkan maize landraces *via* pre-breeding activities, are important Maize Research Institute "ZemunPolje" gene banktasks. The descriptive analysis of the qualitative phenotypic traits of the 93 *top cross* hybrids,developed in crossing of 31 maize landraces with three commercial testers (L217 - *Iowa dent*, L73B013 - *BSSS* and L255/75-5 - *Lancaster*)was conducted.The aim was to identifyeffect of parental components on qualitative traits (kernel colour and type, row straightness, ear shape and anthocyanin colouration of cob glumes)observed.The traits were evaluated according to the UPOV and *CIMMYT-IBPG* descriptors for maize.The two-year trial at four locations, in two replications was setup. In the top cross hybrids, the yellow and yellow-orange kernel colour prevailed (45 and 30% respectively). The most abundant kernel typecategories were dents (40%) and semi-dents (25%), followed by the intermediate type (18%). The least presented categories are semi-flints (10%) and flints (7%). The most frequent category for the row straightness was a category with regular rows (73%), followed by the categories with spiral (20%) and irregular rows (6%), as well as extremely regular one (1%). Regarding ear shape, the most frequent was conical-cylindrical category (87%), evenly distributed in crossings to all tree testers, while the cylindrical and conical ear shape were represented by 12% and 1%, respectively. Medium anthocyanin colouration of cob glumes was the most frequent one (56%), followed by the poor (26%) and the strong (17%), while the least frequent (below 1%) was the very poor colouration of cob glumes. According to the results, more pronounced effect of testers on observed qualitative traits was found.

Key words: gene bank,genetic resources, qualitative traits, pre-breeding, *Zea mays* (L.)

P1_09

Production potential of buckwheat in Šumadija on brown forest soil type

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Abstract

The aim of this study was to examine the influence of NPK fertilization and between row spacing on the growth, development and grain yield of buckwheat (cultivar Novosadska). Field microexperiments were conducted during the 2018 in the agroecological conditions of the central Šumadija (locality Rača Kragujevačka), on brown forest soil type (Eutric Cambisol), according to the Split plot plane in four repetitions. The area of the main plot was 90.0 m^2, and the areas of the subplots were 3.0 m^2, when sowing was carried out on the 25 cm row distance, and 6.0 m^2, when sowing was carried out on 50 cm row distance. The applied amounts of fertilizers expressed in kg ha^{-1} of active substance were: Control (unfertilized), NPK 30:30:30, NPK 60:60:60 and NPK 90:90:90. Standard agrotechnological measures were applied, as for the regular production of buckwheat. The obtained results showed a significantly stronger effect of NPK fertilization on the examined parameters in comparison with the size of the vegetation area. When NPK nutrients were used in the largest quantity (NPK 90:90:90), compared to unfertilized variants, a plant height was increased by 16.9%, a number of fruits were increased by 72.5% and a grain yield per ha was higher by 40.5%. When the buckwheat was sown at a larger row distance (50 cm), a plant height was increased by 3.3%, but a grain yield was decreased by 2.3% compared to the dense sowing of the plant (25 cm). The number of fruits per plant did not significantly differ depending on the row distance.

Key words: brown forest soil, buckwheat, grain yield, production potential

P1_10

The Agronomic Properties of a New Variety of Italian Ryegrass Vubo

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Abstract

The goal of Italian Ryegrass breeding work has been creation of a medium maturity variety with more leaves, larger leaves, good regeneration after mowing, smaller number of generative stems in second and the following cuts as well as two-year period of vegetation. As a result of this work in the period of several years, the first domestic variety of Italian Ryegrass was created by crossing individual selection and polycross method. Variety Vubo was created from a variety Draga and chosen autochthonous populations of Italian Ryegrass from hilly area in Republic of Srpska. The research on this variety in micro experiments have been performed at in four locations in the period from 2016 to 2018. These experiments were performed at random block system in four repetitions. During following this experiment we monitored the next properties: germination date, lodging of crops, hight of every plant immediately before mowing, density at the and of vegetation, resistance to diseases, green mass and dry mass yield. Among chemical traits it was determined content of: raw proteins, raw cellulose, ADF, NDF, raw fat, minerals, moisture and BEM. During two-year research of morphological and biological properties we determined that Italian Ryegrass the variety Vubo possesses good resistance to lodging and winter hardiness was on standard level. New variety of Italian Ryegrass has higher density in relation to standard. An average height of plants in moment of mowing of green mass was 72.6 cms and was higher in relation to standard. Average yield from four locations was 18.4 t ha^{-1} of green mass and 4.7 t ha^{-1} of dry matter. The average content of raw proteins was 12.33 %. Yield of protein was 976 kg ha^{-1}.

Key words: New variety, Italian Ryegrass, Height, Yield, Chemical Properties.

P1_11

First Report of *Barley yellow dwarf virusPAV* (BYDV-PAV*)* in maize *(Zea mays)* and triticale (×*Triticosecale* Wittmack) in Tunisia

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Abstract

Maize (*Zea mays*) and triticale (×*Triticosecale*Wittmack) areimportant crops used as a livestock feed in Tunisia. Barley yellow dwarf virus (BYDV) is one of the most common viruses of barley and oat in Tunisia (Najar et al, 2017), but no data is currently available on the presence of this virus in maizeand triticale. A field survey was conducted during the 2017 and 2018 growing season in Northeastern region of Tunisia. A total of 140and 300 samples were randomly collected from five maize and eight triticale fields, respectively.All the samples were tested by tissue-blot immunoassay (Makkouk and Kumari, 1996) using antisera against BYDV. Fifty twomaize samples (37%) and twenty ninetriticale samples (9.66%) were found to be positive for this virus. To determine the prevalence of the serotype BYDV-PAV, positive sampleswere testedusing DAS-ELISAwith a polyclonal antibody raised against BYDV-PAV(BIOREBA).BYDV-PAV contamination in maize and triticale was estimated at ~84% and ~86%, respectively. BYDV-PAV was further confirmed by RT-PCR analysis. Total RNA was extracted according to Foissac et al. (2005) and used as template for RT-PCR with the BYDV-PAV specific primer pair that amplify ~740nts of the CP gene (BYDV-F: 5' - GTTCTGCCTCAACATCGGAT-3' and BYDV-R: 5'-GTTCTGCCTCAACATCGGAT-3') (Ratsgou et al., 2005). ~700nts amplicon products were observed for all positive samples and seven of these were Sanger sequenced. The seven BYDV-PAV sequences (GenBank accession #, triticaleMK224492-MK224494; maize MK224487-MK224489, MK224491)share >96% pairwise identity amongst them and with BYDV-PAV isolate sequences from Tunisia (KJ467220-23 and KJ410741; isolated from barley), Kansas-USA (KU170668, isolated from wheat) and Iowa-USA (KY593457, isolated from barley). Studies are in progress to better understand the incidence and distribution of BYDV-PAV in these two crops in Tunisia and determine the presence other detrimental viruses in the Luteoviridae family (BYDV-MAV, genus*Luteovirus*) and Cereal yellow dwarf virus (CYDV-RPV, genus*Polerovirus*).

Key words: Virus, infection ,Tissu-blot, RT-PCR, Sequencing

P1_12

Weediness of soybean in different crop rotation

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Abstract

Increasing the soybean cultivated area is closely related to the intensification of crop rotation. The introduction of soybean as a legume crop has a positive effect on the weediness and yield of other crops, primarily maize and winter wheat. In order to prove the advantages of crop rotation in relation to the continuous cropping, a longer period of testing is required, i.e a certain number of rotations in each of the crops is required. This paper presents results of the effects of crop rotation on a weed community in soybean. A trial was settled on the experimental field of the Faculty of Agriculture, Radmilovac in 1992. The following cultivation systems have been observed: soybean continuous cropping, maize-soybean-winter wheat rotation (three crop rotation), and winter wheat-maize-soybean-spring barley+red clover-red clover-sunflower (six-crop rotation). The conventional cropping practices for cultivation of soybean were applied in continuous cropping and crop rotations. Crops are grown in non-irrigation regime, on chernozem luvic soil type. Long-term effects of various cropping systems on weed infestation were observed by the one square meter area method in 2015. The dominant species in continuous cropping and crop rotations were similar: *Datura stramonium* L., *Solanum nigrum* L., *Amaranthus retroflexus* L., *Chenopodium album* L., *Sorghum halepense* (L.) Pers and *Convolvulus arvensis* L. Scop. However, the number of weed species, the number of plants per weed species, fresh and air dry biomass was the highest in soybean continuous cropping and the smallest in three- and six crop rotation. In particular, there are large differences in the number of plants per weed species (in continuous cropping 43.8 and in crop rotation 12.6 and 12.8 per square meter) and in fresh weight (233.1 versus 96.9 and 108.2 g m^{-2}). The 23-year continuous cropping was obviously a respectable period for making unambiguous and precise conclusions. Crop rotations, are more effective in suppressing the number of plants per weed species and decreasing biomass of weeds.

Key words: continuous cropping, crop rotation, soybean, weediness

P1_13

The growth dynamics of soyabean crop during the growing period and yield on acid soil

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Abstract

Given that the need for soyabean (*Glycine hispida* Max.) grows and the area of its cultivation is limited, in the world is growing interest in finding the possibility of cultivating soybean in less favorable conditions. The aim of this study was to analyze the dry matter yield and the intensity of soybean crop growth by stages during the growing period under the conditions of Čačak on acid soil. The trial was set up in 2018 on leached vertisol soil type, acidic reactions (pH_{H2O}=4.8), by a completely random block system in three repetitions with the size of an elementary plot of 4.5 m^2. Two cultivars of soybeans were used: Selena and Lidija. Sowing is done at a distance of 45 x 5 cm. The intensity of crop growth (kg ha^{-1} day^{-1}) was determined in three periods: until the beginning of flowering, during flowering and from the end of flowering to harvest (calculated on the basis of the yield increase and the days number in each period). In the first period, the Selena cultivar had a significantly higher intensity of crop growth (26.94 kg ha^{-1} day^{-1}) compared to the variety of Lidija (14.84 kg ha^{-1} day^{-1}) (F test - $p<0,05$). During the flowering period, the cultivars did not significantly differ in the intensity of crop growth, which was ranging from 202-235 kg ha^{-1} day^{-1}. The intensity of crop growth in the third period ranged from 43-57 kg ha^{-1} day^{-1}. The soybean cultivars have achieved a relatively satisfactory dry matter yield. Significantly higher yield had a variety of Selena (9,659 t ha^{-1}), in relation to the variety Lidija (8,944 t ha^{-1}). This yield was largely contributed by climatic conditions during the growing period, with drought periods at the beginning and the end of vegetation and higher precipitation in June and July.

Key words: crop growth intensity, soybean, yield

P1_14

The growth dynamics of white lupin crop during the growing period and yield on acid soil

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Abstract

Soybean is the main source of protein, and Europe about 70% of its imports. The lupin is recognized as a good source of nutrition and alternative to soybean meals due to the high concentration of energy and protein. The aim of this study was to analyze the growth dynamics of white lupin **(***Lupinus albus* L.) by stages of growth and development during the growing period and total yield of cultivars in agroecological conditions of Čačak on leached vertisol soil type acid reaction (pH_{H2O}=4.8). The trial was set up in 2018 by a completely random block system in three repetitions. Two cultivars of white lupin were used for testing: Ghana and Timiryazevsky (Russian cultivars). The intensity of crop growth (kg ha^{-1} day^{-1}) was determined in three periods: until the beginning of flowering, during flowering and from the end of flowering to harvest (calculated on the basis of the yield increase and the days number in each period). In the observed periods, the cultivar Timiryazevsky had a higher intensity of crop growth compared to the cultivar of Ghana, but the differences were not significant (F test - $p<0,05$). The intensity of crop growth Ghana cultivar was 12.8 kg ha^{-1} day^{-1} in the first period, 21.9 kg ha^{-1} day^{-1} in the second period and 10.5 kg ha^{-1} day^{-1} in the third period. The intensity of crop growth Timiryazevsky cultivar was 22.5 kg ha^{-1} day^{-1} in the first period, 30.2 kg ha^{-1} day^{-1} in the second period and 19.4 kg ha^{-1} day^{-1} in the third period. The cultivar Timiryazevsky achieved higher forage yield by 45.2% and dry matter yield by 74.9%. The cultivar Timiriazevsky showed better results for all parameters tested, so it can be recommended for further testing in different agroecological conditions.

Key words: intensity of crop growth, yield, white lupin

P1_15

Seed production and marketing in the teritory of the Republic of Serbia for the period 2006-2018. year

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Abstract

In this paper are given a multi-year data on the quantities of seed for the period 2006-2018 year. Based on these data we can conclude that there are significant differences in the production and attested quantities of seed per year, especially in small grains, while in the quantity of seed of hybrids less oscillating from year to year. We can conclude that the shave of domestic varieties and hybrids decreases and increases the amount of foreign varieties and hybrids that are producet, processed and placed in the market of Republic of Serbia.

Key words: seed, variety, hybrid, quantity

P1_16

Postcontrol tests as one of ways to promote seed production in Serbia in period 2006-2018.

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Abstract

Control of production and certification is regulated in Serbia by Low of seed from year 2005, and with regulations connected to this low. With this regulations also is regulated postcontrol testing as obligatory, same is in most countries in EU. In this paper work we present first experiences and results of post control tests, testing was during 2006-2015 period on this species:winter and spring small grains, corn, sunflower, oil seed rape, soya sugar beet and also red onion produced from onion set. In this paper work, beside results we give conclusions, proposals and suggestions how to work with more quality in this segment in seed certification, final goal is to protect users of seed which are farmers.

Key words: post control test, seed, certification, low, regulations

P1_17

Assessment of the correlation between grain yield and yield components of spring barley on acid soil

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Abstract

A field trials with spring barley cultivars 'Novosadski 456', 'Dunavac' and 'Jadran' were performed during 2014–2017 to evaluate the effect of different rates of mineral fertilizers, especially phosphorus and lime, on grain yield, yield components, and their relationship. The experiment was conducted under dryland farming at an experimental field of the Secondary School of Agriculture, Kraljevo, on a very acid soil (pH_{H2O} 4.5), in a randomized block design with three replications. The results were processed using SPSS software (SPSS 1995). Mineral fertilization and liming improved grain yield, plant height, spikes m^{-2}, spike length and grain protein content. The best response to mineral fertilizers and liming was exhibited by 'Novosadski 456', whose yield in all years was significantly higher than that of 'Jadran'. All cultivars showed better performance in liming treatment than under increased phosphorus fertilization, resulting from greater availability of macro and micronutrients with increasing soil pH i.e. phosphorus immobilization in the highly acidic environment. The coefficients of correlation between grain yield and its components, and among yield components were significant ($P \leq 0.01$), except between: grain yield and 1000-grain weight, spikelets per spike and grains per spike, and spikelets per spike and 1000-grain weight ($P \leq 0.05$). Grain yield was most strongly correlated with spikes m^{-2} ($r = 0.74$), spike length ($r=0.63$), grains per spike ($r = 0.61$) and plant height ($r = 0.60$). The results refer to complex relationships among these parameters and the dependence of grain yield on major yield components, primarily spikes m^{-2}, grains per spike and 1000-grain weight.

Key words: barley, liming, mineral fertilizers, correlation, yield

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P1_18

The overwintering ability of rapeseed (*Brassica napus* L.) plants in the region of Banja Luka

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Abstract

The agro-ecological conditions in the early growing period can influence later rapeseed development. It is important for plants to be well prepared for the overwintering. The aim of this investigation was to evaluate the overwintering ability of rapeseed plants in the phase of a rosette plant. Three winter rapeseed hybrids, marked as PR46W21, PR45DO3 and PR46W14 were tested. Research was conducted in 2012/13 and 2013/14 growing seasons in the region of Banja Luka. Standard agronomic practices for winter rapeseed were performed. Sowing was carried out on the 22nd of September in 2012/13 and on the 1st of October in 2013/14. Following parameters were analysed: root lenght (cm), root mass (g), leaf rosette mass (g), plant mass (g) and number of leaves per plant. Two–way ANOVA was conducted in 3×2 factorial design and significant differences between treatment means were tested by Fisher's least significant difference test (LSD) at the 0.05 and 0.01 probability level. Significant differences between hybrids were present in root length (cm). The oilseed rape hybrid PR46W21 obtained the highest root lenght of 16.23 cm as a two-year average, which was significantly higher in comparison to PR46W14 and PR45WD03. The effect of year was statistically significant when it comes to root mass (g), leaf rosette mass (cm) and plant mass (g), with higher values in the second growing season (2013/14) of 2.59 g, 14.77 cm and 17.36 g respectively. The interaction hybrid × year was statistically significant in number of leaves per plant. The highest number of leaves per plant was obtained by PR45WDO3 in 2012/13 (8.50). Agro-ecological conditions in 2013/14 were obviously favourable for tested rapeseed hybrids. These conditions improved the overwintering ability of tested rapeseed hybrids by the increase in root, leaf and plant mass, resulting in plants well prepared for the winter period.

Key words: oilseed rape, rosette plant, root length, plant mass, leaf mass.

P1_19

Distribution of *Xanthium* species on the territory of Bosnia and Herzegovina

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Abstract

Species of the *Xanthium* genus are native to America. Thanks to selective colonization of genotypes subset as the best in term of survival and adaptation to environmental conditions in novel habitats, *Xanthium* species successfully colonized a large number of European countries. In the most of these countries they become invasive. Species of *Xanthium* genus in a present days have wide distribution over all continents. From the reasons of photoperiodic adaptation through hybridization and outcrossing *Xanthium* species have a great capacity for growth and colonization of diverse geographical areas and habitats. As a ruderal plant, *Xanthium* species are considered as pest species in agriculture and coastal areas. These species invade crops as maize, wheat, soybean, cotton, potato, sunflower and tomatoes. Seedlings as well as fruits of *Xanthium* species are toxic in regards of high amount of carboxyatractyloside. This work represents first detailed research distribution of *Xanthium* species on the territory of Bosnia and Herzegovina (B&H). On the research area, two species *X. spinosum* and *X. orientale* were determined. Within species *X. orientale* were identified two subspecies: *X. orientale* subsp. *italicum* and *X. orientale* subsp. *riparium*. The distribution of the identified species is presented on the UTM (Universal Transverse Mercator) map with a scale of 10x10 km. Quantitative representation of *Xanthium* species was made by Braun Blanquet (1965) model. The species of the *Xanthium* genus are widespread on the territory of B&H and represent a economically very important weed which occurs on agriculture and ruderal areas. Based on its distribution and qquantitative representation *Xanthium* species can be assessed as potentially invasive species, which endangers anthropogenic habitats such as agricultural and ruderal areas. The results of this research indicated that species of *Xanthium* genus occupy new habitats on the territory of B&H and quantification of these species represents the basis for preventing further invasion.

Key words: Xanthium sp., quantitative representation, UTM map.

P1_20

Influence of soil type and compaction on yield of some varieties of winter wheat

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Abstract

Wheat has high demands in terms of fertility and physical properties of the soil. The most successful cultivation is on fertile soils, where pH is 6.8-7.2. The soil is the basic substrate of plant rooting, and root growth depends on the depth of the layer, plant species, soil compaction, moisture, etc. The aim of this paper was to determine the yield of different varieties of wheat depending on the soil type and compaction. The trial was set during 2016/17. and 2017/18. in the territory of south Serbia (territory of Leskovac municipality), on two different types of soil (alluvium and vertisol). Four varieties of wheat were included in the experiment (Darija, Avenue, Carica and Sosthene). Compaction was measured after sowing and after harvest of wheat, with penetrometer Eijkelkamp hardware version 6.0, software version 6.03. The soil type and variety significantly influenced the average yield of wheat. Significantly higher average yields of all varieties of wheat were gained on the alluvium, related to the vertisol. Varieties Avenue and Sosthene had the highest average yields that were significantly higher than yields of varieties Daria and Carica, among which there were no significant differences. The higher soil compaction of the soil in the ploughing layer was on vertisol related to the alluvial soil. These data on average yields and soil compaction indicate the benefits of individual soil types for the wheat production.

Key words: wheat, vertisol, alluvium, compaction, yield.

P1_21

Stress at early vegetative stage and vivipary in Maize - potential interdependence

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Abstract

During the period from 2014-2016, the stress symptoms at early vegetative stage (plant phase of 2-4 leaves) and vivipary before the grain maturation were detected in maize in one of the five inbred maize lines of the Agricultural Institute of RS - Banja Luka. The line was tested at four locations (Maglajani, Kotor Varoš - KV, Bara and Delibašino Selo - DS), by the random block system in four repetitions using an identical technology. Plant variants in which the intensity of the vivipary was studied are: NGP - normally green and healthy plants (without stress symptoms in early vegetation), PP - purple-red (with anthocyanins) and HP - yellowish chlorotic plants. The aim of the research is to examine the potential interdependence between stress in early vegetation and vivipary tested on different plant varieties of the same inbred maize line with the influence of different soil types and climatic factors. Also, the aim is to determine the reasons for the occurrence of stress symptoms in early vegetation by analyzing weather and soil parameters tested on plants with same genotype and cultivation technology. The highest proportion of viviparous plants was found in PP (38,3%), which is by 4,3 and 4,8 times higher compared to HP and NGP. On average, the highest level of vivipary was found in Maglajani (27,1%) and KV (24,5%), and the lowest in DS (12,8%). The highest vivipary was recorded in 2015 in Maglajani 34,1%, and for all locations the average of 25,7%. The share of viviparous plants in NGP and HP is almost without any significant difference except in 2014 in DS (8,3% HP and 11,7% NGP), and partly in Maglajani 2015 (16,7% HP and 14,3% NGP) and in 2016 (5% HP and 7% NGP).

Key words: maize, stress in early vegetation, vivipary, correlation

P1_22

Variability of yield natural meadow type agrostietum vulgaris on Manjaca

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Abstract

In Republica of Srpska a large part of the surface is located under natural meadows and pastures that represent a significant resource for develop of animal production. On natural meadows application of agro technical measures can achieve high yields of green mass and hay. The aim of this work was to in four vegetation seasons 2015-2018 year in conditions mountainous area in Dobrnja on Manjaca determines yield variability of green mass and hay of natural meadow agrostietum vulgaris. Green mass and hay yields in this workfare depending on weather conditions. The first year in which the four year period laid down in the lowest yields of green mass and hay was characteristic of the small amount of precipitation in the vegetation period. The first year haystack of research has been 3,14 t/ha. During the research period best weather conditions for production of green mass and hay on the site of the research carried out were in the fourth year (2018^{th}). The fourth year of in which identified the largest yields of hay of 4,39 t/ha awarded a large of precipitation. In the field of research carried out weather conditions of the year have a significant impact on the yield of hay. In order to obtain higher haystack yields in the field of research carried out regardless of the weather conditions in addition to the application of necessary agro technical measures, one of the basic precondition is the provision of higher haystacks would be, to examine the application of the amount of and formulation of mineral fertilizers get the highest yields.

Key words: natural meadow, yield, green mass, hay.

P1_23

The influence of extreme weather conditions on the productivity of one year old feed mixtures in the mountainous region of the city of Banja Luka

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Abstract

Due to great significance of bulky nutrient of one year fed mixtures whose production is possible on site done researches, it was necessary to determine the impact of (temperature and precipitation quantities) to yield variability. One year fodder legumes represent significant crops for the production bulky nutrients. In the hilly and mountainous areas, mainly are reduced yields of forage plants species in comparison to low land areas. On getting lower yields next to a number of factors have a significant impact and weather conditions and their side in the vegetation period. The aim of this work was study of influence of weather conditions and shading on protein content and yield of biomass in intercropping in hilly-mountain area. The experiment carried out on field conditions on Manjaca mountain near Banja Luka during the two year period (2014 and 2015). For experiment used two type of intercropping a) spring vetch variety New Belgrade with oats variety Flemingsregent, b) spring forage peas variety Junior with oats variety Flemingsregent. The sowing was performing at an intermediate distance of 12.5 cm. Sowing depths was 3-4 cm. The first year for Banja Luka was characteristized large amount of precipitation and lower temperature compared to the second year. In both intercrops had high yields of green mass second year. The yield in second year of oats bean was 11800 kg ha^{-1}, and the pees with oats 9910 kg ha^{-1}. Humidity favors growth and develops one year compound feed, but due to high humidity there is a formation of an overflowing crop, where pants are being topiary while simultaneously suppressing choking of the plants oats. Overflowing crop is also subject to high humidity partly deteriorating, such an example was 2014^{th} year, which led to the acquisition of very low yield shading, pees with oats 5310 kg ha^{-1}, and vetch with oats 3800 kg ha^{-1}. Years with a large amount of precipitation (during vegetation) are not suitable for producing quality shade of one year compound feed. In these researches established high impact of weather conditions on the green mass yield and heylage of one year feed mixtures.

Key words: peas, bean plant, oat, intercrop, yield.

P1_24

The impact of weather conditions on productivity breeding perennial plants

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Abstract

Growing perennial forage plants can achieve higher yields bulky nutrients per unit area in relation to production on natural meadows. In two growing/vegetation seasons (2017 and 2018) which are characteristic of drastic differences weather conditions, the objective was to determine the effect of weather conditions, the yield of hay perennial forage plants: Italian ryegrass and clover grass mixture and grass clover mixture bridsfoot trefoil and England ryegrass. For the realization of our research sowing has done in acid soils. The first year was characterized by an extremely small amount of rainfall and high temperature, while the second higher precipitation compared to the longstanding average. As a result of weather conditions in the first year and we had only one swath. The good of the provision of plants with moisture of the second year of higher yields in both investigated variants. Higher yields of hay in both variants were in the second year of research in which obtained two cuts. The lowest yield of 2,1 t/ha was the first year of the Italian rye grass. To be in the future received satisfactory forage yields despite all performed agro technical measures, necessary would be done repair of land, and the crops are provided with sufficient amount of moisture.

*Key words***:** yield, hay, weather conditions.

P1_25

Influence of different substrate on sunflower parents line seed germination

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Abstract

Germination is a feature that is characteristic of each individual genotype. If unfavorable conditions can occur during the seed processing, storage, seed treatment, transport, germination and emergence, the value of this parameter may decrease. Therefore the aim of this study was to determine whether the substrate affects seed germination of two sunflower parental lines treated by various combinations of pesticides and stored in different storage conditions. The study involved two substrates for germination - sand and soil. The seed was treated with fungicides: benomyl, metalaxyl and fludioxonil, insecticides: thiamethoxam and imidacloprid, control was untreated seed. The seeds were stored in a warehouse and a cold chamber. Based on the F - test of ANOVA, a significant influence of substrate on seed germination of both examined lines was determined. Seed germination in the soil was significantly higher than in sand – at line L-1 for 16.77%, and line L-2 for 6.54%. The L-1 line noted the existence of a significant effect of storage conditions, the impact of chemical treatment was not significant, and only interaction the storage conditions x substrate were statistically significant. Line L-1 also saw the existence of a significant impact of storage conditions, not significant impact of chemical treatment, and statistically significant only of interaction storage conditions x substrate. At the L-2 line, there is a statistically significant influence of all investigated factors as well as their interactions, except for the interaction chemical treatment x substrate where no statistical significance was noticed.

Key words: sunflower, seed germination, substrate, pesticides, storage

P1_26

Grain carotenoid content variability in maize inbred lines

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Abstract

The first step in development of micronutrienten riched maize through plant breeding is screening aviable germplasm for micronutritient content, so the aim of this study was determination of carotenoids content in set of maize inbred lines. Adiverse panel of 50 inbreds having different kernal type and color was selected and grown at Zemun Polje in 2016 and 2017. Of them, 44 are inbreds with standard kernal type: 20 with orange color, 24 with yelow kernal, 6 sweetcorn inbred lines. Carotenoids were determined by high-performance liquid chromatography(HPLC), and their content is expressed as micrograms per gram drymatter. The wide genetic variation for the kernel carotenoids lutein+ zeaxanthin and β-carotene in maize inbred lines with different kernal type and color were revealed. Content of L+Z was in the range from 14,24 to 52,89 μg/g in 2016, and 14,30 to 62,36 μg/g in 2017. The inbreds H, CH and TVA912 were identified with high L+Z. Content of β-carotene was in the range from 1.20 to 39.37 μg/g (2016) and 1.10 to 38.97 μg/g (2017). The mean values of L+Z and β-carotene were 28,41 μg/g (2016), 27,60 μg/g (2017) and 8,58 μg/g (2016), 8,19 μg/g (2017), respectively. Orange kernel inbred lines had the highest mean value of L+Z (34,34 μg/g/32,91 μg/g) and β-carotene (14,41 μg/g/13,62 μg/g), followed by inbreds with yellow kernel L+Z content (25,35 μg/g/24,93 μg/g) and β-carotene (5,25 μg/g/ 5,10 μg/g). Sweetcorn inbred lines have the lowest content of both L+Z (20,83 μg/g/20,55 μg/g) and β-carotene (2,45 μg/g/2,47 μg/g). In both years inbreds with orange kernel and high content of β-carotene, H, CH and Fd-96 were found promising for breeding for higher content of β-carotene.

Key words: carotenoids, germplasm screening, HPLC, maize

P1_27

The first record of harmfulness *Diabrotica virgifera* sp. *virgifera* (LeConte, 1868) in the Raška district, Serbia

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Abstract

The presence of western corn rootworm (*Diabrotica virgifera* sp. *virgifera*, Coleoptera, Chrisomeliidae) was registered in 1996 on the territory of Western Serbia (Čačak municipality). First record of pest harmfulness registered in June 2018 in the maize crop at the Konarevo locality (municipality of Kraljevo, Raška district). At the beginning of September collected 30 plants with visible western corn rootworm injury symptoms and 30 healthy plants. Roots were inspected i.e. level of root injuries determinate according to Ostlie and Notzel scale (1987) and root mass measured. On the root of infested plants registered high damage (93.3%) ranged with rate 6. Average value of root mass on damaged plants is 42.24 g, and 147.8 g on healthy plants. Obtained data indicate high level of root injuries and damage on infested plants. This result indicates crop rotation as obligatory measure in pest control. It is extremely important conduct this measure on wider area and restrict spreading and invasions from the field to the field according to small field area.

Key words: Western corn rootworm, Corn, First field damage, Kraljevo

P1_28

Sensitivity of phytopathogenic bacteria to bactericides *in vitro* conditions

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Abstract

Bacterial diseases present serious problem in agricultural production which is reflected in reduction of quality and yield of cultivated plants. Long term use of copper compounds in bacterial diseases control can induce resistance in bacterial population. Considering the economic importance of bacterial diseases on cultivated plants the aim of this research was to tested different copper compounds (copper-hydroxide, copper-oxychloride, copper (II) sulphate, copper (III) sulphate) in different concentrations (100, 200, 300, 350 ppm) against one of the most distributed plant pathogenic bacteria (37 strains) *in vitro* conditions. Obtained results suggested that bacterial strains showed different sensitivity to tested copper compounds and concentrations. The lowest sensitivity was observed in strains of *Pseudomonas syringae* pv. *morsprunorum* race 1 (KBNS75; M25) and *Erwinia amylovora* (JČ5, DHM1) in copper-hydroxide and copper-oxychloride. Strains of *Xanthomonas axonopodis* pv. *phaseoli* (Xap1-5) and *X. campestris* pv. *campestris* (UR-1) showed the highest sensitivity to copper compounds compared to other tested strains. In the strains *P. syringae* pv. *syringae* (KBNS90; S30; T1; K1; M18) and *X. euvesicatoria* (Xe-1, Xe-5, Xe-8, Xe-10, XeI) copper-hydroxide inhibited bacterial growth on 300 ppm, while copper-oxychloride on 350 ppm. Among the tested copper compounds, copper (III) sulphate at concentration of 200 ppm was inhibited the growth of all 37 investigated strains.

Key words: bacterial pathogens, copper, sensitivity

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P1_29

Effectiveness of weed control in soybean field

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Abstract

The aim of this paper was to determine the most frequently early and late spring and summer weed species in the soybean *Glycine soja*, possible alternatives to their control in stands and evaluate the effectiveness of herbicide control. In the practical part of research, we investigated the weed species in soybean in four different treatments. The herbicide control was performed on three treatments and the fourth was a control variant, for finding the total weed spectrum in the Bajany locality. On the research treatments we investigated the effectiveness of applied herbicides. Effects of herbicide control were observed by counting the weeds on one square meter area before and after herbicide application. The weed species and species spectrum differed through the soybean growth phase. In various herbicide treatments, 4 to 5 weed species were determined: *Chenopodium album*, *Echinochloa crus-galli*, *Ambrosia artemisiifolia*, *Atriplex patula* and volunteer *Brassica napus*. In the untreated (control) variant, it was determined a 7 weed species: *Chenopodium album*, *Echinochloa crus-galli*, *Ambrosia artemisiifolia*, *Atriplex patula*, volunteer *Brassica napus*, *Persicaria maculosa* and *Amaranthus retroflexus*. The most common and most frequent weed was *Chenopodium album*, whose average value on all treatments was 104 of plants per m^2. On the other hand, *Brassica napus* has the least occurrence and it was with a total number of 7.25 per m^2. The overall efficiency of herbicides treatments was: Variant 1: Pulsar 40 – *imazamox* efficiency U = 84.55%. Option 2: Agil 100 – *propaquizafop*, effectiveness were U = 20.33%. Variant 3: Pulsar 40 – *imazamox* + Agil 100 – *propaquizafop* + Refine 50 SX – *thifensulfuron methyl* efficiency U = 89.74%.

Key words: soybean, weeds, herbicides efficiency

P1_30

Monitoring of potato cyst nematodes in Serbia

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Abstract

Potato cyst nematodes (PCN) are one of the major pests of potato worldwide. They are regulated quarantine pests in Europe and in Serbia. First surveys of PCN in Serbia started in 1990's with the first records of *Globodera rostochiensis* and *G. pallida* from 2000 and 2006, respectively. Since then, regular yearly phytosanitary control of seed and partly mercantile potato production yielded to over 40 PCN infested fields. Since 2013, Faculty of Agriculture in Belgrade was granted by the Directorate for Plant Protection under the Ministry of Agriculture of Republic of Serbia to carry out program of special surveillance of the quarantined areas and we herein present the current program results. Over the years all known PCN infested fields were resampled successively with at least eight soil samples per field taken in a zig-zag pattern across the field The soil is processed in laboratory and cyst extracted with Fenwick elutriator. Species identification was made by morphological and/or molecular means and vitality of populations obtained by individual cyst dissection and counting of viable content. All PCN records were from Western Serbia distributed in five broader localities in Macvanski, Zlatiborski and Moravicki district. From 48 fields where PCN had been found since 2000, in resampling from 2013, 14 fields were found PCN free and those were mostly the older findings with originally low recorded infestations. 33 field were infested with *G. rostochiensis* and only one with *G. pallida* with no registered ones with mixed infestations of PCN species. Most of the fields are with low to medium infestations with around 30% of them with high PCN infestation levels. PCN pathotype testing is underway with up to now only Ro1 and Pa2/3 pathotypes revorded.

Key words: Globodera, Survey, management, phytosanitary control, quarantine

P1_31

Fatty acids profile of potato tubers of Kennebec and Karlena varieties from Serbia

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Abstract

Potato (*Solanum tuberosum* L.) presents one of the most important crops used as food or feed. Tuber, as edible part, is important source of starch and sugars but also contains different fatty acids (FAs) as a part of lipid fraction. Beside FAs potato lipids include other important bioactive lipophilic compounds such as phospholipids, sterols, carotenoids, etc. Although lipids content in potato tuber is low (0.1-0.2%) it can provide useful information especially as a chemotaxonomic tool. In addition, a several agroecological factors can affect on chemical composition of potato tuber including FAs composition. In that sense the aim of this investigation was to determine fatty acids profile of two potato cultivars grown in two areas, Guča and Sjenica, with favorable agroecological conditions for potato production in Serbia: Kennebec (Guča) and Karlena (Sjenica). Samples of both varieties were collected during the season 2016. Total lipids content was determined by using accelerated solvent extraction method (ASM) while fatty acids composition was examined with application of gass chromatography with FID detector (GC-FID method). According to obtain results Karlena tuber had significantly higher content of total lipids (0.27%) compared to Kenebek variety (0.13%). In addition, immportant differencies among FAs profile were observed. Linoleic acid (C18:2) was represent as dominant FA in both tubers with 43.52% of total FAs in case of Karlena variety i.e. 37.83% in case of Kennebec variety. α-linolenic acid (C18:3n-3) and palmitic acid (C16:0) was accompanying in case of Karlena with 23.13% and 21.6% respectively. Besides these two FAs (C16:0 = 30.62%, C18:3n-3= 8.48%) in tuber of Kennebec variety significant quantity of stearic acid (C18:0) was determined- 9.02%. Interestingly, *trans*-oleic acid,

eicosatrienoic acid, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) were identified as trace FAs only in Karlena sample.

Key words: Fatty acids composition, potato tuber, variety, GC-FID

The research was performed within the projects III46009, TR-31049 and TR-31005, supported by the Ministry of Science and Technological Development of the Republic of Serbia

P1_32

AGRORES

Influence of different organic fertilizers on the quality of lavender *(lavandula officinalis* chaix) seedlings

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Abstract

This paper presents results of study of the influence of 4 different organic fertilizers (Chap liquid, Biofert, Guano and Stallatico jolly) on some of the most important productive traits of lavender seedlings. All fertilizers were applied once, except Chap Liquid which was applied twice. Two control variants were included in the experiment: one that was not fertilized and the other one where the organic-mineral fertilizer Sapro elixir was applied. The studies of influence of organic fertilizers at the height of the stems, weight of the above ground part and the mass of roots of the lavender seedlings was done in greenhouse. The highest average height of lavender seedlings was measured on a control variant fertilized with organo-mineral fertilizer Sapro elixir (25.5 cm) as well as variants where Chap fluid was applied twice - 24.8 cm and variant Biofert - 24.6 cm. Plants with the lowest stem height were measured on non fertilized control - 19.6 cm. All variants where organic fertilizer was applied had statistically significantly higher stem compared to plants grown in non fertilized control. In the Biofert variant was measured the largest average weight of the above ground part of the plant - 22.9 g, while the lowest was in non-fertilized control - 12.1 g. The average weight of the above ground part of the plant treated with organic fertilizers was significantly higher than in non fertilized control. The weight of the above ground part of the plant of lavender seedlings fertilized with Biofert was statistically higher than all other fertilized variants, but also higher than control variants fertilized with organo-mineral fertilizer. All variants with organic fertilizer application (Guano - 34.3 g, Biofert - 33.9 g, Chap liquid applied once - 25.6 g, Chap liquid applied twice - 28.8 g and Stallatico jolly - 26 g) had a higher root biomass compared to control variants (Sapro elixir - 24.3 g and non fertilized control - 20.4 g). The results of the research have shown that there are a significant number of quality organic fertilizers that can be successfully applied in organic production of lavender seedlings.

Key words: lavender, seedlings, organic fertilizer

P1_33

Experiences with weed resistance to herbicides in Serbia

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Abstract

Phenomenon resistant can define as the decreased response of a species' population to an herbicide. It is survival of a segment of the population of a weed species following an herbicide dose lethal to the normal population, or, it is phenomenon which occurs as a result of heritable changes to biochemical processes that enable weed species survival when treated with a herbicide. Also, weed resistance to herbicide is a normal and predictable outcome of natural selection. This means that there are rare mutations that confer herbicide resistance exist in wild/weed populations before to any herbicide introduction and they increase in over times after each herbicide application until they become predominate at which time the weed population is called resistant.In the last six-seven years the problem of weed resistance to herbicide has become very pronounced in the Pannonia area in the Republic of Serbia, especially the resistance of Johnson-grass (*Sorghum halepense* L.) to herbicides acetoacetate synthase (ALS) and acetyl-CoenzymeA carboxylase (ACC-ase) inhibitors, as well as of pigweed (*Amaranthus retroflexus* L.) to ALS inhibitors. That is why, with the support of the Ministry of Agriculture, Forestry and Water Management, the Plant Protection Directorate of the Republic of Serbia, we started the farmers' educations in an effort to help them overcome the problem of resistance where it already exists, that is, we help farmers to delay the problem where is not up to now present. In relation to this the following measures of an anti-resistant strategy could be proposed: preventing weed seed production and reducing of weed seed in the soil seed-bank, prevent the movement of seeds and vegetative propagules from field to field, keep arable and non-arable land as weed free, sowing pure crop seeds, growing competitive crops, destruction of weed seeds in post-harvest materials, use mechanical and physical measures where appropriate, using herbicide with different mode of action, tank mixtures, and sequential applications, use of recommended herbicide rate for certain number weed

populations, adopting crop rotations that allow use herbicide of alternative mode of action, intensify research and professional communication and grower education programs, and publishing guide for managing anti-resistant strategy.
Project supported by the Ministry of Agriculture, Forestry and Water Management, the Plant Protection Directorate of the Republic of Serbia.

Key words: herbicides, weed resistance, Republic of Serbia

Section 1: CROP SCIENCE

Oral Presentations

O1_01

Variability of harvest index in wheat (*Triticum aestivum* L.)

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Abstract

The harvest index (HI) of wheat plants is ratio of grain weight and weight of dry matter of plant (straw + grain) which indicate reproductive efficiency. Aim of this work is study of variation of HI of genetically divergent wheat cultivars in different environmental condition. The twenty genetically divergent winter wheat cultivars were used for study of HI of wheat during two year (2015-2017). The experiment was performed in randomized block design in three replication on the field in Kraljevo, Serbia. The seeds of varieties were sown at the distance of 0.10m in rows of 1.0 m length among which was the distance of 0.2m. For analysis of number of HI were used 60 plants in full maturity stage (20 plants per replication). The significant differences between the average values were estimated by F-test values. The analysis of variance was performed by MSTAT C (5.0 version). The obtained results showed differences among cultivars for harvest index. In the first year of experiment HI varied between 33.20% (KG 56) and 44.10% (NS Rana 5), and in second between 28.00% (KG 56) and 38.57 (Sila). The average HI for all wheat cultivars in first year was 38.19% while in second was 32.57%. The average HI for both year of experiment varied from 30.60% (KG 56) to 39.38% (Sila). The obtained results showed significant differences among wheat cultivars for HI and that value of HI varied in dependence of environmental conditions. HI can use as phisiological criterion selction of wheat genotipe in breeding program.

Key words: wheat, cultivar, harvest index, environment.

O1_02

Alterations of carotenoids in maize grain under different tillage and fertilizer dose

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Abstract

Fertilization in maize crop is important measure to achieve high yields and provide optimal grain quality, whilst soil tillage impacts the nutrients outtake of by crop. Carotenoids, are bioactive substances which vital for the human health, especially *β*-carotene which is actually provitamin A. In this study the impact of the reduced and conventional soil tillage in combination with N fertilizer applied in two doses (F1 - 180 kg N ha^{-1} and F2 - 240 kg N ha^{-1}) on carotenoids content in maize grain was evaluated during 2016, 2017 and 2018. 50 kg P ha^{-1} and 50 kg K ha^{-1} were applied in the autumn, while N fertilizer was incorporated in the spring, prior to sowing. The concentration of carotenoids (lutein, zeaxanthin and *β*-carotene) was determined by using high performance liquid chromatography (HPLC). Meteorological conditions in 2016 and 2018 were favorable for maize growing, while a 2017 was a year with drought present. A higher maize yield in both soil tillage regimes was achieved in F2 treatment for all years, except in 2017 where a higher maize yield was achieved in conventional tillage in F1 treatment. The content of tested carotenoids in conventional tillage regime was higher in the F1 treatment when compared to F2 treatment for 2016 and 2018, opposite to 2017. Similarly, a higher concentration of analyzed carotenoids in reduced tillage regime was achieved in F2 treatment for all tested years, in comparison to the F1 treatment. Obtained results revealed that the concentration of carotenoids in conventional tillage was inversely proportional to the maize yield opposite to reduced tillage, for all tested years. Results show that the higher content of carotenoids in conventional tillage was achieved with a lower dose of N fertilizer, contrary to reduced tillage.

Key words: Maize; Carotenoids; Nutritional quality; Nitrogen fertilizer; Tillage.

O1_03

Morphological characteristics of two-rowed barley (*Hordeum sativum* ssp. *distichum* L.) landraces originated from Herzegovina

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Abstract

Barley is a small grain cereal, tolerant to high temperatures and drought. Due to this characteristic, it can be regarded as a promising crop for the production in dry conditions. Research on five spring landraces of two-rowed barley lasted two experimental years (2011 and 2012) in agro-ecological conditions of Banja Luka. In the experiment, the standard cropping practices were applied, without irrigation. Experiment was set as randomized design with four replications. All measurements were performed in 10 plants per replication. Morphological characteristics of examined barley landraces included plant height (cm), spike length (cm), number of seeds per spike and seed mass per spike (g). Obtained data were subjected to two-way analysis of variance with landrace and growing season as main factors. Significant treatment or interaction effects were further analysed by Fisher's least significant difference (LSD) test, often utilized for pairwise comparisons among arithmetic means. In all tested traits the maximum average values were obtained in barley landrace AM2, i.e. the plant height (86.89 cm), the spike length (8.90 cm), the number of grains per spike (24.74) and the mass of grains per spike (1.17 g). Due to these facts, two-rowed barley landrace AM2 can be marked as the most productive in this research, bearing a potential for different crop breeding practices.

Key words: barley, local population, characterization, evaluation, productivity.

O1_04

Effect of cultivar and year on final leaf number in winter barley (*Hordeum vulgare* L.)

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Abstract

Leaf emergence represents externally visible trait that is results of externally not visible leaf primordial initiation. Final leaf number initiated in the apex and the rate of leaf emergence determine of pre-anthesis phases. The aim of this study was to determine the effect of year and cultivars on final leaf number (FLN) in winter barley. In the present study no consistent differences were found in the FLN between 6-rowed and 2- rowed cultivars. FLN differs among barley varieties sown in the field at different years and was controlled by all three factors; cultivar, year and their interaction. Contribution of year in FLN variation was highest, about 74%. This can be explained as a direct effect of the year on the rate of leaf appearance or as an indirect effect of an ontogenetic decline in the rate of appearance. Low value of interaction showed stability of leaf number from year to year. Considered across the growing seasons (GSs), the early cultivar Novosadski 581 had the lowest (11.3) and the late cultivar Kredit the highest (14.7) FLN. In average the early cultivars had one leaf less than the late ones. Earliness is rather the result of leaf number reduction than grain filling reduction. FLN across cultivars and GSs was 13.5. Quadratic equation fitted best the relationship between GDD requirement and FLN per main stem, with R^2>0.99. In our investigation, the FLN was positively correlated with GDD accumulated till flag leaf completion, while the effect of precipitation was less important. The tested cultivars showed significant variability in FLN, which can be used for selecting most adaptable genotypes.

Key words: Barley (*Hordeum vulgare* L.), final leaf number, phenology, polynomial regression, correlation

O1_05

Vitez – a new variety of winter many-rowed barley

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Abstrakt

The high-yielding, medium-early variety, winter, many-rowed barley was obtaind by the method of crossing genetically divergent parents, the varieties "Etincel and Krajišnik". The primary goal during the creation of this variety was selection on yield, while retaining other important agronomic characteristics at the level of the standard, the variety of the Institute of Field and Vegetable Crops Novi Sad under the name "Rudnik". In this variety successfully combined genes are responsible for high fertility potential, good quality, and very good resistance to lodging and excellent resistance to low temperatures. It was release by the Serbian Variety Commission in 2018, following a two-year trial at seven locations, where it was established that the variety is diverse, uniform and stable, with a genetic potential for yield over 10 t/ ha^{-1}, a shorter stem which is desirable, and that on average for all locations and years it has achieved significantly higher yield than the standard of variety. According to the results of the two-year inspection of the Variety Commission, the variety Vitez achieved the average grain yield for all sites of 7940 kg/ha^{-1}, which is 765 kg more than the standard. The highest yield of the Vitez variety was achieved in conditions of intensive production at the location of Pančevo 10375 kg/ha^{-1}, Sremska Mitrovica 8163 kg/ha^{-1}, Kikinde 7834 $kg/ha^{/1}$. It has wide adaptability, satisfactory yield stability, as well as a good level of drought and plant disease tolerance. This new cultivar has a great potential for spreading in farmers production.

Key words: barley, yield, breeding, quality

O1_06

Rapeseed Oil as a Biodegradable Lubricant

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Abstract

Rapeseed oil represents an excellent raw material for numerous technical applications. In the Public Institution Agricultural Institute of the Republic of Srpska - Banja Luka (abbr. the Institute Banja Luka), it has been used for the production of biofuels and biodegradable lubricants, as well as a component of body friendly soaps. This paper mainly deals with the characteristics of rapeseed and rapeseed oil for the production of biodegradable lubricants for chainsaw and machinery in carpentry. Eight rapeseed cultivars from the field trial in Banja Luka were analyzed on oil content and composition of fatty acids. In order to compare these traits among different oil crops, the same parameters were analyzed on three linseed cultivars, two sunflower cultivars in mixture and four soya cultivars. Technical traits of importance for lubricating purposes were determined on the oil of the hybridPT200CL by company Pioneer.The first part of discussion was focused on the proper field technology as a precondition for getting quality coldextracted oil. The oilquantity obtained on the press machine has not always been in accordance to the quantity of oil determined in the laboratory. The problem of "trapped oil", which is not available to press machine demands additional research. The most important traits of rapeseed oil fitted the standards for bio lubricants. By adding biodegradable improver"Viscoplex", rapeseed oil got excellent viscosity characteristics. Unlike other conventional vegetable oils, rapeseed oil had much lower pour point, so can be used for forest works during the winter period. The Institute Banja Luka is orientated on developing and promoting of environmentally friendly technologies in cooperation with local processing industry, in this case company "Tehnosint"from Laktaši.

Key words: rapeseed, rapeseed oil, biodegradable lubricant

O1_07

Detection of Turnip yellows virus in oilseed rape (*Brassica napus* L.) in Republic of Srpska

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Abstract

During autumn 2018, virus-like symptoms were observed in the field (50ha) of oilseed rape plants (hybrid DK Expower, Monsanto) in municipality of Laktaši, Aleksandrovac locality. Approximatelly 70% of the plants exhibited the reddening of leaf margins and interveinal yellowing. Leaves of seven plants were randomly collected in March 2019 for the laboratory analyses for the presence of *Turnip yellows virus*, TuYV (a genus *Polerovirus*, family *Luteoviridae*) by RT-PCR and sequencing. A comparison of the obtained sequence with those available in GenBank confirmed the presence of TuYV in oilseed rape samples. Poleroviruses are readily transmitted by *Myzus persicae* in a persistent, circulative, and nonpropagative manner. During late summer on plants grown on field edges high population of aphid have been observed. This is the first report of the *Turnip yellows virus* in the country, therefore, future research of epidemiology and formation of natural reservoirs of major viruses and efficient aphid species is of utmost importance for determining and imlementing effective control measures.

Key words: Polerovirus, hosts plant, aphids, Aleksandrovac

O1_08

Polycross selection of red clover

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Abstract

The selection work on the pollinated plant species such as red clover aims at creating synthetic varieties. Breeding work in perennial leguminosis is desired to achieve a high effect of heterosis. Polycroos method is a lot used in the creation of varieties of perennial leguminosis, and also in the selection of red clover. In this experiment, three clone lines were used in five combinations per system of randomized block system in four replications. The disposition of clones in the nursery ensures that each clone is pollinated by the mixture of all clones within the framework of one clone group. One polycross plot consisted of five plants (clones). The plots had the shape of a square page length of 1 m, four plants were planted in the corners of the square and the heel was in the intersection where the diagonal was cut. In order to control the fertilization, cages and bees were put into place at the time of fertilization. The grain yield is measured for each combination. The F test showed that there was a highly significant difference in grain yield between the combinations examined. Combination of 40% genotypes 1, 40% genotype 2 and 20% genotype 3, proved to be the most promising for high seed production.

Key words: Trifolium pratense L., polycross method, red clover, synthetic variety.

O1_09

Results of Monitoring of pesticide residues in food on market of Bosnia and Herzegovina in 2018.

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Abstract

Monitoring the residues of pesticides in and on food aims to determine the amount of residues of pesticides and their metabolites in selected products, to check whether they comply with regulations setting maximum residue levels (MRLs) of pesticides, comply with the principles of good agricultural practice (GAP) and assessment of nutritional acute exposure and chronic exposure of consumers to the residues of pesticides and thus contribute to protecting the health of consumers. Within the monitoring of pesticide residues in 2018 a total of 195 samples of food were sampled. 165 active substances were analyzed in 20 different product categories, of which 157 products of plant origin, 16 animal products and 22 products from the category of processed cereal-based foods for infants and young children.Out of 195 samples of domestic origin there were 108 or 55.4%, while import samples were 87 or 44.6%. In total, 20 different products were monitored.

Pesticide residues at the quantification level did not contain 104 samples, 91 samples (46.6%) contained pesticide residues in/above the quantification level.

Of the 165 active substances analyzed, 126 were not found in concentrations that allow quantification in any analyzed sample. In the case of 40 active substances, values that allow quantification in one or several analyzed products are determined. Of the total of 195 samples taken from 20 foods, samples from five foods did not contain pesticide residues.Three samples (1.54%) were above the MRL, but within the limits of measurement uncertainty, and these samples are considered appropriate. The samples were made of table grapes, apples and eggplants. One pear sample was not compliance (0.51%), and residues of the active substance (Chlorpyrifos) were found, above the prescribed MRL, taking into account the measurement uncertainty.

Key words: monitoring, pesticides, MRL, food

Section 2: HORTICULTURE

Poster Presentations

P2_01

Physical and chemical properties of fruits of Čačanska lepotica plum (*Prunus domestica* L.) grafted on four different rootstocks

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Abstract

In order to increase yield, quality and economic profitability of plum production in Serbia it is necessary to switch from traditional, extensive, to modern, intensive, production. To complete the transition new rootstocks should be introduced and tested. The most suitable rootstocks should be introduced into production systems in the growing region which can result in a long and stable productivity of high quality plums. The aim of the research was to test and compare the effects of two vegetative rootstocks (WaVit and WeiWa) and two generative rootstocks (*Prunus cerasifera* and *P. cerasifera* with *P. spinosa* as interstock) in a high density planting system on fruit quality of plum cultivar Čačanska lepotica. Fruit physical properties such as length, width and thickness, weight of the fruit and stone were significantly higher from trees on vegetative rootstocks. Total soluble solids (TSS) content was significantly higher in trees on *P. cerasifera* while titratable acidy (TA) was significantly lower in trees on *P. cerasifera* with *P. spinosa* as the interstock in comparison to other investigated rootstocks. Ripening index (RI) was the highest in *P. cerasifera*/*P. spinosa* rootstock. Newly introduced vegetative rootstocks exhibited positive effect on physical fruit properties with no significant effect on chemical fruit properties. Vegetative rootstocks such as WaVit and WeiWa can be recommended for high-density planting in Serbian agroclimatic conditions with no negative effect on yield and fruit quality.

Key words: fruit quality, generative rootstocks, vegetative rootstocks

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P2_02

Phytochemical assessment of plum (*Prunus domestica* L.) cultivars selected in Serbia

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Abstract

The aim of this study was assessment content of primary and secondary metabolites of 18 plum cultivars (Prunus domestica L.) selected in Serbia. Autochthonous cultivars 'Crvena Ranka' exhibited higest level of total sugars (174.3 g/kg FW) while cultivar 'Mildora' had highest sugars/acids ratio (17.2). Newly cultivar 'Nada' also contained high sugars/acid ratio (11.2) as well as high level of glucose (84.2 g/kg FW) and total sugars (145.1 g/kg FW). In all tested cultivars the predominant group of phenolics were flavanols followed by hydroxycinnamic acids whereas anthocyanins and flavonols were present in lower amounts. Compare to other tested cultivars, cultivar cultivar 'Nada' had a significantly higher content of anthocyanins (27.14 mg/100 g FW), cultivar 'Crvena Ranka' neochlorogenic acid (23.21 mg/100 g FW) and flavanols (86.15 mg/100 g FW) but also a high anthocyanins content (23.47 mg/100 g FW). In terms of total phenolics content (137.38 mg/100 g FW), new cultivar 'Nada' demonstrated better results than the standard plum cultivars grown in Serbia ('Čačanska Lepotica' and 'Čačanska Rodna') and can be recomended for expansion in plum growing regions in aim to produce fruit with high amount of beneficial phytochemicals intended for fresh consumption. Cultivar 'Nada', together with autochthonous cultivar 'Crvena Ranka', can be used for processing as a potential source for functional food products, and in breeding of plum with enhanced nutritional content.

Key words: fruit, sugars, organic acids, phenols.

P2_03

Research on the population of wild strawberry (*Fragaria vesca* L.) in the region of Banja Luka

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Abstract

Wild or forest strawberry (*Fragaria vesca* L.) is a diploid species (2n = 2x = 14), which is one of the most prevalent forest fruit in our area due to its intense and extremely pleasant aroma and taste. The vast majority of wild fruit represent a interesting genetic potential as the starting material in hybridization in order to create new varieties with new traits. The aim of this paper is to determine the different genotypes of wild strawberries in the region of Banja Luka, based on altitude and soil types of the region. The aim of the paper is also to determine, which species according to its pomological characteristics, has the best starting material for clonal selection of wild strawberries. For the analyzes, 30 individuals from each population of the selected localities were isolated, so in total 300 individual plants were analyzed. The basic pomological properties are determined by measuring the mass, length and width of the fruit, the length and width of the plant with flowers, the number of flowers in bloom, and the content of soluble matter. The obtained results of the study were statistically analyzed using the variance analysis and tested with the LSD test.

Key words: Wild strawberry, Population, Altitude, Location, Selection

P2_04

Biological and pomological characteristics of sweet cherry cultivars on *Prunus mahaleb* L. rootstock

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Abstract

Montenegro's production of sweet cherry (*Prunus avium* L.) doesn't fulfill necessary capacities as well as market demands for this fruit species. In order to increase and improve the production of sweet cherry an introduction of new and more productive cultivars in terms of higher fruit weight the excellent pomological characteristics, good transportability characteristics and late season ripening is needed. Cultivation of different ripening season cultivars is necessary in order to meet the demands of consistent and extended season offer. The research has been conducted in a collection orchard situated in the central part of Zeta valley- 10 km distance from Podgorica, covering the period of 2014- 2016. The study included ten sweet cherry cultivars: 'Burlat', 'Sunburst', 'Starking Hardy Giant', 'Ferrovia', 'Sweet Heart', 'Giorgia', 'Van', 'Bing', 'Kordia' and 'Lapins' while cultivar 'Stella' was used as standard. All studied cultivars including control were grafted on seedlings of *Prunus mahaleb* L. The most important biological and pomological characteristics were studied i.e. time of flowering, time of ripening, harvest duration, yield per cultivar, fruit and stone weight, flesh percentage, fruit stalk, soluble solids and total acids content as well as organoleptic characteristics. Cultivar 'Bing' had the highest values of the soluble solids content (17.90%), while the highest fruit weight (9.70 g) and flesh percentage (95.77 %) was noted in cultivar 'Sunburst'. The lowest value regarding the fruit weight was noted in cultivar 'Van' (6.57 g), the lowest flesh percentage in cultivar 'Stela' (93.25 %) while the lowest soluble solids content (14.39 %) was noted in cultivar 'Starking Hardy Giant'. Throughout the studied period, cultivar 'Van' had the highest value of average yield (22.32 kg) while cultivar 'Ferrovia' marked the lowest one (19.11 kg).

Keywords: Sweet cherry, Cultivar, Rootstock, Fruit weight, Soluble solids content

P2_05

Biochemical and pomological characteristics of fruit of some commercial medlar cultivars (*Mespilus germanica L*) grown in Bijelo Polje

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Abstract

This study described some biochemical and pomological traits of fruits in 4 commercial medlar cultivars (Domestic medlar; Pomoravka - seedless medlar genotype; Royal medlar; Medlar without seeds) grown in ecological conditions of Bijelo Polje (Montenegro) in the period from 2010 to 2012. The study focused on few segments. The first one included recording of biochemical traits - dry matter, total soluble solids, pH, and total acidity. The other segment comprised pomological traits [fruit weight (g), fruit size (mm), fruit length (mm), petiole length (mm)]. Dry mater was determined by drying at 105 °C. Total soluble solid content was determined by refractometer. The acidity was measured by titration with 0.1 N NaOH. Fruit weight was determined by measuring by the electric scale Metler 1200. The result was shown in grams with the accuracy of 0.01g. Fruit dimensions - length and width were measured by Vernier scale. The values for fruit dry mater ranged from 26.2% to 28.8%, total soluble solid contents ranged from 20.45% to 22.25%, titrable acid contents ranged from 0.26% to 0.28 %. The values for fruit weights ranged from 31.46 g to 35.50 g, fruit length ranged from 34.7 mm to 40.4 mm, fruit widths ranged from 30.5 mm to 32.23 mm, and petiole length ranged from 29.8mm to 33.2mm. During the years of the study, all researched cultivars had yields in the agroecological conditions of Bijelo Polje. The Royal medlar cultivar is the cultivar we would recommend to producers, due to its fruit dry matter content of 28.2%, the total soluble solid contents of 22.25%, and the total titrable acid content of 0.27%. Moreover, the fruit mass was the highest for the Royal medlar cultivar (33.5g). The length and width of the fruit in the same cultivar had also maximum values (40.4mm and 32.23mm), compared to other researched cultivars.

Key words: Royal medlar, Dry mater, Soluble solid contents, Titrable acid contents, Fruit weights.

P2_06

The effect of passive modified packaging on the quality of raspberry fruits

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Abstract

The aim of this work was to investigate the impact of polymer packaging on the quality of raspberry during the establishment of passive modified atmosphere. Fresh raspberries were packed in clamshell made of polyethylene terephthalate (PET) with perforated coverlid, especially designed for raspberries, and in control clamshell made of PET without perforation, and stored at 5˚C for 14 days. During this storage period, several parameters of quality were evaluated, as followed: the content of total dry matter and soluble solids, weight loss, total acid content (titratable acidity), pH value, soluble solids (SS) / titratable acidity (TA) ratio and ascorbic acid content (vitamin C). In both tested samples, dry matter content increased during storage but the value of this parameter was higher in raspberries packaged in perforated clamshell. At the begining of the experimet (2nd day of storage), soluble solids content was significantly decreased in both tested samples. However, after the 2nd day, the value of this parametar remaind constant during storage of raspberries packaged in unperforated clamshell, and significantly lower then its value in perforated clamshell. The total acids content (titratable acidity) reduced gradually in both tested clamshells, but its content was lower in raspberries packaged in unperforated clamshell which was followed with an increase of pH value. Raspberries packaged in perforated clamshell demonstrated higher weight loss rates then berries packaged in unperforated clamshell, while SS/TA ratio was uniform in both tested samples. In addition, the ascorbic acid content in the tested samples reduced gradually during storage, but significantly higher content was recorded in raspberries packaged in perforated clamshell (25,11mg/100g) then in the raspberries packaged in unperforated clamshell (17,01 mg/100g). This can be explained by greater loss of weight of fruits in perforated vessel, causing concentrations of dry matter.

These results indicated that perforated packaging represented a good solution for maintaining the quality of raspberries during their storage at low temperatures. However, in order to obtain better protection of the tested parameters and extend the freshness of the raspberry fruits, it is necessary to further reduce their metabolism which could be achieved by using a clamshell with smaller holes or by application of polymer material with precisely defined permeability to the gases.

Key words: Passive modification, packaging, raspberry, storage.

P2_07

Physicochemical changes of apple fruits during storage in controlled atmosphere

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Abstract

Apples are one of the most important fruit species grown worldwide and have a significant place in the total value of agricultural production in Republic of Serbia. In recent years, an increasing amount of fresh apples has been exported. For a significant position of apples on foreign markets it is necessary to provide quality protection in postharvest period in order to prolong their shelf-life. Postharvest losses of fresh product are very high therefore storage in controlled atmosphere has been increasingly used to prolong shelf-life. Low temperature and modified gaseous composition plays a significant role in extending shelf-life of fruits and thus the concept of a controlled atmosphere with low 02 and high CO2 content in storage environment originated for long-term preservation of fresh apples. The objective of this study was to evaluate the effect of storage in controlled atmosphere on physicochemical changes related to quality parameters of apple variety Idared. The regular air storage is used as a control. Total sugar, starch and acid content, pH value, dry matter content, firmness and vitamin C content were analyzed in fresh and stored apples. The obtained results demonstrated significantly lower changes in analyzed quality parameters of apples stored in controlled atmosphere compared with air stored apples. After 120 days of storage in refrigerated chamber under regular air, apples had significantly lower firmness than apples stored in controlled atmosphere. In addition, total mass loss was significantly higher in apples stored under regular air than in controlled atmosphere. Storage in controlled atmosphere may be recommended as very suitable postharvest technology for extending the shelf-life of apples.

Key words: apple, storage, controlled atmosphere, postharvest technology, physicochemical changes.

P2_08

Effects of Biovermix fertilizer on the phytochemical screening of blackberry Čačanska Bestrna

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Abstract

The chemical composition of blackberries varies among cultivars, growing conditions, ripeness stage, and other factors. The objective of this study was to investigate the influence of fertilizing with biofertilizer from vermicompost (Biovermix) on improvement secondary metabolism of blackberry Čačanska Bestrna. Secondary metabolites are mainly represented by phenolic acids, flavonoids, and tannins, which provide health benefits as dietary antioxidants. The phytochemical profiles were estimated and their contents compared among fertilization types: standard-chemical and standard + Biovermix.. The content of metabolites determined with HPLC RI/PDA-MS in treated (standard+Biovermix) blackberries was compared with the content of the untreated (without Biovermix) fruit. Most of the phenolic compounds, sugars, and organic acids showed a better extraction after aplication of Biovermix. The main phenolic compounds were cyanidin 3-glucoside (60.45–102.59 mg/100 g FW) and neochlorogenic acid (43.63–74.93 mg/100 g FW). Flavanols, were abundant in higher concentrations, while flavonols glycosides of quercetin where present as in lower amount. Data from our study can be used to improve nutritional value of berries throught developing an alternative method of fruit growing agricultural practise.

Key words: blackberry, biofertilizer, phenols, anthocyanins

P2_09

Phenolic compounds and antimicrobial activity in berry and leaf extracts of black currant (*Ribes nigrum* L.) extracts

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Abstract

The objective of this experiment was to identify and quantify phenolic compounds (total phenolics, flavonoids, gallotannins, condensed tannins, total antioxidant activity, flavonols and phenolic acids) and antimicrobial activity in berry and leaf extracts of black currant. The extracts prepared from black currant leaves and berries exhibited different characteristics. Berries had a higher content of the studied parameters compared to leaves. Berry extracts contained 2.90 to 5.90 times more total phenolics, flavonoids, condensed tannins and gallotannins compared to leaf extracts, and total antioxidant capacity was 5.82 times higher in berries than in leaves. Quercetin was the dominant phenolic compound in both berry and leaf extracts, followed by myricetin, whereas the kaempferol levels was very low. On the other hand, the main phenolic acid found in our sample of berry was caffeic acid, while in leaf extract was dominated by ferulic acid. Antimicrobial activity of extract was examined using eight selected indicator strains. Minimum inhibitory concentrations for all extracts were in the range between 55.82 μg/mL and 199.21 μg/mL. Berry extracts showed the highest antimicrobial activity against the bacterium *Escherichia coli* (55.82 μg/mL), while leaf extracts exhibited the highest antimicrobial activity on the yeast *Candida albicans* (80.016 μg/mL). Generally, berry and leaf extracts of black currant are rich source of phenolic compounds and antimicrobial substances, and can be used as natural agents in the pharmaceutical and food industries.

Key words: polyphenols, HPLC analysis, antimicrobial activity

P2_10

Determination the content of chlorophyll a, chlorophyll b and carotenoids in different plant species

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Abstract

Plant pigments (chlorophylls and carotenoids) in terrestrial ecosystems are crucial for sustaining life on the planet and they are also important indicators of plant health and nutrient status. Biosynthesis of pigments in plants are a genetic characteristic - varies depending on species, but environmental conditions also have an essential role. The aim of this study was to determine the content of chlorophyll a, chlorophyll b and carotenoids in different plant species. The fruits of plant species *Aronia melanocarpa* Michx., *Rubus fruticosus* L., *Capsicum annum* L. and *Beta vulgaris ssp.* and the leaves of *Urtica dioica* L. were used for analysis. Samples of the fruits of *Aronia melanocarpa* Michx. were collected at the three locations in the northern part of Montenegro (Bijelo Polje). Samples of other plants used for analysis were purchased on the market in Germany. Pigments content (ethanolic extract) was determined spectrophotometrically. The absorbance was measured at 450 nm for chlorophyll a, 645 nm for chlorophyll b and 662 nm for carotenoids. The analyzes were done in the laboratory of the Department of Plant Food Processing, Agricultural Faculty, University of Applied Science Weihenstephan -Triesdorf, Germany. Results are expressed as total chlorophyll a, chlorophyll b and carotenoids mg/100g DW fruits of *Aronia melanocarpa* Michx., *Rubus fruticosus* L. and *Beta vulgaris ssp* and mg/100g FW fruits of *Capsicum annum* L. and the leaves of *Urtica dioica* L.. Chlorophyll content ranged between 0.6 -13.3 mg/100g DW. Chlorophyll b content ranged between 0.9-35.3 mg/100g DW. Carotenoid content ranged between 0.9 -33.6 mg/100g DW. *Aronia melanocarpa* Michx. showed the highest content of chlorophyll and chlorophyll b, while *Rubus fruticosus* L. showed the highest content of carotenoids. The high level of of chlorophyll and chlorophyll b also showed *Urtica dioica* L., while the

high level of carotenoids also showed *Capsicum annum* L.The lowest level all investigation parameters showed *Beta vulgaris ssp.*

*Key words***:** chlorophyll a, chlorophyll b, carotenoids, plant species.

The work was created as a result of the cooperation of the two Universities in the Erasmus program

P2_11

Evaluations of pear (*Pyrus communis* L.) cultivars on sensitivity to pear leaf blister mite (*Eriophies pyri*)

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Abstract

Pear is an important fruit in continental climates. There are many pests that cause significant crop losses on pears. An important mite pest is a pear leaf blister mite (*Eriophies pyri* Pgst.,). This mite attacks predominantly leaves causing premature defoliation that has several negative impacts on pear in current and following growing season. Two trees of each of 61 known cultivars and 12 unknow cultivars planted in Botanical garden of Institute for genetic resources of the University of Banja Luka were evaluated in June 2018 on sensitivity to pear leaf blister mite. Evaluation included scoring sensitivity of the tree and the leaves. Sensitivity of the tree was scored by determinig percentage of leaves with symptoms on whole tree. Additionally, each canopy was devided on three parts uper, midle and lower, where percentage of infested area of 10 infested leaves of each part was determined. On this way sensitivity of leaves was scored. 80 tries did not have any symptoms caused by pear leaf blister mite and could be suggested for production without the management of pear leaf blister mite. These cultivars can be recomende to further studies on sensitivity to other pests and desease, with an aim to score their potential for organic production. Other cultivars revealed different susceptibility and might require management meaures of the pest.

Key words: pear leaf blister mite, organic pear production, autochthonous pear cultivars

Acknowledgment: The research is a part of the Program on Genetic Resources of the Republic of Srpska

P2_12

The presence of *Xanthomonas arboricola* pv. *pruni* in orchards and nurseries of the Republic of Srpska

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Abstract

Xanthomonas arboricola pv. *pruni* (Xap) is regulated as quarantine pathogen in the European Union and the European and Mediterranean Plant Protection Organization (EPPO, A2 list). This bacterium cause disease of stone fruits and almond worldwide and produce severe yield losses. The aim of this work was to determine presence and distribution of this pathogen on territory of the Republic of Srpska**.** Monitoring was conducted during 2017 and 2018 in commercial orchards and registered nurseries. Leaves, twigs and branches of hosts (peach, nectarine, plum, apricot, cherry and almond) were inspected and samples were taken for laboratory analysis. Detection and identification were done according to EPPO diagnostic protocols PM 7/64(1) and PM 7/100 (1), with slight modifications. As a reference material it was used freeze dried bacteria CFBP 2535 (producer CIRM, France). In 2017, out of 124 analyzed samples, 2 samples confirmed as positive and both originated from plum orchards. In 2018, out of 145 analyzed samples, no sample confirmed as positive. Further studies on *Xanthomonas arboricola* pvs. are planned to be conducted in 2019.

Key words: quarantine bacterium, stone fruits, orchards, nurseries

Acknowledgement: This project was supported by Ministry of Agriculture, waters and forestry and Faculty of Agriculture, through Special surveillance program for the presence of quarantine pest organisms in stone fruits on theritory of the Republic of Srpska in 2017 (Grant No. 12.03.3-330-2281/17) and in 2018 (Grant No. 12.03.3-330-2380/18).

P2_13

The influence of the sprayer control on the increase in the productivity of the machine-tractor aggregate in the protection of orchards

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Abstract

Intensive fruit production requires intensive agro-technical measures to be taken in strictly defined time frames. One of these measures is the chemical plant protection that is mostly used in the production of apples, i.e. the scope of the protection machines use is high. Therefore, the proper formation of the tractor-machine aggregate should meet the requirements of agro-technology in terms of work quality, ensuring rational use of machines, i.e. high productivity and lower labor costs. For the chemical protection of perennial plantations, a research on the surface area of 150 *ha* was carried out, and a method of spraying was applied. In this method, machines known as orchard sprayer are used, in which, in the presence of the produced air current, liquid disintegration is also carried out at a drop size of 50 to 150 μm. The secondary task of these machines is to distribute chemical solutions to the target surface, i.e. on both sides of plant leaves. The aim of the research is to improve the precision of work within the control of the device, where the emphasis on the nozzle capacity is primarily augmented, and therefore increases the productivity of the device. The paper presents the results of the drawn sprayer testing with the volume of 1.000 l in the aggregate with 45 kW traction-propulsion machines. The technical and technological as well as exploitation parameters of the aggregates are presented in this paper. The results obtained on the basis of a 10-hour working time prove that the exploitation of the controlled orchard sprayer ensures greater productivity by 2.24 ha on a plot distanced 50 m from the location of the tank refill, ie, 2.20 ha on a plot distanced 2000 m from the location of the tank refill. By analyzing the total energy inputs of orchard protection, different application models point to a smaller energy input when using controlled devices on a 50 m range for 7.58%. Energy inputs on a longer distance plot are by 24.68% lower in favor of the treatment of controlled sprayer.

Key words: apple orchards, applications, sprayer, productivity

P2_14

Comparison of aeroponics and conventional production system of virus-free potato mini-tubers in Serbia

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Abstract

Virus-free mini tubers are starting materials for the production of seed potatoes without disease. Conventionally, mini-tubers are produced from *in vitro* plants in various solid media. The low rate of reproduction as well as the disparity in size of mini tubers are considered the main limitations of this production system. In recent years, the aeroponics system for production of mini tubers was developed. The aeroponics system refers to the process of growing plants in the air or in the fog environment without the use of soil or any other substrate. This system allows the production of 20-50 mini tubers per plant with several harvest dates. The size of the mini tubers is more uniform in this system due to successive harvesting. The aim of this study is to assess the application of aeroponics and conventional production system of virus-free potato mini tubers in Serbia in three varieties of potatoes. The experiment was conducted at the Center for Potato in Guča and the RZ Plant during 2018. The experiment included three varieties of potatoes: Cleopatra, Kennebec and Agria. All three varieties were cultivated in two systems: aeroponic and conventional rooting in the substrate. In the aeroponic system, with all three varieties, an average of 17.87 mini tubers was obtained, which is 5.39 times more than in the substrate. This ratio was the highest in the variety Kenebec (6.46), followed by variety Agria (5.71) and the lowest in variety Cleopatra (4.01). Varieties with longer vegetation in the aeroponics give a higher number of mini tubers per plant. The successive harvest of the mini tubers in the aeroponic system allows them to reach the desired mass size over 8 g. The average weight of the mini tubers in the substrate was higher by 3.49 g compared to the aeroponic system.

Key words: aeroponics, potatoes, *in vitro*, virus-free mini tubers

P2_15

Cultivation period influence of different *Lactuca sativa* L. and *Valeriana locusta* L. cultivars on colour parameters and chlorophyll content

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Abstract

Lettuce (*Lactuca sativa* L.) and lamb's lettuce (*Valeriana locusta* L.) are economically important salads worldwide, which have become in recent years available to consumers all year round. In Slovenia they are popular salad vegetables, which are cultivated in every garden and increasingly in market production. The objective of this research was to compare the cultivation period of different local cultivars of lettuce and lamb's lettuce on the colour parameters and relative content of chlorophyll. The experiments were performed in the experimental fields of Agricultural Institute of Slovenia in 2017. In total 16 varieties of lettuce and 6 varieties of lamb's lettuce were tested. Three cultivation periods were compared, i.e. for the lettuce: spring term in greenhouse and outdoors and autumn term in greenhouse, and for lamb's lettuce: spring term in greenhouse and outdoors and autumn term outdoors. The colour of leaves were evaluated at each cultivation period at maturity stage before harvesting. Chroma meter was used for measurements of colour parameters *L**, *a** and *b**, and SPAD-502Plus chlorophyll meter for the relative chlorophyll content. Colour parameters CIELab and SPAD index, i.e. the relative content of chlorophyll, differed significantly among the lettuce and lamb's lettuce cultivars and between different cultivation periods. The lettuce and lamb's lettuce from spring cultivation in greenhouse had significantly higher values of the colour parameter *C**. The relative content of chlorophyll was highly correlated with colour parameters. The relative content of chlorophyll in lettuce leaves was significantly higher for the cultivars 'Posavka','Dalmatinska ledenka','Šempetrka' and 'selection 15/1/4 KIS15'; and in the leaves of lamb's lettuce for the cultivars 'Verte de Cambrai' and 'Gala'. The same cultivars of lettuce or lamb's lettuce grown outdoors contained higher relative chlorophyll content in the leaves, as those produced in greenhouse. Cultivars that have more chlorophyll are also visually darker green in colour.

Key words: chlorophyll, cultivation period, colour parameters, lettuce, lamb's lettuce

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P2_16

Effect of nitrogen fertilizer rates on physico-chemical characteristics of onion bulbs (*Allium cepa* L. var. *cepa*)

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Abstract

Onion (*Allium cepa* L. var. *cepa*) is one of the most important vegetable bulb crops cultivated for more than 4000 years. Slovenia has a long tradition in growing onions, as is shown by many autochthonous varieties and populations. Field experiment with different nitrogen (N) fertilization rates was carried out at experimental fields of the Agricultural Institute of Slovenia in 2017. The aim of the study was to examine the effect of three N fertilization rates on the physico-chemical characteristics of bulbs of five onion varieties. Three autochthonous ('Ptujska rdeča', 'Tera', 'Belokranjka') and two hybrid onion varieties ('Talon', 'Tamara') were tested. During the growth N was applied in the form of ammonium nitrate: 0 kg N/ha (zero fertilization with N), 3-times 54 kg N/ha (in total 162 kg N/ha) and 3-times108 kg N/ha (in total 324 kg N/ha). Physical parameters were measured on individual bulbs from each of 15 treatments. The number of fleshy scale leaves, bulbs weight, height, width and firmness were determined. In addition, the total soluble solids and total sugars were analysed. Both factors, i.e. variety and fertilization with N during onion growth, significantly affected the weight, height and width of the bulbs. In hybrid varieties, the number of fleshy scale leaves was significantly higher, and their number decreased with higher N rate. In all varieties, the firmness of bulbs decreased significantly when high N rates were applied. Hybrid varieties had lower total soluble solids compare to autochthonous varieties. Significant correlations were found between following characteristics: dry matter – number of fleshy scale leaves, bulb weight – width, bulb weight – number of fleshy scale leaves and bulb weight – dry matter.

Key words: firmness, nitrogen fertilization, physical parameters, onion, total sugars

P2_17

The effect of bioregulator application on seedlings on early tomato yield (*Lycopersicon esculentum* Mill.)

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Abstract

Complex organic bioregulators, which contain humic acids, amino acids, vitamins and mineral substances, positively affect the growth and development of plants, increase yield and protect the plant from the effects of physiological stress that can be caused by a number of factors. The aim of this study was to examine the impact of the application of two different bioregulators (Slavol and Aminoflex) in the seedling production period on the earliness and productivity of two genotypes of tomatoes (Novosadski jabučar and Bostina F1) which have an indeterminate type of growth in open field production. The research was conducted in 2017, and the experiment was set up by a random block system, with three repetitions. The research found that the treatment with bioregulators had a significant impact on the parameters of early yield (first-stage yield), but also the genotype factor played an important role in the final results. In this case, in both tested genotypes, better results were achieved with use of the Aminoflex bioregulator. On average, Novosadski jabučar had more formed but smaller fruits (83.63 g) in the first floral branch, compared to Bostina F1 (165.44 g). The biggest fruits were on Boston F1 treated with Aminoflex bioregulator (167.67 g). This resulted in achieving a higher early yield, which was under a very significant influence of the applied treatment and genotype. The average early yield of the Novosadski jabučar variety was 2.44 kg, while Bostina F1 was 3.90 kg. The results show that the application of bioregulators, both in the production period of the seedlings, and in later growth and development, has justification. In doing so, it is necessary to take into account the active substances and the stage of growth and development of plants, in order to get their full effect in practice.

Key words: bioregulators, tomato, mass per fruit, early yield

P2_18

Effect of sowing time on the yield and quality of the sweet maize kernels

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Abstract

The aim of this study was to examine the effect of sowing time on the yield and quality of the sweet maize kernel, intended for industrial uses (freezing). The field experiment was set on the eutric cambisol soil in Mačva. The hybrid Enterprise F_1 (Snowy River Seeds) was cultivated. It is the best known and currently the most prevalent hybrid of sweet maize in Serbia. Sowing was conducted using a pneumatic sowing machine, and the obtained crop density was 62,000 plants per hectare. The sweet maize was sown in 6 sowing periods: 1) April 27th, 2) June 16th, 3) June 22nd, 4) June 28th, 5) July 3rd, and 6) July 11th. Standard agro-technical measures were applied. The following parameters were analyzed during the technological maturity of sweet maize: kernel quality in the processing line, dry matter content (refractometer), ear yield without husk, kernel yield and shelling percentage. The kernel quality in the processing line was the best in the first and second sowing period, when the realized shelling percentage had the values of 79.4 and 82.4%. The lowest shelling percentage, amounting to 67.5%, was recorded in the last sowing period. Dry matter content had an average value of 27.4% for all sowing dates. The sweet maize from later sowing periods had a higher dry matter content. Ear yield without husk was the highest in the first period (14,780 kg ha^{-1}), and the lowest in the last sowing period (9,876 kg ha^{-1}). The pure kernel yield had a similar tendency. It was the highest on the first sowing date and the lowest in the latest-sown crops (4,587 and 2,785 kg ha^{-1}, respectively). Having all this in mind, it can be concluded that the sweet maize sown in regular sowing periods (spring) provides higher yield and better kernel quality, so this type of cultivation is recommended in the production. However, later sowing time is also economically justifiable, since prior to the sowing of maize the production of main crops is conducted. In the industrial production, which is intended for industrial processing (freezing), these main crops are most commonly peas or green beans.

Key words: sweet maize, sowing time, kernels, yield.

P2_19

Occurrence of Alternaria leaf blight [(*Alternaria dauci* (Kühn) Groves & Skolko)] of Carrot in Bosnia and Herzegovina

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Abstract

Carrot is one of the most popular and profitable vegetables grown in Bosnia and Herzegovina. Diagnosis and identification of pathogens is one of major factor for successful disease control. Alternaria leaf blight (ALB), caused by *Alternaria dauci* (Kühn) Groves & Skolko, is an omnipresent and destructive foliar disease of carrots (*Daucus carota var. sativus* Hoff.). Infection by *Alternaria dauci* is favored by moderate to warm temperatures and prolonged leaf wetness. Typically, as the temperature increases the duration of leaf wetness required for infection to occur decreases. Infection can occur in 8 to 12 hours at temperatures of 16-25ºC. The fungus sporulates readily on dead necrotic tissue and the spores germinate readily in water droplets and dew. Isolates of *Alternaria dauci* causing Alternaria leaf blight (ALB) were collected from commercial carrot (*Daucus carota var. sativus*) fields in Bosnia and Herzegovina during 2014–2016. From infected fields diseased samples were collected and fungus *Alternaria dauci* was isolated in lab of plant pathology by using lab PDA media. After this, culture was purified and multiplied for the preparation of inoculum. Pathogenicity test of diseased plants was performed to check whether relevant pathogen is present or not. By inoculation in healthy crop disease was established. Diseases were determined according visual symptoms and microscopic features of fruiting bodies and spores. Foliar symptoms of Alternaria leaf blight appear 8 to 10 days after infection as small, greenish-brown, water-soaked lesions. The lesions enlarge and the infected tissue becomes dark brown to black and may be surrounded by a chlorotic halo. Under favorable conditions, lesions coalesce and may cause the entire leaf to collapse. Older leaves are infected first. Lesions are more common on the margins of the leaflets, but may occur on any part of the leaf blade or petiole. Lesions on the petioles are similar to lesions on the leaf blades, except they often become elongated. Numerous or large petiole lesions can kill the entire leaf, and heavy infestations may cause complete defoliation. Visible differences in disease severity, which ranged from 9.5 to 35.1% of the leaf area affected, were apparent 15 days after inoculation. Significant differences were noted among carrot varieties in response to ALB.

***Key words**:* carrot disease, Alternaria leaf blight (ALB), symptoms, pathogenicity.

P2_20

Properties of grapevine hybrid '14362' obtained from crossing combination Red Traminer × Early Muscat

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Abstract

The most important method for creating new grapevine varieties is hybridization. Work on the creation of new grape varieties by hybridization has been in progress for a long time on the Faculty of Agriculture University in Belgrade. Until now, it was created 31 grape varieties (21 for fresh consumption and 10 for wine production). Also, from the different crossing combinations has been obtained a large number of the hybrids which are investigating in relation to the purpose of selection. This paper presents the results obtained from two years research (2017-2018) of important properties of perspective hybrid intended for table and wine production. The properties of studied hybrid (grape yield, characteristics of bunch and berry and grape quality) were compared to the parental partners Red Traminer and Early Muscat. Data analysis was performed using the statistical software package Statistica, Version 8 (StatSoft, Inc., Tulsa, Oklahoma, USA). The results of the study showed that the hybrid 14362 had a higher grape yield (2.25 kg per vine) than the Red Traminer (1.80 kg per vine), while the Early Muscat had a grape yield of 3.44 kg per vine. The hybrid 14362 had a higher bunch weight (258.0 g) than the Red Traminer (118.6 g), and a smaller bunch weight compared to the Early Muscat (302.0 g). Significant differences between grapevine hybrid 14362 and parents were determined for berry characteristics. Hybrid 14362 and Red Traminer had approximately the same sugar content (22.6; 22.9%) and total acid content in the must (7.1; 7.2 g/l). Sugar and total acid content was lower in Early Muscat (18.1%; 6.9 g/l). The investigated hybrid 14362 due to its specificity and diversity in relation to parental partners should be further monitored and studied in order to obtain a more detailed analysis of the most important traits.

Key words: grapevine, hybridization, yield, grape quality

P2_21

Variation of clusters and berry structural indicators of Cabernet sauvignon and Sauvignon blanc cv. (*Vitis vinifera* L.) under the influence of defoliation and harvest time

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Abstract

Paper include two-year research in vineyard of King Peter I Karadjordjevic-Royal Winery at Oplenac-Topola municipality, on Cabernet sauvignon and Sauvignon blanc cv. Vineyard is planted with spacing of 2.7 m between rows and 0.9 m in row. This vineyard is located at an altitude of 250 m with GPS coordinates N 44º 14' 4" and E 20º 41' 15". Guyot pruning was used. All experimental vines was uniformly pruned where was left spur with two buds and one arc with eight buds. Leaf removing was done at *veraison* and included control (no defoliation) and treatments with four and eight removed leaves. Harves was done it two terms, at full grape maturity and 15 days after. In paper it is presents values by defoliation treatments related to participation of berry skin, pulp and seeds in berry. Cabernet sauvignon had bigger percent of berry skin compared to Sauvignon blanc in both research years. Also, during the two research years, higher participation was recorded in a later harvest, while the lower value of this parameter was recorded in full maturity. With the largest percent of berry skin it is characterized treatment with four removed leaves (15.18%). Sauvignon blanc had less seeds participation in berry in all treatments. With the later harvest, pulp participation was less for both varieties. By application of trophactory ANOVA was determined influence of main effects on berry skin participation: varieties, harvest times and interactions of variety*harvest time. Influence of main factors on seed participation also was determined: varieties and harvest times and influence of interaction of variety*treatment, while influence of interaction variety*harvest time was also influenced participation of pulp content.

Key words: Cabernet sauvignon, Sauvignon blanc, structural indicators, defoliation, harvest time

P2_22

Potential winter buds fertility of the vine variety Rebo (*Vitis vinifera* L.)

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Abstract

The potential buds fertility along the fruit canes of the Rebo grape variety grown on Goblet and double Guyot training system were studied. It was determined that in both training systems there were no dead primary buds in the winter buds, nor fruit buds with 3 inflorescences or inflorescences with a length higher than 750 μm. The average value of the potential coefficients along the whole cane at the Goblet training system is relatively lower 0.97% compared to double Guyot 1.12%. In order to obtain higher yield applying Goblet training system, a mixed pruning should be carried out, leaving canes or spurs. While, applying the double Guyot training system, higher yield will be obtained even from the spurs, and the fruit canes should not be longer than 13 winter buds. In both variants, the yield will be mainly formed by shoots with one inflorescence and the length of 350 μm to 550 μm and 550 μm to 750 μm.

Key words: Rebo, buds fertility, inflorescence

P2_23

Improving the fruit quality of Crimson seedless (*Vitis vinifera* L.) using vine trunk girdling as an agrotechnical tool

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Abstract

Crimson Seedless is grape variety developed by David Ramming and Ron Tarailo in USDA Fruit genetics and Breeding Research Unit, Fresno, California. It is a late-season red seedless table grape variety it ripens in October and can be held on the vine through late November if the weather permits. This variety primary production problem is the small berry size and the sufficient berry color. To increase the berry size and color use of giberellic acid and girdling can be applied as a regular production practice. In this study the influence of the applied GA3 and vine trunk girdling practice on the berry size color and sensory characteristics were examined. Two variants were established: the first one with applied giberellic acid (GA3) and the second one with GA3 and girdling the vine trunk. According to the obtained results the berry from the second variant (GA3 + trunk girdling) had better coloration, slightly higher sugar content and berry weight compared with the berries treated only with GA3.

Key words: Crimson seedless, GA3, trunk girdling

P2_24

Grape quality of the variety Cabernet Sauvignon (*Vitis vinifera* L.) grown in the Banja Luka region

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Abstract

Grape variety Cabernet Sauvignon (*V. vinifera* L.) is one of the leading, globally recognized grape varieties for the production of red wines. Considering the fact that the grape production of this variety is common in the northwest region of Bosnia and Herzegovina, aim of this research was to evaluate the quality of grapes produced at two locations in the Banja Luka region: Banja Luka and Prnjavor. Representative samples of grapes were analyzed for the bunch and berry mechanical properties, basic characteristics of the must, total anthocyanin contents of the skin and total phenolic contents of the skin and seeds. Analysis of the next characteristics of the grape produced at the Prnjavor location showed superior results in comparison to the same characteristics of the grape produced at the Banja Luka location. Higher relative share of the peduncle weight within the total weight of the bunch (4.47%: 2.81%), higher total anthocyanin contents of the berry skin (512.95 mg/l: 415.84 mg/l) and higher total phenolic contents of the berry skin (Catechin: 1567.01 mg/l: 1271.10 mg/l). Grapes produced at the Banja Luka location had higher relative share of the seeds within the berry (5.87%: 4.77%), as well as higher total phenolic contents within the seeds (Catechin: 407.25 mg/l: 378.10 mg/l). Other characteristics of the grapes that were analyzed did not show any significant difference.

Key words: Cabernet Sauvignon, region, grape quality

P2_25

The quality of grape and wine of Merlot and Blatina varieties in the agroecological conditions of the Trebinje vineyard

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Abstract

The aim of this paper is to present the quality of grape and wine of Merlot and Blatina varieties in the agro ecological conditions of the Trebinje vineyard, during the vegetation in 2016 and 2017. The vineyards were established in 2004 (Merlot) and in 2013 (Blatina), at an altitude of 269 m, with the planting distance of 2.8 x 1 m for Blatina and 2.8 x 0.9 m for Merlot. The Merlot and Blatina grape varieties were grafted on *Berlandieri* × *Riparia* Kober 5BB rootstock. The research included analysis of the sugar, total acid content and pH as parameters of grape quality. The sugar content in must was 24.0% (2016) and 24.4% (2017) for Merlot and 22.0% (2016) and 21.8% (2017) for Blatina variety. The total acid content in grape juice was 6.0g/l for Blatina (2016) and 5.75g/l for Merlot (2016). For Blatina variety total acid content was 6.8g/l (2017) and 7.4g/l (2017) for Merlot variety. The pH value in Merlot must was 3.18 (2017) and 3.32 (2016), and in Blatina must pH was 3.25 (2016) and 3.21 (2017). The quality parameter of Blatina wine for 2016 were: alcohol content 12.8 %v/v, total acid 4.58 g/l, total ash 2.81g/l and total phenols 1.87 g/l eqv GAE; the quality parameter of Blatina wine for 2017 were: alcohol content 12.7 %v/v, total acid 5.23 g/l, total ash 2.30 g/l and total phenols 1.91 g/l eqv GAE. The quality parameter of Merlot wine for 2016 were: alcohol content 13.65 %v/v, total acid 4.56 g/l, total ash 2.40 g/l and total phenols 1.25 g/l eqv GAE; the quality parameter of Merlot wine for 2017 were: alcohol content 14.2 %v/v, total acid 4.72 g/l, total ash 1.92 g/l and total phenols 1.16 g/l eqv GAE. The quality of the grapes, grown in the conditions of Trebinje vineyard is suitable for the production of quality red wines.

Key words: Merlot, Blatina, grape variety, wine quality

P2_26

Agro-biological characteristics of clone variety of cabernet sauvignon 169

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Abstract

Cabernet Sauvignon is a very old French variety, with a great economic significance in Serbia intended for the production of premium red wines. The Cabernet Sauvignon population contains many variations, qualities and clones. The basic goals of modern clonal selection are cloning free from the most economically important viruses, increased resistance to burners, ash and gray rot and with better grapes of technological properties compared to the mother plant. The agro-biological properties of the clones of Cabernet Sauvignon largely depend on the agro-ecological conditions of the site, the applied ampleological measures, rootstock, the breeding form and the method of cutting. The biological and economic-technological characteristics of the variety are significantly influenced by agroecological conditions and applied ampleological measures. The aim of this research was to test fertility and quality of grapes of variety Cabernet Sauvignon standard and Cabernet Sauvignon 169 in the agroecological conditions of the Nis region. Research are conducted at the Vineyard and Viticulture Center in Nis. The paper presents the results of testing the most important economic and technological characteristics, as a basis for their valorization and recommendation for further expansion. Based on the analysis of the results of the yield test and the quality of clones of the Cabernet Sauvignon clone in the conditions of the Nis region, it can be concluded that in the investigated period (2009-2010) favorable conditions for the normal development of the vineyard. In the biennium of the trial the high yield of grapes is high, which is on average by hectare for Clone 169 was (12.524kg), while in the varieties standard in average yield of grapes (6.248kg). In the conditions of the Nish wine-growing region, the examined Cabernet Sauvignon clone 169 showed significant differences in the yield and quality of the grapes compared to the Cabernet Sauvignon.

Key words: variety, clone, characteristics

P2_27

The total phenolic content of grape brandy and wine distillate enriched with Chaga mushroom *(Inonotus obliquus)*

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Abstract

Used for centuries as a folk medicine, *Inonotus obliquus* or Chaga mushroom is widely known for its health-promoting properties. These effects are caused by its bioactive substances, like complex polysaccharides, vitamins, minerals, terpens, sterols, etc. Among these compounds, polyphenols take an important place, because of their antioxidative, antimicrobial and other positive properties. Since ethanol is more appropriate extracting agent compared to hot water, alcoholic beverages may represent an interesting medium for supplementation with Chaga's compounds. The goal of this research was to determine how the addition of Chaga in different concentrations (1%, 2,5% and 4%) extracted during 7, 14 and 21 days influenced on total phenolic content (TPC) of grape brandy and wine distillate (total of 18 samples). TPC was determined according to Folin-Ciocalteu method and the results were expressed as mg of gallic acid equivalents per L (mg/L GAE). TPC values for grape brandy were in the range of 87,73 – 301,41 mg/L GAE, while TPC for wine distillate ranged from 78,57 to 318,02 mg/L GAE. The best results were obtained with same extraction parameters – 4% of Chaga extracted during 21 days, for both alcoholic mediums. An increase of Chaga concentration and extraction duration is directly proportional with TPC of the samples. Further studies could determine whether higher concentrations may result in higher TPC or what extraction duration would be limitative. However, this analysis showed that above mentioned parameters are suitable for enrichment of alcoholic beverages, regarding phenolic content of samples.

Key words: Inonotus obliquus, Chaga, total phenolic content, grape brandy, wine distillate

P2_28

OCCURRENCE, DISTRIBUTION AND HARMFULNESS OF *Xylella fastidiosa* (Wells *et al.*) - CAUSED OF PIERCE'S DISEASE OF GRAPEVINE IN EUROPE

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Abstract

Phytopathogenic bacteria *Xylella fastidiosa* – caused of Pierce's Disease of grapevine, is currently one of the largest phytosanitary threats to agricultural production in Europe, where the presence of the pathogen was first established in Italy in 2013. After that, presence of this bacteria in 2015 was also established in Corsica, as well as in southern France (Jeger *et al.*, 2015). The same year, the presence of *X. fastidiosa* was also found in the territory of Switzerland (EPPO, 2015), where successful eradication was carried out (EPPO, 2018), which is also, upon the occurance of pathogen and successfully carried out in Germany in 2016 (EPPO, 2016). In Spain, this bacteria was first established in 2016, after which it expanded into other parts of the country in 2017 (EPPO, 2016; Olmo *et al*., 2017), and in 2018 its presence was also established in Portugal (EPPO, 2019). Currently, this dangerous quarantine phytopathogenic bacteria is classified on the EU I/A2 list, and on the EPPO A2 list. So far, there are as many as 563 different plant species in the world that are hosts of *X. fastidiosa* (EFSA, 2018). From that number, in Europe the largest number of positive host plants has been found in France (45), Italy (31) and Spain (19). Therefore, six different subspecies of this bacteria have been described in the world, four of which were identified in Europe: *X. fastidiosa* ssp. *fastidiosa, X. fastidiosa* ssp. *multiplex, X. fastidiosa* ssp. *pauca* and *X. fastidiosa* ssp. *sandyi* (EFSA, 2017; Jeger *et al.*, 2018; EPPO, 2019). Infected plant material of the host plants have an important role in the transmission of this bacteria, while the spreading is contributed by insect vectors - leafhoppers, among which the greatest importance in Europe have species *Philaenus spumarius*, as well as species *Neophilaenus campestris* and *Euscelis lineolatus* (Saponari *et al*., 2014; Elbeaino *et al*., 2014). *Xylella fastidiosa* caused extremely high economic damage in Europe - about 1.2 billion euros (Clover *et* Plummer, 2018), mostly due to the decline of centuries old olive trees in southern Italy. In addition to direct damage, major economic losses result both from the costs of eradication, as well as

from the costs associated with obstructing the international trade of risky host plants of this bacteria.

Key words: *Xylella fastidiosa*, distribution, host plants, economic importance.

P2_29

Ornamental vine *Parthenocissus quinquefolia* (L.) Planch. 1887 as an invasive species in Serbia

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Abstract

Parthenocissus quinquefolia is a perennial herbaceous vine, originally from North America. It was introduced into Europe for ornamental purposes, as one of the most attractive vines. This introduction pathway has facilitated its subsequent spread across the continent, leading it to become naturalized and widespread across Europe. Nowadays it is considered to be one of 150 most common alien plant species on the continent. Bearing in mind the importance of riparian areas as plant invasion corridors, the aim of our research was to analyze the degree of riparian invasion by *Parthenocissus quinquefolia* in Serbia. Field research was conducted at 250 field sites, along the course of 39 rivers and 6 canal sections of the Danube-Tisa-Danube hydrosystem. Vegetation data was recorded following the 7-degree van der Maarel scale on 100 m long transects in the riparian zone. Relevant hydromorhological parameters and anthropogenic disturbances were recorded following the standard River Habitat Survey field protocol, and the impact of these parameters on the studied subset of invasive species was evaluated using principal component analysis (PCA) in Canoco 5.0 softvare. *Parthenocissus quinquefolia* was recorded along the course of two canal sections and 23% of studied rivers, belonging to five different catchment areas. Its presence was most pronounced within the catchment areas of the Timok and Velika Morava rivers, i.e. within the regions of eastern and central Serbia. Analysis of the field data shows that this species if most often found along the course of low-lying rivers (up to 200 m altitude). Furthermore, multivariate analysis has shown that its presence is positively correlated with the unmodified profile of the studied rivers and therefore natural flood regimes. The analysis on the impact of recent riparian management

activities and the presence of this IAS has shown a positive correlation between this species' presence and reforestation and fishing activities.

Key words: Virginia creeper, alien, riparian, river, Serbia

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P2_30

Attitudes and perceptions of the Knin-based secondary school pupils concerning the growing and use of indoor plants

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Abstract

Based on their habitus, indoor plants are divided into six groups: grasses and grass resembling plants, vertical growing plants, climbers and creepers, rosette-shaped and ball-shaped plants. Ecological and growth requirements of indoor plants have been addressed in the general part of this paper and general knowledge is provided about their different groups. A survey research was conducted in April and May 2018 on a sample of 60 respondents (secondary school pupils) from the area of the city of Knin, its outskirts and the neighbouring towns. The specific objective of the research was to analyse attitudes and perceptions of the Knin-based secondary school pupils in terms of supply, growing and use of indoor plants. According to the findings of the survey, it was concluded that the respondents most frequently purchased indoor plants in the Knin-based garden centres and supermarkets. The largest number of the respondents spen up to HRK100 at annual level for the purchase and care for indoor plants. A smaller number of the respondents are frequently involved in growing of potted aromatic herbs indoors. The decorative feature of indoor plants that they pointed out as the most important for them is the flower. A small number of the respondents are also involved in growing of indoor plants. The respondents normally place the largest number of indoor plants in the living room. The secondary school pupils' parents and relatives played the most important role in terms of arousing their interest in growing and care for indoor plants.

Key words: indoor plants, general knowledge, pupils, attitudes and perceptions, Knin.

P2_31

Decorative plants on the example of a flat green roof (case study Novi Sad)

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Abstract

With increased urbanization, securing biodiversity is becoming one of the most important conditions for local communities. Green roofs can provide shelter for different species and re-establish an ecological chain interrupted by city infrastructure. The structure of green roofs is one of the most important factors in the richness of biodiversity. Greened roofs are provided with a shallow substratum for habitats of a smaller number of species suitable for dry habitats, while deeper substrates have a diverse plant cover and therefore represent the habitat of many individuals (Brennisen, 2003). Analysis of the examined area, the strength of the building, climatic conditions and the selection of seedlings, the eastern part of the flat roof of the faculty of Agriculture, case study Novi Sad (Serbia), would be an intensive type. This research shows decorative species suitable for the greening of the roof in the given conditions. The selection of planting material would give a significant importance to the aesthetic aspect, climate regulation (green roof as a thermal insulator), reduction of CO2, reduction of the effect of thermal islands, increased surface of natural habitat, clean air and other ecological advantages. The bioecological base of decorative plants and graphic attachments will be shown, which will help to see the transformation of the space more clearly. Previous research has determined woody, bushy species and herbaceous plants that are suitable for this area. In relation to field exposure, the quality of plant material and the strength of the structure of the object, the following species are selected that are decorative and useful for planting in the shade: *Hosta Tratt, Houttuynia cordata, Sempervivum tectorum L., Hedera helix, Aucuba japonica, Ilex aquifolium.* The idea of revitalization a flat roof (of faculty of Agriculture) will contribute to popularization and further research on green roofs in urban areas.

Key words: green roofs, decorative plants, urban conditions, environment

P2_32

Germination of seeds of calendula (*Calendula officinalis* L.) in ecological conditions of Polimlje, Montenegro

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Abstract

Biologically active components of calendula flower (*Calendula officinalis* L.) are used in scientific and folk medicine and for making cosmetic preparations. By cultivating calendula, pure and high-quality herbal raw materials are produced. This can be achieved by the right selection of varieties, land, using optimal agro-technical measures. The aim of this paper is to examine seed germination of variety "Domaći oranž", obtained from the Institute "Dr. Josif Pančić", Belgrade. The field experiment was carried out in 2017 at Crnča, in municipality of Bijelo Polje. Sowing of calendula, with 2 seeds in containers, was done on May 5, 2017. The seeds were sown in the same day, at a distance of 10 cm, when (daily mean) temperature was 12.4 °C. Transfers of plants from the container to garden beds were performed on July 07, 2017 at a distance of 10 cm, when plants had 4-6 leaves. Analyses of flowers heads dswere measured at the Laboratory of Biotechnical Faculty-Podgorica, Center for Continental Fruit and Medicinal Herbs, Bijelo Polje. The seeds of calendula began to emerge 5 days after sowing. After 12 days, the germination of seeds in containers amounted to 83.3%. The time from sowing to flowering was 59 days in garden beds, and 62 days for transplanted plants from container to field at the locality of Crnča. From flowering until the harvest of flowers, was 16 days in plants that were directly sown in the garden beds, and 19 days in plants which were shifted from continers to the garden beds.
The research has established that there are good conditions for calendula plantation in the mountainous areas of the municipality of Bijelo Polje. Direct sowing of marigold in the field achieving higher yields compared to production from transplants. The production of calendula through transplants is only justified when used for ornamental purposes.

Key words: calendula, germination, planting, garden beds

P2_33

Germination of floral species depending on the applied biostimulant

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Abstract

The demands and needs for the production of floral species are increasing because through various activity the focus is placed on the arrangement of parks and public areas. That's why the main task of each producer of planting material should be the production of high quality seedlings. The aim of this study was to examine the impact of biostimulant Radifarm on the germination and germination energy of the seeds two floral species. As a material the *Bellis perennis* L. (manufacturer PanAmerican Seeds) and *Viola* x *wittrocikana* Gams. (manufacturer Benary Quality Seeds) seeds were used. By applying biostimulant in the germination phase, it is possible to create better conditions for the growth and development of the germ and germination. The seed that has better germination energy also has better vigor, so it is more resistant to stressful conditions during germination. The experiment was set up at the laboratory on Faculty of Agriculture, University of Banja Luka and consisted of control (K) and treatment with biostimulant Radifarm in two concentrations (T1 0.25% and T2 0.5%). After 7 days germination energy and after 14 days germination of the seeds were tested. The highest average values of the germination energy of the *Bellis* were recorded in the treatment plants (89.5% T2, 89% T1), while the lowest values were recorded in control plants (85%). The highest average germination values were also recorded in tretament (93.5% T2, 92% T1), and the lowest in the control group (88.5%). The best germination energy of *Viola* seeds were in tretament group (T2 87.5%, T1 83%), while control group had the lowest germination energy of 74%. The highest average germination values of *Viola* seeds were recorded in T2 91%, while in T1 germination was 89%. The lowest average germination value was 81% in the control group. It can be concluded that biostimulant treatment is recommended in the seed germination phase, but in order to achieve the effects it would be even more necessary to prevent the seeds by some of the fungicides.

Key words: biostimulant, germination, germination energy, floral species.

P2_34

AGRORES

Effect of different BAP concentrations on multiplication of *Lavandula angustifolia* Mill. explants

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Abstract

Nodal segments of micropropagated lavender (*Lavandula angustifolia* Mill.) plants were used to evaluate effect of diffrent concentrations of cytokinin 6-benzylaminopurine (BAP) on shoot proliferation and multiplication. Murashige and Skoog (MS) (1962) plant medium was used in the experiment, supplemented with 30 g/l succrose, 6.4 g/l agar, 0.1 mg/l indole-3-butyric acid (IBA) and 0.5, 1.0 and 1.5 mg/l BAP. Explants were cultured in the growth room under 25°C ± 2°C temperature and 16 hours of light (provided by fluorescent lamps), for 6 weeks. The experiment consisted of 25 explants per treatment divided into five 100 ml flasks with 30 ml of medium. Multiplication rate, shoot length and number of nodes per shoot were counted and measured. BAP treatment of 1.0 mg/l gave the highest multiplication rate (5.92) as well as the longest shoot (5.15 cm), but the highest average number of nodes per shoot was recorded in BAP 0.5 treatment (4.15). The average height of shoots was greatest in BAP 1.0 mg/l treatment (1.78), but percentage of shoots shorter than 1 cm was higher in BAP 1.0 mg/l than BAP 0.5 mg/l treatment (14,86% and 10,42%, respectively). BAP 1.5 mg/l treatment gave poor multiplication rate with stunted shoots and more than 50% of shoots shorter than 1 cm.

Key words: lavender, micropropagation, 6-benzylaminopurine, multiplication rate

Section 2: HORTICULTURE

Oral Presentations

O2_01

Characteristics of newly-bred domestic and introduced apricot cultivars (*P. armeniaca* L.) grown in the region of Čačak

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Abstract

The region of Čačak (central part of Serbia) is known as an apricot growing area. 'Hungarian Best' is the most grown cultivar in Serbia, followed by 'Roksana', 'NS-4', 'NS rodna'. The large number of cultivars ripens in the second half of July and they are commonly used for processing. The aim of this research was the evaluation of early- and late-season cultivars, in order to improve apricot cultivar assortment and enrich the offer of fresh fruits and products. Properties of nine apricot cultivars grafted onto Myrobalan (*P. Cerasifera* Ehrh.) were examined. Cultivar 'Hungarian Best' was used as a standard. The experiment was conducted during the two-year period (2017-2018) at the experimental orchard, located 10 km north-west from Čačak, in the village Gornja Gorevnica, located at 390 m altitude. The orchard was established in 2014, with 6 x 3.5 m tree spacing and vase training system. The earliest flowering onset was observed in the cultivars 'Goldrich' and 'Tsunamy' ('Goldrich' flowered 3 days and 'Tsunamy' 1-2 days before the control cultivar). On the other side, 'Roksana', 'Farbaly', 'Kech Psar' and 'Zerdelija' flowered 2-3 days after the control cultivar. 'Tsunamy' is particularly distinguished by its ripening time as an early-season cultivar (ripens at the beginning of June), while 'Farbaly' and 'Kech Psar' were determined as late-ripening cultivars (the second half of August). As regards fruit size, compared to 'Hungarian Best' (53.54 g), the largest fruit was in 'Roksana' (82.44 g), followed by 'Zaklopačka ruža' (80.42 g) and 'Goldrich' (56.13 g). The highest soluble solids content was detected in the late-season cultivar 'Kech Psar' (24.46° Brix).

Key words: properties, flowering, ripening, fruit size

02_02

Raspberry production in Bosnia and Herzegovina – characteristics and challenges

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Abstract

Raspberry production has become an important segment of agricultural production and rural development in Bosnia and Herzegovina. Raspberry export is very significant in the overall structure of the fruit and vegetables exports from Bosnia and Herzegovina (B&H), considering both exported quantities and realized revenues. This paper presents information on the main characteristics of the raspberry production in B&H. During the period 2014 – 2018, raspberry production has become a significant segment of agricultural production and rural development. The export of frozen raspberry comprises more than 50% of the total fruit and vegetables exports from B&H. Raspberry production is accompanied by increase in the construction of processing facilities (cold storage capacities). In the overall structure of the raspberry production, floricane cultivars prevail ('Willamette' and partially 'Miker'). Primocane cultivars such as 'Polka' have been introduced in the production during the recent years. Due to the lack of knowledge in cultivation specifics and the biology of this fruit species, yields that are achieved in the raspberry production are generally lower than actual fruiting potential. Fluctuation of the raspberry prices on the global market may have long-term negative effects on the raspberry production in B&H.

Key words: Production, Price, Biology, Cultivation technology

O2_03

The effect of hydrocooling treatment of sweet chery on hardness during storage

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Abstract

Cherry fruits are characterized by short storage times. For the purpose of prolonging the storage time, cooling treatmen is done to reduce the temperature of the fruits before entering in cold storage. In the course of 2015 and 2016, cooling treatment of fruits was carried out in two varieties of cherry, 'Regina' and 'Kordija', with two localities, Gradiška and Trebinje. Samples of both varieties were subjected to cooling treatment, whereby in Gradiška being manually submerged in cold water, and in Trebinje samples were treated in an automatic hydrocooling system. Fruit hardness analysis was performed on fruits after harvest and after storage. The fruits are divided into three groups. The first group was analyzed immediately after harvest, the second group of fruits was subjected to cooling treatment at a temperature of 0.9ºC for 10 minutes and the third group was the control group. The fruits were placed 15 days in NA cold srorage at a temperature of 1 °C and humidity 85-95%. A positive effect of hydrocolouring on the fruity hardness of both varieties from the Trebinje region was observed. A higher value of hardnesswas recorded in the case when fruits subjected to cooling treatment in relation to untreated fruits. On samples of both varieties from Gradiška, there was a slight decrease in the hardness of the fruits that were stored in relation to the harvest time, which indicates that the cooling did not have a significant effect on this group of fruits. This leads to the conclusion that the different ways of cooling treatmen of fruits with cold water are affected by the sustainability of the fruit hardness, that is, modern hydrocolours contribute to the possibility of prolonged storage in cold storages.

Key words: Cherry, Cooling treatment, Fruit hardness

Acknowledgment: This research was supported through the project "Improving productivity and utilization of cultivated and autochthonous cherry genetic resources" financed by the Ministry of Science and Technology of the Republic of Srpska, number of contracts: 19/6-020 / 961-41 / 15

O2_04

Effects of Olive Oil Application on Maturity in Fig

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Abstract

In the study early harvest has been provided by spreading pure olive oil into ostial cavity of Siyah cultivar fig. The study has been proceeded with 16 Siyah cultivar fig trees in a grower's field in the village of Kurtuluş of Perşembe district, Ordu province. A little olive oil was spreaded in ostial cavity of figs reached pre-cultivating period on each tree using a cotton-rolled stick, 14th August. The practice was performed between 12.00-15.00 hours on a sunny day. On the 14th August, 10 days after the practice the fruits were reached to the harvesting. The physical and chemical measurements have been taken on early-grown fruits. The olive oil applied figs were sent to the market 17 days before usual-growing time. The physical and chemical measurements have been taken on early-grown fruits on the 29 August, normally grown figs have been harvested on 15 September. The physical and chemical values between the figs normally cultivated and early-grown figs were compared.

Key words: Ficus carica, fig, Siyah cv., olive oil application, maturity, fruit characteristics, fresh consumption,

O2_05

Differences in some characteristics between primary (N+2) and secondary (N+3) shoots of Probus (*Vitis vinifera* L.)

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Abstract

It is widely accepted that the presence of frost or the presence of primary bud necrosis decrease yields because primary fruitful shoots will be replaced by less fruitful secondary shoots. However, there are no papers about this topic, due to difficulties for identification of the shoot categories in the field. The aim of this study was to investigate if these shoot's categories can be identified in the field according phyllotaxy (the position of petioles) and to collect some data related to inflorescence. We chose the variety with huge compound buds (Probus, *Vitis vinifera* L.) and we removed certain bud's category of the compound bud leaving the category which we wanted to arise as the shoot. Just prior the budburst (EL2), two treatments were set up. In the first treatment, primary buds were carefully removed with a razor blade and secondary buds were retained in the manipulated compound bud. In the second treatment, secondary buds were removed and only primary left in the compound bud. In the spring we identified the shoots using phyllotaxy to confirm that shoots really originated from certain bud's category. For each category, number of inflorescences per shoot and number of flowers per inflorescence were determined. Moreover, at three different phenological stages during the season (EL13, EL19 and EL33) the length and width of inflorescences on both categories were measured. Surprisingly, the secondary shoots had at least one inflorescence in more than 90 %. However, primaries had a higher percentage of shoots with two inflorescences compared to secondary shoots. The same number of flowers per inflorescence on different shoot's categories indicates that the number of flowers per inflorescence was not affected by shoot's origin. Our results confirm that shoot's category (primary or secondary) characteristics can be identified in the field according to phyllotaxy.

Key words: Vitis vinifera, Probus, compound bud, shoot, inflorescence

O2_06

Two years monitoring of spotted wing drosophila - *Drosophila suzukii* in northern Montenegro

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Abstract

Drosophila suzukii Matsumura is invasive pests in the world, native to southeast Asia and now reported throughout North America and Europe. As a polyphagous pest it attacks a wide host range, both wild and cultivated. It is one of the most economically important pest of fruit crops, able to attack healthy ripening fruit, particularly soft and thin-skinned fruit (stone fruits and berries). *Drosophila suzukii* was detected for the first time in Montenegro in 2013 in localities along the seacoast. In the following years it has gradually spread in the northern part of the country. Northern part of Montenegro is the most important area for raspberry, blueberry and blackberry production.

Monitoring of adult flies was carried out in two consecutive years (2017-2018) in raspberry orchards in localities Kolašin (Lugovi), Mojkovac (Lepenac) and Bijelo Polje (Božovića Polje). One plastic transparent traps with *holes (*diameter of approximately 5-8 mm) *filled with* 250 ml of apple cider vinegar were set up in each orchard. Traps were placed in the second half of June and checked in 15-20 day intervals until November, when attractant was also changed. In the both years the first flies were captured in the second half of July. During August number of captured flies gradually increased and reached their maximum in the last week of September in 2017 and during mid- September in 2018. The last flies were captured in the first decade of November. In the both years the highest number of flies were captured in locality Kolašin (Lugovi).

Key words: *Drosophila suzukii,* traps, apple cider vinegar, population dynamic, raspberry orchards

O2_07

Problem in management of the Norther root-knot nematode - *Meloidogyne hapla*

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Abstract

The Northern root-knot nematode – *Meloidogyne hapla* is a widespread nematode in temperate climates. Survey on the presence of root-knot nematodes in Republic of Srpska in 2016 revealed its presence in 60% of agricultural fields. Identification of the nematodes was done by species-specific PCR primers. Additional identification was done by the morphology of infective juveniles. Body length of *M. hapla* was different among studied populations. In Rogatica, Nevesinje and Manjača there were present juveniles that were longer than the other populations. The length of these populations suggests that they belong to race B. This race is rarely reported from soil samples. The race has different pathogenicity towards different cultivars and crops and has specific life cycle characteristics. These specificities mean that management of the Northern root-knot nematode in Republic of Srpska must be done on race level. The specificities will be discussed in the paper.

Key words: the northern root-knot nematode, *Meloidogyne hapla*, management of the nematodes, Republic of Srpska,

O2_08

Private and Beautiful Fruit of Our Country: Cramp Bark (*Viburnum opulus* L.)

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Abstract

Cramp bark in our country in the Western, Central, is a shrubby plant that grows in Northern and Eastern Anatolia. Central Anatolia, especially Cramp bark water, a traditional drink in the Kayseri region is derived from the fruit of this plant extract. Vitamins contained in fruit, minerals, antioxidants and other bioactive because it is a valuable fruit ingredients. Snowball also works as taking into cultivated plants known abroad Cramp bark to continue. Fruits are participating for many years in many western countries bakery products are used in sweets like gel. Cramp bark of nervous diseases of plants known as Wind qelder rose, fatigue, cramp, epilepsy, tetanus, has been successfully used in medicine for the treatment of many diseases such as rheumatic diseases. Gardening and landscaping work in the countryside to give good results in SO2 sensitivity test is said to be based on a kind the most.

Key words: Viburnum opulus, snowball, cramp bark, antioxidant, landscape

SECTION: ANIMAL SCIENCES

Poster Presentations

P3_01

Relationship between the metabolic status and the reproductive efficiency of dairy cows in the transition period

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Abstract

Peripartal period in dairy cows includes 3 weeks ante partum and 3 weeks post partum - transition period. The metabolism of cows in the transition period faces a series of changes in the homeostasis with endocrine changes, metabolic stress, and numerous pathophysiological mechanisms (inflammation, insulin resistance and metabolic adaptation) that affect the economy of production. In the last third of gestation and early lactation, the needs of the organism for energy, glucose, amino acids and other nutrients increase, while the appetite is reduced in the animal. The high reproductive efficiency of cows in the transition period is directly related to the absence of metabolic diseases. However, a very important factor that affects the increased incidence of metabolic diseases in the peripartal period is the negative energy balance (NEBAL), which is the main cause of fertility reduction. The reproductive efficiency of dairy cows is reflected in the fact that each cow is taken off during the planned calving season and gives its maximum in milk production, since productive and economic indicators depend on it. The reproductive cycle is quickly established after calving in dairy cows. However, expressed NEBAL, poor metabolic adaptation and poor farm management may have a negative impact on reproduction in dairy cows in transition. For this reason, it is necessary to minimize the NEBAL period, increase the intake of dry matter, in which cattle farmers and veterinarians play a large role.

Key words: Dairy cows, transition period, reproductive efficiency, NEBAL

P3_02

Technological process of milking and quality of milk on a commercial farm

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Abstract

Quality and hygienic correctness of milk depends to a large extent from milking procedures at the farm. There are numerous rules and recommendations on the subject of properly milking cows depending of the milking equipment used at the farm. However, over time workers (dairyman) get practical experience and this procedure becomes a routine. Main goals on this article show us this practical experience and time organization of milking operations on the commercial farm. The milking was performed in milking place fishbone 8+8. Average milk yield per cows was from 10.87-13.85 L depending on which milking group they belong to. The chronometric recording of the process of milking and individual procedures in the process of milking, and also duration of milking was analyzed. Time of milking has participated 71%, procedures before milking 21.25%, and procedures after milking 8.35% of the total time during the milking operation. Dairyman where milking from 32.39-34.39 cows per one hour. Rationalizing the time and energy of work in the milking process can increase the volume and quality milk obtained per unit of capacity and working time. Chemical analysis of milk quality determined that on average it contains 4.48% fats, 3.82% proteins, and 9.32% dry matters. Produced milk on the farm was in extra class.
(purpose) of the research, methods, results, and a short conclusion. For characters verification, please use Word count option.

Key words: milking time, chronometric methods, quantity and quality of milk

P3_03

Determination of the relative advantages in the cattle production of milk and meat by comparative analysis of production in Osijek-Baranja County and Krapina-Zagorje County

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Abstract

The use of relative advantages in practice implies that one area concentrates on the production of those kind of products for which there is lower opportunity cost. Osijek-Baranja County is rich in arable agricultural land. Compared with Krapina-Zagorje County, where the agricultural land area is much lower, it could be said that the Osijek-Baranja County has an advantage in terms of agricultural production. This paper analysed, using the Comparative model of production opportunities, that it is necessary to use natural resources and put them into operation after profit. Free trade increases the overall production and consumption of all participants in trade because it enables production specialization in which specific areas have more relative, and not absolute efficiency (products with less relative marginal costs). Comparative model of production opportunities is the model which points to the production orientation of that good which achieves maximum benefit.

Key words: agricultural production, relative advantage, opportunity cost, labour productivity, limit of production possibilities

P3_04

Chemical composition of milk as an indicator of nutritional state of cows

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Abstract

The aim of the study was to evaluate the nutritional state of cows at the farm level, based on the results of the analysis of the chemical composition of the milk. A total of 94 cows in different phases of lactation, kept and fed in standard farm conditions were examined, and milk samples were taken within the framework of regular productivity control carried out by the selection service. Milk fat and protein concentrations were determined on the Bentley 150 Infrared Milk Analyzer, and urea concentration on the Bentley Chemspec150 Urea Analyzer for Milk. The average concentrations of milk fat, protein and urea were 4.22 ± 0.73%, 3.51 ± 0.40%, 2.51 mmol/l (15.05 mg/dl) and the average value of fat to protein ratio was 1.21 ± 0.20. The results of this study show that the cows on the farm are adequately supplied with energy and proteins, that the structure of the ration was satisfactory, so it can be concluded that the cows on examined farm are fed well which reflects favorably on the manifestation of their genetic potential for milk yield, but also to preserve their health, reproductive abilities and prolong their exploitation period.

Key words: nutritive state of cows, chemical composition of the milk

P3_05

Influence of mastitis on reproductive parameters in holstein-freisian cows

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Abstract

We carried out our researches on a farm with black spotted cows. This breed is characteristic by a big agglomeration of cattle on the same place and this breed is faced to a series of zoohygienic-epizootiological problems connected with the environmental microbiose. In that period we selected 30 cattle that, according to the data on the farm, had healthy problems with udder. From all of the quarters of selected cows which showed a positive reaction with CMT, we took samples of udder (milk) secretion and sent them to the laboratory on estimation of the number of somatic cells. It was used the highly sophisticated equipment *BactoScan FC, MilkoScan FT 6000* and *Fossomatic FC* and the identification of the found microflora for these purposes. In all of the 30 cows a secretion disorder in one quarter was found: in 3 cows – in the front left quarter; in 5 cows - in the front right one; in 12 cows - in the back left one and in 10 cows - in the back right udder quarter. As oestrus in cows appears in principle every 21 day, we monitored if oestrus appeared in the selected cows as a control group after partus and also in the 30 other cows that did not show health problems. During this research, in 30 cows with udder secretion disorder it was estimated the average number of somatic cells of 280.000/ml. The highest number of SC/ml was $1,6x10^6$ and the highest number of inseminations was 5. It is also noted the average number of inseminations – 2,6 and the duration of the service period – 76 days. According to the data obtained from the veterinary service on the farm, the average number of inseminations on this farm was 1,96 per female breeding, what lead us to the conclusion that the service period was approximately 53,2 days for all the farm.

Key words: mastitis, somatic cells, service period, inseminations

P3_06

The microbiological status of autochthonous dairy products

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Abstract

In this paper work it is tested the microbiological status of autochthonous dairy products on the plateau of Janj. The basic goals of the work are quality determination based on microbiological analysis. The survey was conducted in the period since October 2016 to until July 2017. 15 samples of cheese "pleta", 5 samples of "janj" cheese and 5 samples of "kajmak" were examined. In a microbiological laboratory samples of cheese were examined on presence of Salmonella spp. (BAS EN ISO 6579/cor2:2010), *Listeria monocytogenes* (BAS EN ISO 11290-1/A1:2005), *Escherichia coli* (BAS EN ISO 16649-2:2008) and coagulase of staphylococci (BAS EN ISO 6888-1/Amd1:2005). "Kajmak" samples are, in addition to these four parameters, examined on the presence of yeasts and molds (BAS ISO 21527- 1:2009) and total number of microorganisms on 30° C (BAS EN ISO 4833:2006). *Salmonella spp.* and *Listeria monocytogenes* are not isolated in the examined dairy products. The presence of coagulase was presented in the samples of cheese "pleta" are establish of positive staphylococci's >104 cfu/g at 15,38% samples and *E. coli* >102 cfu/g at 61,54% samples. The presence of coagulase of samples "janj" cheese was determined presence of positive staphylococci's <102 cfu/g and E. coli <102 cfu/g. The presence of aerobic mesophilic bacteria at 80% was determined of the samples "kajmak" presence was established aerobic mesophilic bacteria >103 cfu/g. Presence of yeast and mold >10cfu/g and E.coli >10cfu/g was determined in 100% of "kajmak" samples tested. Coagulase of positive staphylococci's >10cfu/g, are determined by 60% of "kajmak" samples tested. The microflora data obtained show that it is necessary to pay more attention to the milking hygiene as well as to the disinfection of the equipment used in autochthonous products production.

Key words: Microflora, autochthonous dairy product

P3_07

Genomic selection in horse breeding

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Abstract

The aim of this paper was to present the general aspects of genomic selection in horse breeding and also to provide an overview of existing applications in horses breeding, with particular emphasis on the challenges of implementation and long-term use. Based on conducted review, it could be concluded that breeding organizations must convince horse breeders that genomic selection can be a valuable tool to increase selection success either in sports or in other horse breeding. Genomic selection (GS) allows breeders to evaluate the important traits of offspring even before its birth. GS uses genetic markers to test all relevant traits, including those that are currently very difficult to measure, such as disease resistance, meat quality, horse's crest height, etc. Finally, to establish the relevant genomic selection in individual breeds or breeding types of horses, it is necessary to create a network of collaboration between breeding associations in order to gather all necessary data.

Key words: genomic selection, horse breeding, breeding associations

P3_08

Basic production parameters of broiler farms in Banja Luka region

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Abstract

This paper presents the basic production parameters of eight broiler farms with a capacity of 6,000 birds/round in the Banja Luka region. Data from farm production records of total 80 rounds achieved during 2013 and 2014 were statistically processed by methods of descriptive analysis and one-way analysis of variance. Average values of investigated parameters were as follows: round duration 38.87±2.52 days; day-old chick weight 42.92±2.75 g; final chick weight 2.10±0.24 kg; daily weight gain 52.94±4.29 g; feed conversation ratio 1.80±0.07; total mortality 4.011.90±%; European production efficiency factor 288.47±22.47 and European broiler index 282.54±22.29. Mortality, European production efficiency factor and European broiler index significantly varied among broiler farms ($p<0.05$), while other investigated parameters had comparable values. It can be concluded that production parameters reached satisfactory values, and the obtained data can be useful in analysis of broiler meat production, as well as for further improvement of broiler farm production performance in region Banja Luka.

Key words: broiler farm, production efficiency

P3_09

Seasonal changes in boar ejaculate quality parameters

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Abstract

The aim of study was to investigate the influence of the season on the values of quality parameters of ejaculate in boars of different breeds, kept in conditions of commercial reprocenters. The survey was conducted in the commercial reprocenters for producing insemination doses of Landrace, Yorkshire and Pietrain boars' semen. The research covered the period of three consecutive years, divided in four seasons (winter, spring, summer, autumn). The following parameters of the quality of semen of boars were determined: volume of ejaculate (ml), the percentage of progressively motile sperm (%), the concentration of sperm cells (in millions per ml), the percentage of live sperm (%) and number of insemination doses produced per ejaculate. The data were analyzed using hierarchical linear models (Bolker et al. 2009). Limit the significance of differences was set at the level of $p \leq 0,05$. For statistical analysis and graphical presentation of data, the software package SPSS 22 (IBM, 2013) and R 3.1 (CRANE-CP, 2016) were used. The average volume of ejaculate ranged from 175,83 to 317,10 ml. The percentage of progressively motile sperms ranged from 76,80 to 87,89%. The average concentration of sperms in the ejaculate ranged from 273,01 to 531,25 million per ml. The average percentage of live sperms ranged from 76,07 to 88,42%. The average number of insemination doses of semen produced ranged from 25,20 to 32,38. As a general conclusion of this research can be said that breed, age and season individually have an impact on the quality parameters of boar semen, but the main factor which influence quality parameters is impact of their interactions, as boars of different breeds at different ages, react different to the impact of the season.

Key words: boars, ejaculate quality, season

P3_10

Use of some cereals for carp (*Cyprinus carpio* L.) nutrition

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Abstract

Maize, wheat, rice and barley account for more than 90% of global cereal production. These crops are main energy sources for humans and livestock, including fish. The dramatic increase in human population and growing livestock production require the use of other cereals for this purpose. Some other cereals such as triticale, rye and sorghum are suited for this aim as well as for organic farming owing to the low presence of pesticides, fertilizers and different pollutants and high tolerance to unfavorable agroenvironmental conditions. Experiments conducted during 8 months using maize, wheat and triticale grains in carp diet showed a lower yield (kg/fish) receiving triticale diet (mean 0.915), compared to maize (1.084) and wheat (0.987). However, total fat content in the meat of carp that consumed triticale was lower (9.72%) than in carp fed maize (13.26%) and wheat (11.22%). The percent of total PUFAs (polyunsaturated fatty acids) in carp fed triticale was lower (12.59%) than in carp fed maize (15.41%) and somewhat higher than in carp fed wheat (12.14%). Sixty-day testing of the nutritional properties of extruded barley, wheat, triticale and rye grains in carp diet under controlled conditions revealed the highest yield (final weight – initial weight x 100/initial weight) in carp receiving wheat (324.00±26.72%), followed by rye (319.42±13.16%), triticale (313.43±18.07%) and barley (308.48±5.54). An experiment on digestibility of main organic compounds was conducted in carp fed rye and sorghum. Higher digestibility values for proteins (91.89%) and lipids (79.84%) were detected in rye-based diet than in sorghum-based diet (71.86% and 76.71%, respectively). These results suggest possibilities for partial or complete substitution of major cereals (especially maize and wheat) with minor ones in some types of fish feed.

Key words: triticale, rye, sorghum, carp nutirtion

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P3_11

The effects of ration size on condition factor and length-weight relationship of the brown trout (*Salmo trutta* m. *fario*)

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Abstract

The effects of ration size on condition factor and weight-length relationship of brown trout (*Salmo trutta* m. *fario*) were investigated in the laboratory conditions during 42 days. The experiment included two groups with 3 replicates, and was realized in the six flowing aquariums. The one group included 12 fish/aquarium in 3 repetitions (36 fish/group), the total number of the fish in 2 groups was 72 brown trout. The average individual weight (W) ± standard deviation (SD) and total body length, (TL) ± standard deviation (SD) of brown trout was similar and it was in G_{100} 75.72±10.94 and 18.58±0.74 and in G_{80} it was 75.22±9.77 and 18.52±0.83. Both groups were fed with the same commercial diet. Daily nutrition norm for brown trout in G_{100} was 100% and in G_{80} 80% according to nutrition tables recommended by manufacturers of the feed used. Length-weight relationship of the brown trout in G_{100} was calculated as $W = 0.004295L^{3,357}$ (positive allometric growth) and G_{80} was $W = 0.028576L^{2,714}$ (negative allometric growth), while the correlation coefficient (r) in G_{100} and G_{80} was 0.907 and 0.870. Condition factor (CF) ± standard deviation (SD) in G_{100} and G_{80} was 1.25±0.05 (min 1.18; max 1.29) and 1.23±0.04 (min 1.18; max 1.26) on average. Fish with lower daily nutrition norms have negative allometric growth and lower condition factor if compared to higher daily intake.

Key words: Ration size, condition factor, length-weight relationship, brown trout (*Salmo trutta* m. *fario*)

P3_12

Preparation of expert studies on the damage caused to the fish fund

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Abstract

Fish fund represents a very important life community of aquatic ecosystems. The fishing basis determine the composition and the number of fish population populations in natural conditions, which at the same time represents the starting document in the preparation of expert studies on possible damage to the fish fund. In fishing basis, qualitative and quantitative composition of the fish population in natural conditions, water quality and other parameters are processed. The cause of fish mortality in natural conditions may be different, and it is the determined by the competent inspection body. Scientific-expert analysis and the field research need to determine the difference in terms of the previous state (condition before degradation - Fishing basis) and to state the condition of the fish fund after the damage was caused. The damage scores are determined by representative catch of fish in the degraded hydrological area. The difference between the previous and the present state of the fish fund is the damage calculated according to the compensation price list for fish. A specific case is the damage caused to the fish stock in fish farms, classical fish ponds and salmonid fish farms or by cultivating fish in cages. In classical fish farms, it is clear what kind of fish is breeding, how much is the individual and total fish mass and how much is the cultivation area. This information is provided by the manufacturer in cooperation with the inspection authorities. The inspector also states the cause of the damage. In the case of breeding fish in cages, the breeding species, age of fish, quantity of fish by age category, number and area / volume of breeding units should be noted. It is necessary to obtain data from inspection and other verified authorities on the cause of the damage. It's just that way can the data on direct and indirect a pity to the fish fund be collected and the breeding facilities. Summing direct and indirect damages, according to the applicable compensation price, the total damage done to the fish fund and breeding units is calculated. This is very important in the process of expert judgment and fair compensation. An estimate of the damage caused to the fish fund in natural and cultivated conditions is performed by a scientific institution in the field of Fisheries or Ichthyology.

Key words: Fishing basis, expert study, natural waters, fish breeding, fish fund damage

P3_13

Hexachlorobenzene in smoked sausage, yes or no?

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Abstract

Organochlorine pesticides (OCPs) are often used to preserve crops. Their use can have a serious impact on human health, because treated crops are used for animal nutrition, and be found in animal products. The aim of this study was to determine the level of hexachlorobenzene, HCB, and its three isomers alpha, beta and gamma HCB in 36 samples of smoked sausage, collected from supermarkets in Serbia. Chlorinated residues were quantitated by gas chromatography with mass detector using packed and capillary columns. Sample preparation was made by QuEChERS method. During this investigation it was found -alpha and beta HCB isomers in all analyzed samples but we did not find a gamma HCB. Concentration of alpha HCB was in range of 0.025-0.045 µg/g and concentration range of beta HCB was from 0.025 to 0.089 µg/g. Concentration in one sample was 0.089 µg/g and it was near the EC-MRL for meat and meat products of 100 ppb, but another samples contained alpha and beta HCH residues slightly below the respective MRL of 0.2 ppm. From the presented investigation of smoked sausage from Serbian retail, it can be concluded that concentrations of some OC pesticides was still be near the maximum limits. This is due to the fact that OC pesticides are persistent in nature because of their slow decomposition rate, long half-life and high stability in the environment. Levels of contaminants in smoked sausage products which are not in compliance with regulatory limits can pose a threat to human health, mainly due to its chronic action. Therefore, it is important to monitor OC pesticide levels and continue to find solutions to reduce human exposure and other living organisms to these compounds.

Key words: Organochlorine pesticides, Hexachlorobenzene, Smoked sausage, Gas chromatography, QuEChERS

P3_14

Phenotypic characterization of the Bosnian Broken-haired Hound – Barak on the territory of Bosnia and Herzegovina

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Abstract

The largest number of today`s known autochthonous breeds originated from 19th century by cross-cutting of existing breeds and the selection of desirable phenotypic characteristics. The targeted selection that man has performed decisively influenced the present phenotypic diversity. So far, the Bosnian Broken-haired Hound – Barak has not been the subject of the comprehensive research. The aim of the research was to make the phenotypic characterization of the Barak from entire territory of Bosnia and Herzegovina. It included 120 dogs (64 males and 56 females) aged from 9 months to 10 years. Measuring points on the body were taken on the basis of recommended criteria for zoo-technical measurements. By taking exterior measures from dogs (34 exterior parameters on the body such as dog height in the ridge, back height, muzzle length, skull length, knee height, shoulder joint height, skull width, muzzle width, etc.) and processing the data, we have completed a unique zoo-technical study for this dog breed, which has great importance for our country in terms of preserving animal genetic resources. The measurements were made using the following instruments: Litin`s rod, movable gauge with nonius, ribbon and protractor. The conclusion of this research shows us great heterogeneity in the examined population of dogs.

Key words: autochthonous breeds, Barak, zoo-technical study, exterior measures

P3_15

Influence of taking frequency on boar ejaculate quality parameters

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Abstract

The aim of study was to examine the effect of the ejaculate taking frequency on the parameters of the quality of boar semen. The research covered a three-year period, and four most common boar breeds in our areas. A total of 1705 ejaculates were taken from Yorkshire boars, 1693 ejaculates from landrace boars, 1106 ejaculates from pietrain boars and 669 ejaculates from duroc boars. Within the each breed, groups were formed according to the frequency of ejaculate taking (once, twice, three, four, five or six times a month). Evaluation of ejaculate quality was performed in a reprocentre laboratory, according to their quality standards. Quality parameters that have been determined are: volume of ejaculate, sperm concentration, progressive sperm motility, live sperm count, number of doses and grades. Results of this study show that the volume and progressive motility increase with the increase of frequency in ejaculate taking, while the sperm concentration drops, except for pietraine boars. The best results were observed in ejaculates collected 5-6 times during the month. The highest mean volume of ejaculate was found in the landrace boars (292.22 ml), in ejaculate taking frequency of five times per month. The highest average progressive sperm motility was 92% in Yorkshire boars, on frequency of six times a month, while the highest concentration of spermatozoa was found in duroc boars frequency of one taking per month (447.32 mil./ml). The results of this study indicate that the frequency of ejaculate taking affects the boar semen quality parameters, which confirms the hypothesis from which the research starts.

Key words: boar, ejaculate, frequency of taking, quality

SECTION: ANIMAL SCIENCES

Oral Presentations

O3_01

The current status of transhumance livestock farming in Montenegro

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Abstract

Montenegro has large mountainous areas with a very diverse relief and only small areas of lowland. Due to that geographical characteristics permanent grasslands dominate in total agricultural land (about 95%). Hence traditional livestock production, based on the rearing of ruminants is still the main sector of agriculture. The most important is cattle breeding with total population of 86,649 heads, followed by sheep breeding with population of 189,000 heads (MONSTAT, 2018). Utilization of the mountain pastures is closely linked with the traditional way of rearing of sheep and cattle by the seasonal movement to mountains settlements named ``the katuns``. The katuns are temporary settlements in mountains where the agricultural households moved livestock from the villages during the summer, mostly for 4 to 5 months (June to October). This movement, also known as vertical transhumance or nomadic pastoralism, is still practiced by many agricultural households, however nowadays significantly lower number of farmers uses it. In the past there were more than 500 katuns regularly used, while today only half of them, with much less number of livestock. In 2017, the katuns were used by 1462 households with total of 21,825 livestock units (LU). The highest share in this number were cattle, 60.8% or 13280 LU, than sheep and goats 33.6% or 7344 LU and the rest were horses, 5.5% or 1200 LU. The main purpose of this way of livestock farming is cheap and easy animal rearing and production of the traditional milk and meat products, which are the main source of income for the households. Transhumance livestock farming is a very convenient way of sustainable use of the large mountain pastures in Montenegro. Therefore, the katuns, as a unique social-cultural resource of Montenegro, should be supported, preserved and revitalized via implementing new activities to enable them to become distinctive and attractive tourism destinations.

Key words: mountain pastures, livestock farming, katuns.

O3_02

The effect of breeding region on differences in persistency of heat stress effect in first parity Simmentals

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Abstract

In order to determine the effect of breeding region on differences in persistency of heat stress effect in first parity Simmentals test-day records provided by the Croatian Agricultural Agency were analysed. Only cows with detected statistically significant decrease in daily milk yield at set temperature-humidity index (THI) threshold value (65, 70 and 75) were included in the further analyses. The persistency of heat stress effect regarding the daily milk traits was determined as a drop in the subsequent milk recordings (1st and 2nd). The research results indicate significant difference in animals' response to heat stress effect due to breeding region and individual's susceptibility to heat stress. The most pronounced and persistent negative effect of heat stress was determined in cows bred in Eastern region. Also, the negative effect of heat stress was more pronounced and more persistent in Simmentals that were heat stressed at the lower THI threshold values (cows that are more susceptible to heat stress).

Key words: heat stress, persistency, first parity Simmentals, daily milk traits, breeding region

O3_03

Goat farming: stagnation and development on the territory of Bosnia and Herzegovina

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Abstract

Thanks to the great natural abilities of adaptation to the conditions of keeping and feeding, goats are successfully used today in all parts of the world, including arid, subtropical, tropical and mountain regions. Today, around 1 000 000 000 goats are grown worldwide. From the 1980s to the present day, the number of goats in the world has been almost doubled. As an animal species, it successfully submits all production systems. Just before the arrival of the Austro-Hungarian monarchy, about 1 500 000 goats were grown in Bosnia and Herzegovina, and just about 500 000 before at the beginning of the Second World War. The tendency of reducing the number of goats was recorded during the Second World War, especially after the war and the adoption of laws prohibiting the keeping of goats. The aim of this paper is to examine the stagnation of goat farming in Bosnia and Herzegovina, which followed the adoption of legal solutions and their prohibition of keeping. According to the mention legal solutions, the keeping of the Balkan goat is prohibited, but it is permissible to keep the highly productive breeds, especially the Sana's goats, under certain conditions. Today in Bosnia and Herzegovina we have between 50 000 and 60 000 goats, which is a small number if we take the importance of this products for human consumption.

Key words: goat, stagnation, legal solutions, Bosnia and Herzegovina

O3_04

The average relatedness coefficient in Lipizzan horse from state-owned stud Vučijak

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Abstract

The state-owned stud Vučijak was founded in 1946s in Prnjavor municipality, and today stud has 6 stallions line and 15 mare families. Pedigree analysis is an important tool for identifying genetic diversity and changes that occur from generation to generation. Also, the pedigree allows the assessment of population structure and inbriding levels, which are important for closed populations under high selection pressure. The aim of this work was to determine the average relatedness coefficient (AR) in Lipizzan horse from stud Vučijak using pedigree analysis. In this study, pedigre information from total of 121 Lipizzan horse was used, and animall was born between 1997 to 2017. For all animal was calculated the average relatedness coefficient (AR) in five generation. The AR was 0,048 (4,8%), respectively for mares 0,052 and stallions 0,041. For the purpose of monitoring the AR by years the animals are divided into two decade. The first group was animals born between 1997 and 2007 and the second group between 2007-2017. Results of t-test showed that there no significant differeces for AR between mares and stillions, and between animals born in different decade. The ANOVA showed that there is differences for AR between stallion line, respectively mare families. Based on the obtained results, we can conclud that the sire line Favory (0,23) and the mare families Ilova (0,014) have the smallest, and the sire line Conversano (0,065) and Maestoso (0,067), and the mare families Visla (0,074) and Sava (0,080) have the highest average relatedness.

Key words: Lipizzan, stud Vučijak, pedigree, the average relatedness coefficient

O3_05

The presence of heavy metals, Cd and Pb in the fodder in the area of Banja Luka

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Abstract

One of the major current environment health problem is havey metal toxicity. The toxic heavy metals such as Cd and Pb are usually associated with harmful effects in men and animals. The aim of this study was to examine the possible presence of heavy metals, Cd and Pb in the Banja Luka area, in urban and rural areas, as well as on sown and natural grasslands. The samples of fodder were taken in 2013 and 2014. The location of Ramici was selected as an urban region, while the rural part was the location of Manjača. The results of the study showed that the highest value of Pb in the hay was determined at the location of Manjača, on the sown grassland (0.33 mg/kg). The lowest value of this heavy metal was detected at the location of Ramići on the sown grassland (0.26 mg/kg). Analysis of Cd presence showed the lowest value in the hay in the Ramići location, on sown grassland (0.06 mg / kg), and the highest value was on the natural grassland in the same location (0.14 mg/kg).

Key words: havey metals, Pb, Cd, fodder, hay

O3_06

The fluctuation in wild boar population in hunting area in eastern Croatia

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Abstract

Considering the great importance of the wild boar population in Croatia, the objective of this study was to determine the fluctuations of all categories (offspring, young, middleaged, and mature) of wild boar population in hunting ground in Eastern Croatia during the analysed period from year 2008 to year 2018. Based on the conducted analysis, following could be emphases: the last recorded maximum of offspring (male, and female) was in year 2013, the highest number of young (male, and female) was determined in year 2018, the last recorded maximum of middleaged (male, and female) was in year 2014, and the last recorded maximum of mature (male, and female) was in year 2013. Considering the situation in the hunting ground in year 1955, in the last 10 years the number of wild boar has redoubled. Given the fact that the hunting ground today, and comparing to year 1995, has much more resources available and there is significant human activity that can recreate the wildlife population by releasing throats, there is a possibility that the number of wild boar increase slowly from year to year.

Key words: wild boar, population, variation, hunting area

Section 4: AGRICULTURAL ECONOMICS AND RURAL DEVELOPMENT

Poster Presentations

P4_01

Structural changes in agriculture: Implications for the economy of the Republic of Serbia

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Abstract

Agriculture of the Republic of Serbia plays an important role in the national economy, making it significantly different from agriculture of developed countries. Its contribution to the national economy is reflected in a still significant share in the gross domestic product, total employment, and especially in the trade balance. Despite the insufficient utilization level of available natural resources, agriculture in Serbia is a backbone of the economic development of rural areas. In addition to providing food and raw materials for industry, it provides employment opportunities to a still large part of the rural population in Serbia. This is especially important given that agriculture, apart from providing livelihoods for farmers, contributes to alleviating high unemployment in rural areas and in the entire economy. Accordingly, the research goal of the paper is to examine structural changes in agriculture of Serbia in the following aspects: changes in the employee structure, in plant and animal production, as well as a change in a share of agriculture in the gross domestic product and trade balance of Serbia. The analysis has been carried out in the period from 2002 to 2016 based on the available data of the Statistical Office of the Republic of Serbia. The aim is to quantify the level of changes in agriculture, as well as to examine the interdependence between them in order to point out the critical determinants of agricultural improvement. The methods used in this paper are: analysis method, synthesis method, comparison method, descriptive statistics and correlation analysis. Research results show that the Serbian agriculture has suffered significant changes in the analyzed areas, resulting in a decrease in its share in total employment and gross domestic product, but also in a slight increase of its share in the value of exports and imports.

Key words: agriculture, structural changes, national economy, rural areas.

P4_02

Households as main factor of rural and sustainable development in the Republic of Serbia

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Abstract

The research is focused at households located in rural areas of Serbia, with special emphasis on the agriculture households. However, a tendency has been seen that some households are active in other economic branches such as rural tourism, artistry, trade, food industry, etc. The Theoretical framework for socio-economic analysis is based on the Monographic method for qualitative and quantitative description of households, rural and sustainable development. As a complementary tool of the previously specified method the analysis of the documents, was used, such as official publications and statistical data (total number of households in other settlements in the Republic of Serbia). Research has shown the existence of an unquestionable role of households, primarily in rural and sustainable development. Accordingly, 17 objectives of sustainable development are observed in the function of solving the challenges faced by households as the holders of rural development.

Key words: households, rural development, sustainable development, social changes, rural areas

P4_03

Criteria for the delineation of areas with natural constraints in the European Union and Republika Srpska

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Abstract

Each of the candidate countries for accession to the European Union (EU) in order to use the support of the European Agricultural Fund for Rural Development is obliged to develop a Rural Development Program, analyze the situation, determine problems and objectives, determine measures to improve agriculture, rural areas and criteria for budget implementation. In this regard, the Ministry of Agriculture, Forestry and Water Management of the Republic of Srpska (RS) is developing a Rural development program consisting of several individual measures, among which are those related to subsidies for areas with natural constrains in agriculture (ANC). Since 1975, the EU has supported less favorable areas (LFA) within the framework of the Common Agricultural Policy. The aim of the measures for the LFA is to maintain agricultural production in areas where that production could be economically endangered without subsidies, sustainable use of natural resources and environmental protection. Areas with natural constraints are areas that are less favorable for agricultural production due to natural characteristics (altitude, inclination of terrain, shallow depth of soil, climatic factors, etc.). Initial name, less favorable areas, in 2011 was replaced with the term "area with natural constraints". In addition to the new term, the European Commission also limited the list of criteria as the basis for delineation of ANC, limiting it to only natural criteria. The aim of this paper is to conduct a comparative analysis of indicators for delineation of ANC applied in the EU, and to analyze the significance of applying measures for development of rural areas, the relevance of the natural criteria and the method of delineation of the ANC for RS. The research included twelve RS municipalities: Banja Luka, Čelinac, Drinić, Istočni Drvar, Kneževo, Kotor Varos, Kupres, Jezero, Ribnik, Šipovo and Teslić. A revised EU methodology for delineation the ANC area is used (EC, JRC, 2014), respecting the natural geographical characteristics of RS. The results of the research show that ten of twelve municipalities meet at least one criterion according to the EU methodology for delineation of the ANC.

Key words: European Union, less favorable areas, areas with natural constraints, criteria, Republic of Srpska

P4_04

Multi criteria decision making in agriculture - A review of use in Balkan countries

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Abstract

The aim of this paper is to present a review of using certain multicriteria techniques in Balkan countries in the field of agriculture. Two types of approaches of multi criteria decision making (MCDM) have been covered with this research: multi objective decision making (MODM) and Multi attribute decision making (MADM). A numerous article papers, dissertations, thesis and other sources were analyzed. Investigations with MCDM techniques in different field of agriculture have been increased in recent years. MADM techniques are more frequently used, where a few methods are the most popular: AHP, Topsis, DEXi, SAW, PROMETHEE, VIKOR. MCDM techniques have been used in different types of purposes: irrigation sector, fruit production, vegetable production, animal breeding etc. Some of concrete problems, which were solved with MCDM techniques are: choice of plant species/cultivars in both vegetable production and fruit production, choice/ranking of different types of technology of production etc. MCDM techniques are becoming more and more important part of management processes in agriculture sector. They are used not only in processes of strategic planning, also for the operational planning as well as other purposes..

Key words: Multi criteria decision making, analysis, agriculture, Balkan

P4_05

Analysis of Climate change Impact on production systems in the region of Bizerte (Tunisia) using a bio-economic approach

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Abstract

To ensuring adequate yields and sustainable farmer incomes in Bizerte region in the north of Tunisia, we studied the climate change impact on production systems and adaptation forms in this region. We adopted a preventive bio-economic methodological approach, based on coupling a biophysical model constructed by "CropSyst" allowing long-term yield simulations, with an economic model developed with "GAMS" (General Algebraic Modeling System) based on mathematical programming. We surveyed 120 farms during 2014-2015 cropping season and aggregated them into 3 distinct groups (G1, G2 and G3) using "SPAD" as a statistical tool: G1 medium-sized farms (40ha), G2 small-sized farms (2.5ha) and G3 large-sized farms (273ha). Three farm-types (T1, T2 and T3) were selected from each group. They produce respectively durum wheat (T1); potato (T2); durum wheat, soft wheat, oat and faba bean (T3). Also, we collected the observed climate data (1983-2015) of the studied region and soil textures of farms. We generated (using a subprogram "ClimGen" in the CropSyst model) 40-years climate data (2016-2055) for bio-economic modeling and we carried out simulations. Results showed that around the year 2055, the temperature average will reach 19.6°C compared to 1983-2015 (18.4°C), increasing of 1.2°C. The annual rainfall average (438mm) will reach 346mm, decreasing of 92 mm. So, climate change will decline crop yields and such a decrease can reach 64%/ha for durum wheat (T1); 46%/ha for potato (T2); 44%/ha for soft wheat, 51%/ha for oat and 70% /ha for faba bean (T3). Gross margin (GM) reduction can reach 79%/ha for T1. It will be canceled or even become negative for T2 and around 51%/ha for T3.With fertilization, T1 can improve gross margin by about 46%/ha. With complementary irrigation, T2 could improve the GM by 16%/ha. For T3, climate change impact is reduced by diversified production system. The GM is more or less stable in the long term.

Key words: Bio-economic modeling, production system, yield, gross margin.

P4_06

Women entrepreneurship development in agriculture

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Abstract

In rural areas, entrepreneurship is considered to be the potential for employment of agricultural producers, which is also an opportunity for self-employment, employment close to home, independence and the way for lowering the need for social assistance. It is also a driver for improving the quality of life of an individual, family and community. The main aim of the research is to determine the possibility of developing and improving the women entrepreneurship in the sector of agriculture in the area of Prijedor. The survey was conducted with 150 respondents. The survey refers to the collection of data on the attitudes and opinions of women who have a registered agricultural holding, on their possibilities of starting and upgrading entrepreneurial activity. Research results show that most respondents did not have formal work experience, 85% of respondents did not participate in entrepreneurship training, 60% of respondents are not familiar with the incentive programs for business startup. Entrepreneurs face problems with access to information, finance, market and education. In order to achieve a higher level of women's entrepreneurship development, and thus the ability to acquire greater income and a favorable living environment, training for entrepreneurial skills, leadership, communication skills, education for business plans, marketing training, foreign language courses, computer work and other, are needed. In addition, it is necessary to organize forums in the field of women's entrepreneurship through the presentation of successful entrepreneurs from the region, with the aim of interconnecting and further cooperation.

Key words: women's entrepreneurship, rural areas, agriculture

P4_07

Opportunity Cost of Serbian Agricultural Exports

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Abstract

Significant changes in the foreign trade structure of Serbia occurred after the collapse of the SFRY, and were reflected in the decrease in exports and the share of semi-manufactured and manufactured goods, and in the increase of the volume of exports and the share of raw materials, especially cereals. Extensiveness of agricultural products export was reflected in the increase in the share of raw and unprocessed agricultural products. At the same time, the imports of final products of animal origin has grown, whose production is based on the consumption of cereals, primarily corn. Considering the high mutual reciprocity of livestock production and corn consumption, from an economic point of view, the import of meat and processed products, as semi-manufactured and manufactured goods, represents the opportunity cost of corn exports. The opportunity cost of corn exports is an increase in the value of imports of meat and processed meat, which is the result of unfulfilled domestic production and export of meat on the basis of exported corn as the basic raw material for feeding livestock. In this paper a dynamic quantitative model of a system of functionally related equations is made, which enables the quantification of opportunity costs. The total opportunity cost of agraricultural export of Serbia was determined by calculating the costs and value of production, foreign trade and the prices of corn and pork in the period 2000 - 2015. The aim of the paper is to examine the phenomenon of opportunity costs in concrete examples, with a comparative analysis of trends in production, consumption, exports, imports and prices of inputs. The opportunity cost was determined on the basis of the difference in the increased export of corn and unrealized domestic production and increased imports of pork meat.

Key words: Agricultural exports distortion, opportunity cost, export of corn, import of meat

P4_08

Competitiveness of maize and sunflower production in the crop rotation of family farms oriented towards crop production

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Abstract

The success of family farms focused exclusively on crop production is conditioned by numerous factors, which can be classified into two groups: external and internal. External factors such as prices of inputs and outputs, climate conditions cannot be influenced by family farms. On the other hand, internal factors like production structure, agro-technology and production technology can significantly be influenced by farms in order to increase the performance business. According to the survey conducted on family farms in Vojvodina between 2009 and 2018, with 10-20 ha of arable land, specialized exclusively in crop production, organized in a three field crop rotation, the analysis of the mutual competitiveness of maize and sunflower production was carried out. Performed regression analysis shows that sunflower, due to its biological characteristics, better endures by unfavorable climatic conditions than maize. Also, the results of the survey showed that the average realized gross margin, as an indicator of the efficiency, of sunflower production is by 12% higher than the average gross margin in maize production and shows significantly lower variability measured by the coefficient of variation.
Based on the obtained research results, it can be concluded that higher participation of sunflower in the production structure of family farms significantly reduces the risk from the adverse effects of climate and market factors.

Key words: family farms, competitiveness, maize, sunflower, gross margin

P4_09

Analysis and prediction of rapeseed production indicators in the Republic of Srpska

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Abstract

The aim of this paper is to predict future trends in the basic production of rapeseed in the Republic of Srpska. The period to which the prediction relates is from 2018 to 2022, and the time series that is the subject of research is from 1996 to 2017. In addition to the descriptive analysis method, the Box-Jenkins model based on the ARIMA (*Autoregressive Integrated Moving Average)* class is used in the paper with the prediction purpose. The results obtained from the research show that, regardless of the present oscillations, in the future, there will be an increase in the area under the rapeseed and that in the last year of the prediction, the surface will reach the level of 1920 ha. Also, production is expected to increase even by 4 times more in comparison with the average from the analysed period. Predicted production in the last year of the prediction period will be about 5,824 tons. As far as the yield of rapeseed is concerned, it is expected to be 1.11 t/ha or even by 36% at a higher level than the average yield in the analysed period. Respectively, the predicted yield in the last year is higher by 0.21 t/ha or about 7% of the maximum yield in the observed period.

Key words: rapeseed, prediction, ARIMA models, Republic of Srpska

P4_10

The relationship between import of feed for salmonids and export of trout from BiH

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Abstract

Freshwater fishery in Bosnia and Herzegovina is one of the most developed sectors in the agro-industry. The subject of the study is an analysis of the market trends and foreign trade of Bosnia and Herzegovina, import feed for salmonid species of fish and export trout. The aim of this paper is to determine the dependence on the imports of fish feed and the coverage of its imports by exporting trout. This paper analyses these two factors over a ten-year period (2010-2018). The source of the analysed data is secondary sources and the research was conducted using the so-called method desk research. Data processing was done through mathematical-statistical methods. The results of the research have shown that in the structure of imported fish feed dominates feed for the feeding of salmonid fish species (around 83%). At the same time, the export of fish is dominated by rainbow trout. The export value of trout in the analysed period was greater than the value of the imported feed for salmonids. The export price of trout grew at a higher average annual rate (2.72%) than the price of imported fish feed (1.38%), which means that the value added to the value of imported feed increased in favour of the final product. The conclusion is that Bosnia and Herzegovina mainly imports trout from the countries of the European Union and that it is not realistic to substitute feed imports for salmonids because of the lack of components of domestic origin for its production. However the import of salmonid feed is justified because it is completely covered by the export of trout fattened with that feed. Bosnia and Herzegovina is predominantly exporting trout while its imports of smaller scale, whereby permanently achieving surplus in this product in international trade and it contributes significantly to the reduction of the foreign trade deficit.

Keywords: Trout, imports, exports, fish feed, added value.

P4_11

Comparative financial analysis of crop, livestock and mixed agricultural producers' profitability in the Republic of Srpska (Bosnia and Herzegovina)

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Abstract

The aim of this research was to compare profitability indicators between three major agricultural sub-sectors in the Republic of Srpska: crop producers, livestock producers and mixed producers. The analysis was based on the structure of total revenues and their distribution and profitability ratios such as: ROA, ROE and ROI. The analysis covered financial data of approximately 150 crop producers, 84 livestock producers and 43 mixed agricultural producers in the six year period (2010-2015). Scientific-research methods used in this analysis include: data classification, calculation of financial indicators, time and spacial comparison, descriptive statistics and method of inference. The results of analysis show that the profitability of all agricultural producers is generally low, especially for livestock producers. Regarding the structure of total revenues, they completely relate to operating revenues, while operating expenses make 97% of total revenues for all three sub-sectors. Among other expenses, financial expenses are dominant, but almost insignificant in relation to total revenues. This clearly indicates that loans are not available to agricultural producers due to their low profitability which can be also seen in the low participation of net profit in total revenues (from 0,84% to 0,97%). Profitability ratios have provided similar results. Thus, ROI was 0,00% for all producers during the whole period, while ROA (in average: 0,02% - crop producers; -0,44% - livestock producers and 0,33% - mixed producers) and ROE (in average: 1,66% - crop producers; 4,19% - livestock producers and 4,49% - mixed producers) have been generally low. Although these results indicate weak profitability and capital structure of all agricultural producers in the Republic of Srpska, on the other hand, they show higher profitability of mixed agricultural producers, and it would be interesting to investigate the reasons behind this in the future.

Key words: agricultural producers, profitability, indicators, comparison

P4_12

EIT Food activity as an example of support for innovation in the agri-food sector

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Abstract

The results of EU agriculture and agri-food processing depend mainly from the innovative capacity and ability of connecting modern technologies with agricultural practice. This will allow on production of high quality products that are more and more appreciated. It is a huge opportunity for the agri-food industry, because it can help in meet consumer needs and enables the improving the production and financial results in the agri-food sector. The main object of the research is to focus on supporting the innovation of the agri-food sector on the example of EIT Food (The European Institute of Innovation & Technology). This EU initiative linking the three sides of the 'knowledge triangle': business, education and research. The mission of EIT Food is to support changes taking place in the agri-food sector and effective satisfaction of current and future needs of sector by building, managing and strengthening networks of entities operating in a sustainable manner and based on mutual trust, with particular emphasis on the role of consumers. Main challenges of EIT are low consumer confidence, bad eating habits, fragmented value chain, competence gap and low entrepreneurial culture. Activities of EIT Food help to increase consumer confidence, produce products with high nutritional value, proper resource management, a consumer-focused system, education developing competences and support for innovation.

Key words: innovation, agri-food sector, EIT Food

P4_13

The profitability of energy production from the cultivation of energy crops

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Abstract

The negative impact of human activities on the environment affects changes in regulations and goals countries belonging to the European Union, including those regarding the amount of energy consumed and its origin. One of the solutions facilitating the fulfillment of ever higher EU requirements is replacing conventional solid fossil fuels with biomass, for example from energy crops. Energy plants are those that be able to large gains in a short time, are suitable for combustion, during which a lot of thermal energy is obtained, and much less impurities compared to popular hard coal. Importantly, the energy produced in this way is qualified for renewable energy sources, which gives many economic benefits for both the state and the planter. The aim of the research is to compare cultivation costs, possible revenues and profitability of energy production from various species of energy crops in Polish conditions (including energy willow and miscanthus). A documentary method was used to collect secondary source data. The results of the research have been prepared in a descriptive and tabular form. The costs borne by the planter are mainly those related to the cultivation assumption and later with harvesting crops, which in the case of the most popular plants, that are resistant to diseases and unfavorable environmental conditions provide profits for many years. For example, the cost of buying willow seedlings for one hectare depending on the density of plantings is about 220-420 euros, while the value of the collected biomass after three years is about 1500-2100 euros. Relatively low costs of running energy crops and good revenues, as well as changes legal, subsidies and increase the sales market cause dynamic development and popularizing such crops, can make it a good business for many farmers, especially if they have low-fertile lands where traditional crops are not too profitable.

Key words: energy crops, renewable energy, crops production profitability

P4_14

Global market trends in organic farming

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Abstract

Agriculture is one of the most important economic sectors worldwide and the most important part of the food chain. It is also quite a significant element of the degraded environment around us. Public awareness of degradation has begun to transform conventional agriculture into organic farming. The interest in organic farming is growing from year to year in spite of quite restrictive requirements in the context of this type of activity. In the last few years this trend can be seen not only in highly developed countries, inhabited by affluent societies, but also in developing countries. Thanks to such agriculture, smaller farms have greater prospects, the quality of local markets is much higher and export opportunities are created for a wider international arena. The aim of the research is to show trends in the global organic farming market. The time range of research is 2007-2016. Secondary data were used in the research, mainly from reports prepared by FiBL & IFOAM - Organics International and from data prepared by The Statistics Portal STATISTA. The test results were obtained using the following methods: statistical description, regression analysis and the least squares method. In 2007 were almost 31 million hectares managed organically by about 634 thousand farms. The total organic area in 2016 were almost 58 million hectares in hands more than 2.7 million producers. This means an increase in organic surface by about 87 percent and four times more producers in the period of 10 analyzed years. This means an increase in organic surface by about 87 percent and four times more producers in the period of 10 analyzed years. The rapidly increasing share of organic farming in the economy is the result of strong pressure from international institutions on environmental protection, sustainable development, much higher subsidies and growing demand for organic products.

Key words: organic farming, organic products, organic food, market trend

P4_15

Consumer habits and opinions toward organic products in Banja Luka

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Abstract

Organic production is nowadays one of the measures that increases the sustainable development of agriculture and customers are choosing organic products more and more. This type of production is in development in Bosnia and Herzegovina and this paper focuses on consumer habits and decision making processes during purchase. The aim of this paper was to determine consumer preferences and attitudes toward organic products in Banja Luka. The research was conducted during March using structured questionaire which contained 21 questions. Survey was carried out using Google forms among customers of shop specialized in sale of organic products. Totally, 48 consumers of organic products were questioned and all data were processed in MS Excel and SPSS program using basic mathematical and statistical methods. The results of survey showed that 75 % of all respondents thought that organic products are products without any chemicals or pesticides which have organic certificate, and the word 'healthy' was the first association on the term organic in 64,6% of cases. Health and the quality were the most important factors influencing the purchase. Consumers also agreed that bigger surfaces should be under organic products and that offer is not satisfying. Based on the results it can be concluded that larger arable areas should be under organic products, that suitable management of certification should be developed and that these products should have suitable promotion. Also, organic production should also be supported more through agrarian policy measures and through subsidies.

Key words: Organic products, consumers, opinions and preferences, Banja Luka

P4_16

The impact of certain demographic factors on consumer attitudes toward organic agricultural and food products in the Republic of Serbia

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Abstract

Lately, in the Republic of Serbia, there may be an increase in the interest of the population for agricultural and food products produced in the so-called organic production system. The dissemination of information about this type of products through the mass media and their impact on the health of animals and people undoubtedly significantly influence public opinion on this issue. However, it is assumed that opinion and attitudes about this depend, inter alia, on sex of the respondents, their professional qualifications and age. For this reason, the main goal of the study was to examine the attitudes and opinions of the respondents on organic agricultural and food products, as well as the motives for purchasing this type of product, depending on the aforementioned factors. In order to collect data on the attitudes and opinions of the respondents, the survey method was used through questionnaires, in several cities on the territory of the Republic of Serbia. The study was conducted on a simple random sample of 369 respondents. For the collection, processing and analysis of collected data, other research methods were also used: observation method, content analysis, tabular analysis, comparative analysis, and hypothetico-deductive method. In addition to the abovementioned methods, $\chi 2$ test was also used to examine assumptions. The results of the research indicate that the analyzed demographic factors have a certain impact on the opinion and attitudes of the respondents on organic agricultural and food products as well as on the motives for their use.

Key words: agriculture, food industry, organic products, consumption, attitudes

P4_17

Analysis of rural tourism management, an integrated and sustainable approach

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Abstract

The aim of this paper is to examine the quality of rural tourism management in the Republic of Srpska, one of the entities of Bosnia and Hercegovina, by applying a sustainable and integrated approach. The analysis of both, the potential and the integration of the entities that are crucial for the management and planning of rural tourism, as well as the consideration of the principles of sustainability in the planning of rural tourism in the Republic of Srpska, are included. The research is based on the Integrated Quality Management method (IQM), that integrates all the carriers of the tourist offer in the destination. IQM connects four key elements of a destination in its approach: the satisfaction of tourists, the satisfaction of service providers, the quality of local inhabitants' lives and the quality of the environment. For measuring the results of the quality of a destination concerning individual indicators, a so called Qualitest was used, that was created by European Commission as a manual for evaluating the quality of a destination. Qualitest consists of 16 quality themes that provide information on basic factors of a destination and the quality of a tourist product itself. By comparing the mean value for each indicator of the quality of rural tourism, it can be concluded that there is no significant deviation in the attitude of the respondents on the quality of rural tourism offer. All groups of respondents believe that it is primarily necessary to improve the existing infrastructure in rural areas, then to adapt the rural tourist destinations to people with disabilities and improve the promotion and marketing of destinations. The highest rating by all groups of respondents is given to the indicators such as gastronomic offer, the quality of accommodation, the kindness of employees and residents.

Key words: rural tourism, integrated quality management, integral approach, sustainable approach, quality of the destination

P4_18

Analysis of the potential for agri-tourism development in Laktasi municipality

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Abstract

The purpose of this paper is to present opportunities for development of rural tourism in the area of Laktaši municipality, as well as potential benefits of rural tourism for strengthening of rural economy in this area. The subject of this research was focused on potentials for agri-tourism development of rural households in Slatina community. For the purpose of the research, a case study was selected in the field of viticulture in Slatina, by using the methods of interview and questionnaire. Literature sources show that rural tourism today represents one of the very important factors in countryside preservation and rural development in general. The significance of rural development, on the other side, is in integration of different activities and sectors: agricultural production, traditional products manufacturing, preservation of traditional products and way of life, traditional gastronomy and other tourist services. The research result show that Slatina community has the potential for development of rural tourism. Different tourist potential that have been identified (Spa complex Zotović, Terme Laktaši, Starača lake, countryside household "Aleksini vinogradi, specific street names) are already visited by tourists for a long time. Economic benefits of rural tourism are represented trough several standard indicators like the number of meals, the number of overnights stays and the daily tourists spending. The research also revealed several issues that hinder further development of agri-tourism and those are: low financial support for business start-ups in rural tourism, a lack of strategies and programs for rural tourism development, on both local and republic level, lack of educational programs for existing and potential service providers in rural tourism, lack of institutional support for entrepreneurship development in the field of rural tourism, unwillingness for undertaking self-initiative, fear of failure.

Key words: rural development, rural tourism development,agri-tourism, touristic potentials.

Section 4: AGRICULTURAL ECONOMICS AND RURAL DEVELOPMENT

Oral Presentations

O4_01

Enabling evidence-based agricultural and rural development policy making in the Western Balkans

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Abstract

Evidence-based policy is set of methods which informs the policy process and advocates a rational, rigorous and systematic approach. Policy which is based on systematic evidence is seen to produce better outcomes. The purpose of this paper is to analyze the possibility for evidence-based policy in the Western Balkans. It attempts to answer to following questions:

1. What are the crucial factors enabling evidence-based policy?
2. Are those factors favorable for evidence-based policy making in SEE?
3. What could be done to improve the situation?

Thereby, positivist data collection method is used with secondary data analysis. Namely, this paper summarizes the findings of seven policy studies produced as part of the SWG policy assessment work on topics related to agriculture and rural development in SEE. It considers critical enabling factors for evidence-based policy defined by Head (2010), and their fulfillment in the Western Balkans: high-quality information bases on relevant topic areas; cohorts of professionals with skills in data analysis and policy evaluation; political and organizational incentives for utilizing evidence-based analysis and advice; and substantial mutual understanding between the roles of policy professionals, researchers and decision-makers. The results show lack of data as a central problem when it comes to evidence-based policy. In addition, education and capacity-building are under-developed. Agricultural policy is usually formed on an ad hoc basis and driven by vested interests rather than by serious consideration, monitoring, evaluation and evidence-based adaptation. There is a lack of awareness, understanding and involvement of stakeholders in the policy-making process. To improve the situation capital investment in data management and modern methods are necessary. Staff involved in policy-making should be improved in numbers, knowledge and technical capacity and inter-institutional cooperation should strengthen. Developmental logic must replace redistributive logic. New forms of communication should be installed to promote active stakeholder exchange platforms.

Key words: evidence-based policy, agriculture, rural development, Western Balkans

O4_02

The FADN' Farm Net Value Added as a main indicator of farm income in EU and Serbia

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Abstract

Farm Accountancy Data Network (FADN) is one of the most reliable data sources for economic analysis in the agriculture. The FADN methodology enables to extrapolate the data on economic results of sample agricultural holdings to the agricultural sector as a whole and compare the relevant indicators of all EU member states. The main income indicator used by FADN is Farm Net Value Added (FNVA) per holding or per Annual Working Unit (AWU). Farm net value added (FNVA) is one of the FADN's main income indicators, used to remunerate the fixed factors of production (labor, land and capital). In order to obtain a better measurement of the productivity of the agricultural workforce taking into account the diversity of farms, FNVA is also calculated by annual work unit (AWU - work of one person occupied full time on a farm). This paper presents results based on FADN' indicator Farm net value added, per annual working unit (AWU) (Indicator 425) in the EU countries and Serbia, taking into account different types of farming.
In the process of EU accession Serbian agricultural sector is obliged to align a set of regulations and standards and adopt certain requirements compliant with the objectives of the Common Agricultural Policy (CAP), inter alia, to establish Farm Accountancy Data Network (FADN). This paper provides the comparative analyses on farm income based on FNVA in 2017. and classification of the holdings by economic size and type of farming. According to the paper results the FNVA is proven to be reliable indicator allowing comparative analyses between different EU countries.

Key words: FADN, FNVA, Standard output, AWU

O4_03

The analysis of subsidy structure according to type and economic size of agricultural holding in Serbia

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Abstract

The modern concept of agricultural policy implies two forms of support for the agricultural sector market price policy and support for rural development. The most common form of support for agricultural producers are subsidies. According to the Law on Subsidies in Agriculture and Rural Development of the Republic of Serbia, there are four types of incentives: direct payments, support for rural development, special incentives and credit support, whereby direct payments and support for rural development participate with more than 90%. Within the framework of direct payments, subsidies for animal and crop production, as well fuel and/or fertilizer subsidies, are monitored. On the other hand, subsidies for investments are also included under the monitoring of measures for support to rural development. The aim of the research is to present the structure of allocated subsidies in accordance to the type and economic size of agricultural holding in the Republic of Serbia for the period 2012-2016. According to the official methodology of Eurostat, nine types of agricultural holdings are distinguished, while the economic size is divided into ten classes. Most of the subsidies for investments (43.4%) and direct subsidies per hectare, fuel and/or fertilizer (51%) were allocated to agricultural holdings specialized for crop field production. The largest part of the funds intended for subsidizing animal production was distributed to agricultural holdings specializing for grazing livestock (37.7%). The largest number of agricultural holdings, 33.7% of the total number of households in Serbia, is in the category under 2.000 EUR of economic size. Agricultural holdings with economic size between 25.000 and 50.000 EUR are received the most investment subsidies (20,1%) and direct subsidies per hectare, fuel and/or fertilizer (16,3%). The largest part of the subsidies for animal production was allocated to agricultural holdings of economic size over 250.000 EUR (21.5%). The imporatnce of this research for creators of agricultural policy in Serbia is to identify the direction of rural development in Serbia. Also, the subsidy structure according to type and economic size of agricultural holding is comparable with EU countries and provides an opportunity to perceive further development of agricultural production in Serbia in relation to the EU countries.

Key words: subsidies, economic size, types of agricultural holdings, Serbia.

O4_04

Comparative advantages and intra-industry trade for meat sector in Bosnia and Herzegovina's trade

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Abstract

The aim of paper is analyses the foreign exchange of three types of meat; poultry, pork and beef, as well as identification of comparative advantages and the level of specialization in intra-industry trade of these products between Bosnia and Herzegovina and the rest of world. The analyses is referred for a time period between 2014 and 2017. Indicators used in the analysis are: RCA as an index of comparative advantages; GLi which shows the level of specialization in intra-industry trade and RUV index for the analysis of horizontal and vertical specialization in intra-industry trade. Except the poultry, where are in the analysed period recorded positive values of RCA index and high level of specialization in intra-idustry trade, by other meat products is confirmed the lack of comparative advantages and intra-industry trade. RUV indicator shows that in the trade od meat prevelant feature is the vertical specialization in intra-industry trade.

Key words: meat, Bosnia and Herzegovina, comparative advantages, intra-industry trade

O4_05

Competitiveness of Russian grain: state, prospects and development trends

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Abstract

For more than 100 years, the grain industry has been a leader in the structure of Russian agro-industrial production due to favorable conditions, soil fertility (240 million hectares) and the acquired historical experience of farmers, who ultimately ensure efficient grain production. At the same time, the existing trends in reducing the profitability of grain production, deepening the uneven distribution of income between producers and intermediaries, increasing dependence of farmers on grain traders, who currently control most of the commodity flows of grain and significantly affect the domestic price policy, the growing gap between import and export prices of grain crops cause an objective need to find innovative ways to improve the competitiveness of Russian grain producers in both domestic and foreign markets. The authors analyzed the main parameters of the competitiveness of Russian grain, identified the problems of realization of its competitive advantages in the world market. The comparative analysis of parameters of competitiveness of grain crops of Russia and other leading grain powers (USA, Canada, EU) is carried out. In particular, the level of costs for the production of grain crops under favorable weather conditions, Russia has significant competitive advantages in the world market. The main reasons for the low cost of Russian grain in the article highlighted the low level of wages of farmers in comparison with developed countries, the minimum cost of fertilizer, almost complete lack of investment (except for government subsidies) to restore soil fertility, low rent for land, etc. The article proposes and substantiates measures aimed at improving the competitiveness of domestic grain producers in the domestic and foreign markets, focused on the implementation of unused competitive advantages of domestic agricultural products. The most significant, according to the authors, is the systematic development of all parameters of competitiveness of grain crops, and not the dominance of individual components, including the balance of multidirectional economic interests of producers, support processes to ensure and use the competitive potential of the Russian grain market; implementation of certain competitive advantages of Russian grain in the world market.

Key words: grain crops, grain subcomplex, competitiveness, efficiency of realization

O4_06

The lack of labor force - a threat to the development of agriculture

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Abstract

The subject of research is labor supply and labor price, in general and in particular in agriculture. The aim of the research was to determine to what extent the increase of demand and the price of labor outside agriculture jeopardizes the development of agricultural production in Bosnia and Herzegovina (B&H). The methods used in the research are the analysis, crossing and comparison of data from primary and secondary data sources. Due to the fact that statistical and other data sources did not adequately cover these phenomena, additional data were collected by surveying the holders of agricultural holdings in B&H (N = 76) during the first three months of 2019, which were further analyzed using a rapid review approach. The collected data were statistically processed by of descriptive statistics methods. The results of this research confirmed that the biggest current limitations for maintaining the existing level and for increasing the level of agricultural production are money and labor force. Only 15% of the households meet their workforce needs completely by household members, and 85% hire additional workforce. Usually there is a workforce that is paid (61%), and other options are the help of family members (15%), help of friends (7%) and mutual assistance of farmers (18%). The average cost of hiring workforce is 54.7 KM/work day, or 5.9 KM/work hour. 65% of surveyed households confirmed that today more difficult to find the necessary workers than 3 years ago, and 71% of them workers paid more than 3 years ago, while others pay roughly the same wages, while no one pays less than before. In the last 12 months 42% of farms have left one of their members. One third of the agricultural households' holders confirmed their willingness to stop farming, and the opportunity cost (salary) for which they would do was 1,843 KM net monthly. Three quarters of them would like to go abroad, and a quarter would be happy to be employed in a place of residence and continue to deal with farming. The conclusion is that the labor force for agricultural production is becoming increasingly difficult to be ensured and that wages are increasing, which will be one of the serious treats of agricultural production in B&H in the coming years.

Key words: agriculture, labor force, price, opportunity cost.

O4_07

Tomato Price – Comparative Analysis: Serbia, Macedonia and Republic Of Srpska

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Abstract

Subject of research in this paper is price of tomato, important kind of vegetables for Serbia, Macedonia and Republic of Srpska. The main goals were to, based of quantitative analysis, find out tendencies in prices movements, and to make an comparative analyses of tomato prices in mentioned countries (entity). The parameters of tomato price were analysed in the period 2012-17. Average year prices were analyzed. Quantitative analysis was performed by using descriptive statistics method, and average annual rate of changes to discover the tendencies of changes in the analysed period. Average year price of tomato in Serbia in analysed six year period was 425.55euro/ton. Price was changing in interval between 318 and 565euro/ton. Annual change rate of tomato price in Serbia in analysed period was -5.78%. In Macedonija average year price of tomato was 769.58euro/ton. Price was changing in interval between 702 and 881 euro/ton. Price of tomato in Macedonia shows positive tendency. Annual change rate in analysed period was 1.96%. In entity of Republic of Srpska average year price of tomato was 613.68euro/ton. Price was between 462-872 euro/ton in analyzed period. Price of tomato in Republic of Srpska shows very high negative tendency. Change rate in analyzed period was -9,83% per year in average. The lowest price of tomato was in Serbia. In Republic of Srpska price of tomato was 44% higher, while price in Macedonia was highest, 25% higher than in Republic of Srpska, and 81% higher than in Serbia. Price of tomato shows positive tendency in Macedonia, while in Serbia and Republic of Srpska shows significant tendency of decreasing.

Key words: tomato price**,** comparative analysis, Serbia, Macedonia, Republic of Srpska

O4_08

Cabbage Price – Comparative Analysis

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Abstract

In this paper subject of research is price of cabbage. The main goals are (based of quantitative analysis) to find out tendencies in cabbage prices movements, and to make a comparative analyses of prices of cabbage in Serbia, Macedonia and Republic of Srpska. The average cabbage prices are analyzed in the period 2012-17. Quantitative analysis was performed by using descriptive statistics method, including an average annual rate of changes, aimed to discover the tendencies of changes in the analyzed period. Average year price of cabbage in Serbia was 159.62 EUR/ton. Price was changing in interval between 130 and 183 EUR/ton. Variation of prices in observed period was low (CV=12.86%). Price of cabbage in Serbia shows low negative tendency, almost stagnation. Annual change rate of cabbage price in Serbia in analyzed period was 0.74%. In Macedonia average year price of cabbage was 230.11EUR/ton. Price was changing in interval between 177 and 291 EUR/ton. Variation of prices in observed period was medium (CV=18.81%). Price of cabbage in Macedonia shows very high negative tendency. Annual change rate in analysed period was -7.20%. In entity of Republic of Srpska average year price of cabbage was 174.36 EUR/ton. Price was between 128-205 EUR/ton in analyzed period. Price of cabbage in Republic of Srpska shows negative tendency. Average annual change rate in analyzed period was -2,86%. The lowest price of cabbage was in Serbia. In Republic of Srpska price of cabbage was 9.2% higher, while price in Macedonia was 32% higher than in Republic of Srpska, and 44% higher than in Serbia. Price of cabbage shows negative tendency in Macedonia and Republic of Srpska, while in Serbia showed un significant tendency of increasing.

Key words: cabbage**,** price**,** Serbia, Macedonia, Republic of Srpska

O4_09

Perceptions toward agrotourism diversification – the case of family farming in Prespa region, Macedonia

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Abstract

Agrotourism has helped to sustain many rural communities as a resilient strategy adopted by farmers across the globe. Despite being promoted by different national and international development programmes, it has not gained much popularity in the rural areas of Macedonia. Additionally, a limited number of studies in the country have explored societal perceptions of this strategy. By applying an interpretivist approach, this thesis placed the family farms at the centre of its interest. The aim was to enhance the knowledge about their perceptions towards agrotourism diversification. It explored how farmers in the study region of Prespa understand and define agrotourism, which factors have been impeding its development, and in which way this type of on-farm diversification can help farmers. A case study of 18 family farms was conducted through in-depth individual interviews. The open-ended questions resulted in a variety of answers, which were analysed content-wise. The creation of conceptual categories and the inclusion of excerpts supported the analysis. Patterns in the perceptions on agrotourism diversification were identified. Agrotourism was described as a combination of agriculture and tourism, where the farm is open for visitors and offers recreational and educational services. Activities which add value to the farm and convey the authenticity of the local traditions stood out as important attributes of this diversification strategy. The most important benefits, assigned by the interviewed farmers, were increased revenue and job opportunities, the reduced youth migration, the improved cooperation between the farmers and the cultural and knowledge exchange which agrotourism may provide. However, the participants recognised multiple impediments, the most significant being: the conservative mentality and the farmers' lack of proper skills; the bad infrastructure and inadequate policies. The empirical evidence resulted in a definition, based on the farmers' perceptions. This definition can be implemented, after further refinement, in the potential legal and operational framework concerning agrotourism in the country. Also, the revealed benefits and impediments of agrotourism can serve as a foreground for the implementation of on- farm diversification policies and development programmes.

Key words: perceptions; agrotourism; family farms; case study; Macedonia

O4_10

Potentials and Obstacles of Agritourism Development in Bosnia and Herzegovina and Serbia

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Abstract

Western Balkan countries are having great natural, cultural and social diversity in rural areas giving them great potentials which can be used for the purpose of agritourism development. Agritourism can be important driver of economic growth and rural development increasing household income of agricultural producers.
The objective of this research is to present recognized and available potentials in the area of agritourism that can be used for the development of this specific form of rural tourism in Bosnia and Herzegovina and Serbia. The paper analyzes different development potentials and obstacles of agritourism on the territory of Serbia and Bosnia and Herzegovina. A number of research methods is used for data collection in order to collect representative data on the state and potentials for the development of agritourism. Research methodology and data collection* included focus groups, on-line surveys and interviews with households providing agritourism services. Research results identify the list of priorities in order to develop the agritourism in both countries. Lack of financial means are recognized as main obstacle for further expansion of existing agritourism service providers in both countries. In the process of accession to the European Union, both countries are getting available pre-accession assistance and funds for the development of rural tourism. These funds can be used for agritourism development and to overcome this recognized main obstacle, but alone this is not sufficient, especially if other obstacles that are preventing agritourism development are underestimated.

Key words: Agritourism, rural tourism, Serbia, Bosnia and Herzegovina, developmen

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Sarajevo Economic Region Development Agency; Dragana Stojanović, Regional Development Agency South; Danijela Jandrić, Zlatibor Regional Development Agency.

O4_11

National action plan (NAP) for sustainable use of plant protection products: an example of Slovenia

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Abstract

The principal task of Slovenian agriculture is the production of safe and quality food in such quantities to provide for an appropriate level of self-sufficiency. Plant Protection Products (PPP) are an important milestone in providing food production, since they safeguard agricultural products by eliminating or reducing competition arising from weeds and attacks by harmful organisms and diseases. A legal basis for the National Action Plan (NAP) is laid down in EU Directive 2009/128/EC, which has been transposed into the Slovenian law by the PPP Act (No. 83/12) and Rules on Integrated Pest Management (IPM) (No. 43/14) adopted at the EU level. The NAP aim at setting targets, measures, timetables and indicators to reduce risks resulting from the use of PPP and impacts of such products on human health and the environment, with a special emphasis on IPM and alternative plant protection approaches and techniques in order to reduce the use of PPP. The measures are based on eight general IPM principles. NAP for the establishment of a systemic approach in the field of general IPM principles combining different tasks: preparation of specific guidelines (e.g. potato, cereals, maize, *Alium* species); IPM website; study the choice of PPP; introduction of various tools/methods for managing the resistance of pests on PPP; non-chemical methods of plant protection and low-risk PPP; systematic monitoring and control of weeds in agricultural production; develop a model of advice for the growers to monitor the occurrence of the pests and to keep records of the IPM taken measures; training of agricultural advisors and producers on IPM principles and solutions; updating recommendations for managing new economically important pests with the IPM principles; participation in the working groups of International Organization for Biological Control (IOBC); proposal for an integrated design of the IPM implementation.

Key words: pests, IPM, plant protection products, NAP

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Section 5: SUSTAINABLE MANAGEMENT OF NATURAL RESORUCES

Poster Presentations

P5_01

Diversity of genetic resources of *Phaseolus coccineus* L. from Bosnia and Herzegovina

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Abstract

The legumes (Fabaceae) represent one of the most widely distributed plant families in South Eastern Europe. The local wild and agricultural floras in the Western Balkan countries, including Bosnia and Herzegovina (BiH)/Republika Srpska are relatively rich in legume species. Morphometric seed evaluations for 18 runner bean accessions (*Phaseolus coccineus* L.) including composite accessions from BiH were analysed. Average seed length was 20.87 mm and width in longitudinal cross 8.52 mm. An average 10 seeds weight was 13.33 g with predominant two colours on the seed coat. Principal component analysis (PCA) extracted four components which cumulatively explained 86 % of variability among accessions combining all 14 morphometric seed characteristics characterised. The morpho-agronomic evaluations of 11 sample accessions and 2 control accessions were germinated and many of them faced with drought while growing. They needed between 36 and 41 days to reach 50 % flowering and the flowers showed high variety in colour, i.e. white (plain, with lilac edge or with red stripes), dark lilac or of different shades of red. Leaves were mostly triangular or round shape, often both shapes were presented in the same accession. Majority of accessions grew in the form of indeterminate climbing, while a few of them were determinate bushes or showed determinate climbing. The accessions grew from 69 to 197 cm high. Genetic diversity parameters on 12 SSR loci showed a high genetic variability within examined BiH accessions (He=0.685; I=1.423). The results of the present study will add value through enrichment of the *Phaseolus* collection, improvement of the documentation, study of the accessions for valuable breeding traits within Balkan.

Key words: runner bean, seed characteristics, morpho-agronomic traits, genetic diversity

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P5_02

Evaluation of the soil suitability of the Bužim municipality, for the potato (Solanum tuberosum) cultivation

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Abstract

Rational use of available land is of great importance for the economic development of every society, especially when considering the fact, that the soil is primary production resource, thereby placing an even greater importance on its protection and conservation, but also on the appropriate use. This paper focuses on the municipality of Bužim, located in the northwestern part of Bosnia and Herzegovina, where we assessed and examined the soil suitability for the purposes of potato cultivation using the FAO AEZ (agro-ecological zoning) methodology (1976), which uses input data such as: soil characteristics, climate changes, relief patterns of the investigated area, and the production requirements of selected agricultural crops. Within the municipality of Bužim, 13,026.27 ha of land is used for agricultural purposes. Regarding potato cultivation, the methodology used distinguishes between two categories of soil suitability: the suitable classes (S1, S2, S3) occupiying more than 45% of the land surface, and the unsuitable class (the N class) covering 1,43% of the municipality land surface. Thus, it can be concluded that conditions necessary for potato production, do exist within the municipality of Bužim, in form of land resources. Higher yields couldbe achieved by implementing landscaping measures and introducing new potato varieties in accordance with the latest scientific and expert achievements.

Key words: Agro-ecological zoning, *Solanum tuberosum,* Municipality of Bužim, soil suitability.

P5_03

Effect of seed priming on seed viability and seedelings performances in maize gene bank accessions

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Abstract

During long-term storage of gene bank accessions, even under excellent conditions, seed viability declines with period of storage, resulting in seed death. On the other hand, regeneration of gene bank accessions should be done as rare as possible, because, each time an accession is regenerated, there is a risk that the genetic integrity of accession is compromised by genetic drift, selection, or gene flow. Occasionally it happens that the sample's viability drops below the standard level, when there is a risk that regeneration from such a sample disrupt the identity and integrity of an originally collected sample. Different pre-sowing treatments are often used to improve seed germination and early seedling growth in various crops. The aim of this study was to evaluate the effect of three different seed priming treatments on four maize gene bank accessions, stored for 5 and 30 years under medium-term conditions (t=4-5°C; RH=45-50%). The standard seed germination test on filter paper (BP, 20⇔30°C, ISTA Rules) and cold tests were performed. The following parameters were observed: germination including germination energy, seedlings fresh and dry weight, as well as seedlings length. Data analysis showed that the treatments had a positive effect on the seedling's fresh and dry weight, but not on the seedling's length. Also, seed priming treatments improved germination dynamics. The pre-sowing treatments did not show a positive effect on the final germination in the filter paper tests, while in the conditions of the cold test, they had a positive effect, especially in the samples stored for 30 years. These results have shown that seed priming treatments had more pronounced effects on studied maize seed germination and seedlings traits under suboptimal (low and mixed temperature) than at optimal conditions and can be useful in gene banks practice.

Key words: cold test, germination, growth parameters, seedling, *Zea mays* L

P5_04

The dominant directions of wind erosion in Vojvodina

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Abstract

Most commonly, wind erosion is associated with extremely arid, desert areas. However, even the area of Vojvodina, notably lowland and agricultural (northern part of Serbia, 2.15 million ha, more than 75% arable land) is not exempted from these processes. Wind erosion is the most intense, most frequent form of erosion processes in Vojvodina. Adverse consequences are most pronounced in agriculture, water management and the environment. The dominant directions of wind erosion show temporal and spatial variation and depend on the coincidence of a number of factors. Determining the dominant directions is important for fully defining the process and implementing erosion control measures. Multi-year research of wind erosion was conducted on a several characteristic localities: Subotica and Deliblato Sands (Arenosol soil type), and near Novi Sad and Becej (Chernozem). Soil conditions: permanent and intensive agricultural processing, crushed surface layer, no wind protection. The intensity of erosion has been measured by static catcher of wind-borne particles, run-off sampler deflameter type. They are set in groups of 4 pieces, with the openings positioned in different directions. On the erosive fields, different average yearly intensities of wind erosion and their percentage distribution by direction were noted: Subotica Sands 6.918 kg/m/year, NE-21%, SE-10%, SW-18%, NW-51%; Deliblato Sands 4.478kg/m/year, NE-22%, SE-34%, SW-23%, NW-21%; Novi Sad 1.154 kg/m/year, NE-24%, SE-19%, SW-23%, NW-34% and Becej 2.50 kg/m/year, NE-27%, SE-26%, SW-24%, NW-23%. In Novi Sad and especially Subotica Sands localities, the NW direction is dominant in the production and transportation of deposit; in Deliblato Sands - SE; in Becej - relatively equal from all directions. The noted distributions are not always in direct correlation with the direction, speed and frequency of dominant wind - they are rather a consequence of complex, joint actions of a number of relevant factors.

Key words: Vojvodina, Wind erosion, Agriculture, Soil degradation, Dominant directions

P5_05

Climate Strategy and Action Plan in the Republic of Serbia

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Abstract

Climate change is a global challenge that requires a rapid and decisive response of individual countries. The consequences of climate change in the Republic of Serbia are anticipated to create material and financial consequences and human loss. The National Climate Change Strategy will establish a strategic framework for climate actions. This framework will also secure fulfilment of Serbia's obligations under the Paris Agreement and as the EU candidate country. Thus it shall be consistent with the EU 2030 Climate and Energy Framework, the Energy Union Strategy and the EU 2050 Roadmap. Serbia submitted its Intended National Determined Contribution (INDC) with the pledge to reduce greenhouse gas emissions of 9.8% by 2030 compared to 1990 levels. The Climate Strategy will show that Serbia is moving forward in the fulfilment of both its international commitments and national objectives. In addition, the Strategy will identify priority the GHG emissions reduction measures, define the responsible institutions for specific options alongside timelines for implementation and overall financial resource requirements. A set of transparent scenarios will be prepared to explore different cost-effective approaches for Serbia. Scenarios are defined for each of the following years – 2020, 2030 and 2050 with an outlook to 2070, elaborated through running three models: The Primes – GEM-E3 suite, CAPRI and the IPCC Waste Model. The Climate Change Action Plan will describe the short-term actions covering the first phase of the implementation of the Climate Change Strategy: Proposed policy measures per sector up to 2020 with outlook to 2030, Required resources, including potential resources of financing, Actions to be carried out by public authorities and regulators, Clear timelines and outcome indicators for these activities, Type and frequency of activities to monitor progress. The purpose of Climate strategy and Action plan is to consider possible significant effects on the development of the economic sectors and environment and to give guidelines for their mitigation, i.e. to mitigate them to acceptable levels to avoid their sustainability and stay in line with the commitments.

Key words: Climate change, Climate Strategy, reducing GHG, Action Plan

P5_06

Radioactive residue burdens in soil, foodstuffs, animal feed and biological material

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Abstract

Peaceful uses of nuclear energy (nuclear weapons testing, nuclear reactor accidents, industrial and medical use of radioactive compounds) and application of phosphate mineral fertilizers in agricultural production lead to substantial environmental contamination. Land contaminated with radionuclides represents the first link in the food chain and hence the radioactive contamination of crop and livestock production. Activity concentrations of radionuclides gamma emitters were determined by the method of low-level gamma spectrometry on high resolution HPGe detector system produced by ORTEC. Concentrations of thorium and uranium in all samples were analysed by a technique of inductively coupled plasma with mass spectrometry (ICP-MS 7700, Agilent). The samples of the soil, foodstuff (meat and meat products, milk and dairy products, fish, honey), animal feed (complete mix, concentrated pre-mix feed, phosphate mineral feed, fish meal) and biomaterials (internal organs, urine) were examined. The results revealed the presence of the following natural radionuclides: K-40, Ra-226, Th-232, U-235 and U-238. Besides, the presence of Cs-137, that is, an anthropogenic (artificially produced) radionuclide has been confirmed. Based on the results obtained, it can be concluded that in all tested samples the highest concentration of activity originates from natural radionuclide of potassium-40. Also, in this study, the content of the tested radionuclides in different environmental samples gives interesting additional data for an approximate calculation of the average input of radioactive residues.

Key words: natural radionuclides, artificial radionuclides, biosphera

P5_07

Selection of probiotics from Tunisian table olives : Towards a better control and valorization of a Mediterranean fermented food

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Abstract

The present work falls within the framework of ProMedFoods project ID: 9028. It aims to improve knowledge and selection of microorganisms involved in the local and artisanal Mediterranean fermented foods considered as an important part of the traditional gastronomical heritage of Mediterranean countries. In this context, fourty lactic acid bacteria were isolated from the brine and the flesh of Tunisian olive varieties, from various recipes and at different stages of the fermentation process. The isolates were tested for their probiotic properties based on the resistance to biological barriers (gastric and intestinal juice), antimicrobial activity, hemolysis on human blood, autoaggregation ability and surface hydrophobicity, and correlation between these two traits was determined. According to the results found, five isolates showed the best probiotic characteristics among the lactic acid bacteria assessed. Isolate NC18 identified as *Lactobacillus plantarum* by a 16S rRNA gene sequence analysis, was the most interesting strain since it showed high values of resistance to gastric juice, autoaggregation and it was shown to inhibit the growth of *Escherichia coli* ATCC 35150, *Salmonella enteridis* ATCC 13076, *Staphylococcus aureus* ATCC 6538, *Listeria monocytogenes* FMCC B-128 and *Bacillus cereus* ATCC 168. In conclusion, our studies should contribute to provide efficient fermentation starters to local food producers not only to develop high quality and safe artisanal foods but also to preserve Mediterranean fermented food microbial resources and diversity.

Key words: table olives, process, lactic acid bacteria, selection, probiotics.

P5_08

Organic grape production

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Abstract

In most of the developed wine-growing countries in the world, there is a growing demand for grape products without residues of pesticides and other harmful substances, which encourages the development of specific forms of production such as organic (organic, biological). "Organic agriculture" is a production system that maintains the health of land, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions. Organic agriculture by the definition of IFOAM (International Federation of Organic Agriculture Movement) combines tradition, innovation and science with the goal of using a common environment and promoting fair relations and good quality of life for all involved parties). Organic viticulture is defined as the application of organic farming processes for the production of grapes and wines of the best possible quality. All aspects of organic viticulture such as cultivation system, land, disease control and pests are implemented in order to increase the quality and health safety in the organic production of wine and table grape varieties.Because of their high sensitivity to fungal diseases, *Vitis vinifera* varieties require the regular application of a large number of pesticides during vegetation, and their cultivation according to the principles of organic viticulture is possible. Let some new products have efficiency at the level of synthetic preparations, and therefore they are starting to use more and more in conventional production in the management of resistance of harmful organisms.By properly selecting varieties and developing appropriate agrochemicals, it is possible to make organic production economical and to offer quality, health-safe grapes, wine and other products to consumers.
Global developments in the direction of taking measures to protect the environment and produce healthy foods should be supported by viticulture.

Key words: variety, pesticides, environment, quality

P5_09

Diversity of pear (*Pyrus communis* L.) accessions in the *ex situ* collection at the Gene Bank of Republika of Srpska

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Abstract

Republika of Srpska and Bosnia and Herzegovina are very rich with fruit genetic resources. Their characterization and sustainable use are the main tasks of Working group for Fruit and Vitis. Fruit germplasm was inventoried and collected all over the Republika of Srpska and as a result of these actvities, *ex situ* fruit field collection, consisting of 85 pear accessions, was established in 2013 at the University of Banja Luka, Institute of Genetic Resources. Five pear accessions: Ječmenica, Jeribasma, Sijerak, Glibanjka and Gospoinjača were evaluated. Morphological, pomological and molecular analysis were conducted in order to identify level of diversity of pear germplasm in the *ex situ* collection. According to the IBPGR descriptors, following characteristics were measured: length, width and weight of the fruit, length and width of the fruit stalk. Fruit firmness and soluble solids content (ºBrix) were measured as well. RAPD (Random Amplified Polimorphic DNA Markers) markers were used to determine genetic similarity between accessions using 10 oligonucleotide primers. According to morphological characteristics, accession Glibanjka had the highest values for all measured characteristics while accession Ječmenica had the lowest values. Accession Glibanjka was separated as the largest one while accession Ječmenica was identified as the smallest one from all five accessions evaluated. Accession Sijerak had the highest value for soluble solids content while accession Gospoinjača had the lowest value. Highest value for the fruit firmenss had accession Glibanjka, while accession Ječmenica had the lowest value. Genetic similarity was assessed accoding to Jaccard coefficent of similarity using RAPD markers. The results showed that genetic similarity coefficient ranged between 0.4-0.6 and all five accessions had different genetic similarity coefficients. We were able to distinct between five pear accessions from the *ex situ* collection and evaluate diversity on the morphological, pomological and molecular level.

Key words: IBPGR descriptors for pear, molecular markers, characterization

P5_10

Fruit characteristics of tomato accessions (*Lycopersicon esculentum* Mill.) from the Gene Bank of Republic of Srpska

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Abstract

Through the Program for conservation of plant genetic resources of the Republic of Srpska and the Working group for vegetables, 25 tomato accessions have been collected. To utilize the collected material in a sustainable way, the agronomic evaluation is needed from which the most important part is fruit evaluation. The purpose is to determine if there are duplicate accessions present. Fruits of 11 accessions were evaluated using IPGRI morphological descriptors (The International Plant Genetic Resources Institute, 1996) for tomato (*Lycopersicon* spp.): GB00548 ('Paradajz 1'), GB00874 ('Paradajz amerikanac 2'), GB01107 ('Paradajz 2'), GB01110 ('Sitni paradajz 2'), GB01123 ('Paradajz 4'), GB01126 ('Trebinjski jabučar'), GB01128 ('Paradajz 5'), GB01129 ('Žuti paradajz 2'), GB01132 ('Intenzivno žuti amerikanac'), GB01238 ('Žuti paradajz 3') and GB01239 ('Volovsko srce'). Plant material was produced in 2018 in greenhouse from seedlings. In total, 35 fruit characteristics (descriptor code 7.2.2) were scored on 10 fruits per accession. The highest fruit weight (202.6 g) and fruit width (76.75 mm) was recorded for accession GB00874. On the other hand, GB01126 had the lowest fruit length (35.79 mm) and fruit width (33.67 mm), while GB01110 had the lowest weight (26 g). Predominant fruit shape was flattened (GB00548, GB00874, GB01107), slightly flattened (GB01129, GB01238), rounded (GB01123, GB01132), high rounded (GB01110, GB01126, GB01128) and heart-shaped (GB01239). Exterior color of mature fruit was red for most of the accessions, while GB01129, GB01132 and GB01238 were yellow and GB00548 and GB01239 were pink. Most of the accessions had yellow ripe fruit skin color, while GB00548 and GB01239 had colorless skin. The highest number of locules was observed for GB01238 (9.6), while GB01126 had the lowest number of locules (2). In conclusion, all accessions were different on morphological level, but further chemical and molecular evaluation should provide more complete picture of differences between accessions.

Key words: conservation, evaluation, IPGRI descriptors for tomato

P5_11

Reproductive potential of Jerusalem artichoke (*Helianthus tuberosus* L.)

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Abstract

Jerusalem artichoke (*Helianthus tuberosus* L.) is an invasive plant from North America which had been imported to France in 1607 and expanded to Europe. *Helianthus tuberosus* L. occurs along water-course, where high and dense vegetation forms. It belongs to species, which are spreading aggressively and settle larger areas. It contribute for not only propagation by generative diaspore, but also propagation by parts of rhizomes and tubers. The aim of this study was compare basic parameters of tubers and seed production of *Helianthus tuberosus* L. from two locality (Opatovce nad Nitrou, Veľká Čausa, Central Slovakia) in the years 2016 and 2017. On the base of analyse and its statistic interpretation of collected data we can conclude, factor locality had high significant influence to parameter count of species. Factor year significant influenced weight of dry biomass and production of sterile seeds. We found out, by descriptive statistic, that there are more plants and tubers per m^2 in locality Veľká Čausa like in locality Opatovce nad Nitrou. We can see double increase of count of plants during two years in locality Opatovce nad Nitrou (2016 – 48 plants per m^2, 2017 – 102 plants per m^2). Weight of tubers of *Helianthus tuberosus* L. was from 3.2 g (2016, Opatovce nad Nitrou) to 7.6 g (2016, Veľká Čausa) in average. Count of lively eyes was from 2 to 3 pieces per tuber, in both locality, in both years. The research results on production of reproductive organs show that under the conditions of Slovakia, the Jerusalem artichoke is able to produce fertile seeds, not only sterile or not at all. However, the primary method of reproduction still remains with tubers.

Key words: Jerusalem artichoke, invasive plant, reproduction, dry biomass, seed production, tubers

P5_12

Pomological characteristics of apple fruits from *ex situ* collection

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Abstract

Through the activities of Gene Bank of the Republic of Srpska, two field fruits collections are raised: in Botanical garden, University of Banjaluka and in the municipality of Čajniče. During 2018. the fruiting was recorded on ten accessions in core and duplicate field collections on which pomological characterization was done. In this research, observed characteristics were fruit weight, fruit and pedicel lenght and width, fruit hardness, total soluble solids content in fruit juice and presence of aborted seeds. The accession Krompiruša from Čajniče had the longest fruit and the same accession from Botanical garden collection had the higest hardness fruit flesh, measured by penetrometer method. Most accessions in Čajniče had a higher content of sugars in the fruits, and the highest soluble solid content was recorded in the accesion Šarunija. The results of the research show that apples from Čajniče collection had a higher weight, lenght and fruit width as well as a higher sugar content, while most accessions from Botanical garden collection had longer pedicel, lower presence of aborted seeds and higher hardness fruits. This leads to a conclusion that same apple accessions from Gene bank cultivated on different locations have different values of pomological characteristics, which is explained by the climate influence. Thereby, a positive influence of a climate in Čajniče on fruit growth and development was observed.

Key words: genetic resources, *ex situ*, pomological characteristics

P5_13

The content of copper in the soils of different geomorphological units

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Abstract

The aim of this paper was to determine the total contents of copper (Cu) in the soils of different geomorphological units in the northwest of Bosnia and Herzegovina: plain and lowlands (I), hilly terrains (II) and mountainous terrains (III). Total Cu content and soil properties (pH, content of organic matter, cation exchange capacity), important for an appropriate risk assessment as well as the mobility of metals, were determined in 330 samples, taken from two layers (depths): arable (0-25 cm) and sub-arable (25-50 cm). Total Cu was determined by atomic absorption spectrophotometry after digestion with concentrated nitric acid. Soil properties, which were measured by standard agrochemical methods, indicated a great heterogeneity of the investigated soils through entire examined area. Total content of copper in all individual samples was mainly lower than the allowed maximum for unpolluted soils (60 mg kg^{-1}). Average total Cu in different units and soil depths revealed similar values, between 19,3-23,6 mg Cu kg^{-1}. The descending order for the average total Cu contents in the geomorphological units was: I > III > II. The results showed that the soil parent material had the highest influence on the content and chemistry of copper in the investigated soils.

Key words: potentially toxic elements, natural origin, environment, pollution.

P5_14

Soil biogenity of the Banja Luka region as a result of the interaction of biological and chemical factors

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Abstract

The soil is sensitive to any changes occurring inside or on its surface affecting its heterogeneity and biogenic composition. Analyzing soil samples, got insight into chemical properties as well as the diversity of the living world in it. The chemical and biological analysis of soil samples was performed on 10 average soil samples taken from the Banja Luka region in 5 different locations. Media used for cultivation of microorganisms, isolation and subcultivation were: soil extract agar, nutrient agar, Potato Dextrose Agar (PDA), Jensen's medium for nitrogen fixing bacteria, Czapek-Dox agar, Actinomycete isolation agar. After incubation in thermostat under controlled temperature conditions the results were estimated as: total number of bacteria, number of fungi and actinomycetes. In the neutral reaction soil sample, a greater number of bacteria was observed and at the same time the sample contained a large percentage of humus, while mild alkaline soil had a higher growth of actinomycetes. Soil samples of acidic reaction showed a slightly higher number of fungi. Free-living nematodes were extracted with Ostenbrink elutriator. Morphological nematode identification was done to feeding type level and plant-parasitic nematodes to genus or species level. In acidic soils dominated fungivore nematodes, bacteriovore nematodes in microorganisms rich soils while in vegetable soils dominated plant-parasitic nematodes. These results reveal that nematodes and microorganisms biodiversity can be an indicator of biological and chemical properties of soils.

Key words: soil, biogenic, nematodes, microorganisms, chemical analysis

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P5_15

Dependence of the efficacy of pre-emergence herbicides (PreEM) in common ragweed control of the dose and number of days after herbicide application (DAA)

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Abstract

The aim of the research is to determine the efficacy of 12 active substances in control of common ragweed (*Ambrosia artemisiifolia* L.), and these are: atrazine, alachlor, acetochlor, alachlor + linuron, S-metolachlor, pendimethalin, metribuzin, prometryn, napropamide, imazethapyr, oxyfluorfen and dichlobenil. Dependence of the efficacy of pre-emergence herbicides (PreEM) in control of common ragweed on the dose and number of days after herbicide application (DAA) will be analyzed by multiple regressions. The efficacy of the pre-emergence herbicides was researched in 2004 and 2005. The pre-emergence herbicides were applied in May on the soil that had been prepared for sowing but not sown yet. The efficacy was observed 30, 45, 60 days after the application. Herbicides were used in 4 different doses: Dose I (D1), which is ½ of the recommended dose, Dose II (D2) is the lowest recommended dose, Dose III (D3) is the highest dose and Dose IV (D4) is the dose where the herbicides were used with the dose higher than it is recommended (D3 × 1,5). To estimate the efficacy, the number of weed and fresh weed mass were estimated. The experiment was set by a random plan, with four repetitions. The multiple regression between the dose and numbers of days after the herbicide application, as the independent variables and percentages of the efficacy as the dependent variable was performed by the statistic programme Statistica 7. Partial coefficient of the correlation of the dependence of efficacy percentage of the herbicide dose is positive in all the cases and significantly high at all the herbicides, from 0,739** to 0,956**, meaning, by the increasing the herbicide dose, efficacy percentage is significantly growing. Partial correlation coefficient of dependence of efficacy percentage of the number of days after the herbicide application is

negative in all the cases and for the efficacy percentage for the common ragweed mass is statistically significant or highly significant and is from -0,606* to -0,904*.

Key words: herbicides, common ragweed, efficacy

P5_16

The development of the biogas sector in Poland

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Abstract

The growing demand for energy, with the depletion of traditional resources and increased pollution of the natural environment, increase the interest in the use of energy from renewable sources. Renewable energy sources are an alternative to non-renewable fossil fuels. Energy from renewable sources includes energy from solar radiation, water, wind, geothermal resources and energy generated from solid biofuels, biogas and liquid biofuels, as well as energy obtained by heat pumps. Biogas is a gas consisting mainly of methane and carbon dioxide, obtained in the process of anaerobic biomass fermentation. Due to the method of obtaining, the following types are distinguished: landfill gas, sewage sludge gas and other biogases, such is biogas obtained as a result of anaerobic digestion of animal waste, waste in slaughterhouses, breweries and other activities in agri-food processing.

The aim of the research is to show the development potential of the biogas plant sector in Poland, with particular emphasis on agricultural biogas plants. For collecting of the secondary source data was used a documentary method. The source data came from Polish government institutions involved in controlling the energy market and support for the biogas plant sector. The potential of biogas production in Poland is very high. Nearly 100 million tons of livestock manure, a dozen or so million tons of cereal, corn and other straws, several million tons of various food processing and food wastes - this gives biogas potential at a level of several billions m^3 annually or over 3,5 GW of power. Today, all biogas plants generate electricity (most of them also heat in cogeneration). The number of biogas plants is approximately 300 with a total installed electricity of 215 MW (including 103 MW from 96 agricultural biogas plants).

Key words: biogas, agricultural biogas plant, renewable energy

P5_17

Grain characteristics of the collection *Lathyrus sativus* L. in Institute of Field and Vegetable Crops, Novi Sad, Serbia

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Abstract

Serbian botanical name for *Lathyrus sativus* is "sastrica". Variety of folk names for grass pea, such "šoder pasulj", "cicor", "radan", "sekirče" testify its past prevalence in the diet of local population. Grass pea is usually consumed boiled, combined with vegetables, with or without meat, or as a salad. It was nearly forgotten crop and could rarely be seen on Serbian farms. Recently, grass pea has been reintroduced in Serbia, mostly for the purpose of organic production. It is especially important in diet of patients suffering from diabetes. For the purpose of successful reintroduction, 11 accessions of grass pea cultivated in Serbia were collected and evaluated. Part of the accessions are landraces collected from the territory of Serbia, while several accessions were introduced years ago, mostly from Herzegovina. Evaluated seed traits are: seed size (1000 seed weigh; seed length, width and thickness), seed shape, seed coat surface, seed color and seed coat patterns. Seeds were mainly of medium size with rhomboid or triangular shape. The largest seed had an accession collected from locality Erdevik, laying on the slopes of Fruska gora Mt. Accession with the smallest seed originated from the locality Bački Petrovac. Six accessions had monochrome, mainly cream seeds (except one accession with yellow-green seed) and smooth seed coat surface. The rest of the accessions are mixture of two types of seeds: monochrome (yellow-green or cream with smooth seed coat surface) and multicolor (brown, streaked and tubercular seed coat). This small collection indicates variability of *Lathirus sativus* in studied region. It is necessary to organize collecting mission and conduct further investigation, as well as popularize advantages of this species and its usage.

Key words: edible grass pea, genetic resources, accessions, morphometric grain evoluations

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Section 5: SUSTAINABLE MANAGEMENT OF NATURAL RESORUCES

Oral Presentations

O5_01

Bioeconomy as a development driver for natural bioresources strategies in Romania

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Abstract

In the worldwide economic, social and political development, every century encountered a central driver that represented the innovation trigger for a knowledge leap. At this moment, many studies indicate that bioeconomy is an emerging concept, that will ensure the sustainable development of human activity, for a prosperous and safe future. Agriculture is one of the main economic activities in many countries in Europe and waste management in agriculture represents a critical point in the national strategy of most of them. In the same time, agriculture is generating great amount of byproducts, thus increasing disposal and storage issues. This paper gives an overview on bioeconomy as an element for the development strategies for Romania, with a specific highlight on environmental challenges and agriculture opportunities. From a methodological point of view, the technique of indirect research was used, studying various articles, official statistical information and specialized studies published until now. The information was processed by observation, analysis and comparison of data provided by official databases. In Romania, there are significant opportunities for the development of a competitive economy based on bioresources. Agriculture and the rural development sector occupy a very important place in the Romanian economy. With nearly 30% of the population employed in the primary sector and a large proportion of the population living in rural areas, agricultural activities play a central role in the lives of many Romanians. It is to be taken into account, that an effective settlement of bioeconomy concept through development strategies will strongly be influenced by a successful cooperation of multi-actor stakeholders (farmers, industrial partners, business environment, policy makers, and most important, citizens).

Key words: bioeconomy, agriculture, Romania, biological resources, management strategies

O5_02

Establishment of shelterbelts with autochthonous tree species

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Abstract

The aim of this paper is to emphasize the benefits of shelterbelts establishment with autochthonous tree species, which includes erosion control, biodiversity enhancement and increase in crop production. Shelterbelts decrease the rate of soil erosion and evapotranspiration which benefits the agricultural production. On the other side, shelterbelts represent an obstacle to airborne transport of chemicals, including pesticides and fertilizers outside the agriculture fields. Established at the river or canal banks, shelterbelts act as a buffers which reduce water pollutions and also decrease the water temperature, improving the living conditions for fish species. They contribute to integral management of soil, water, plants, and animals. For the purpose of this paper the shelterbelts are established near Opovo, at Banat region, Serbia, using the autochthonous tree species of pedunculate oak, black poplar, white poplar, and white willow. The pedunculate oak shelterbelts are established in a single and a double-rows by direct seeding, while shelterbelts of other species are established in a single rows by planting of seedlings (with and without roots). The shelterbelts are established in years 2014-2019, at total length of 2675 m, of which 1210 m with pedunculate oak, 1015 m with black poplar and white poplar, and 450 m with white willow. The survival rate of seedlings range between 96% and 100% after the first growing season. Two years after the pedunculate oak shelterbelts established, excess seedlings are used to establish a new shelterbelts. Height of seedlings before planting of poplar and willov amounted to 1,2-3,1 m, wich did not significantly affect the survival rate. There is damage to the seedlings, most of the man.

Key words: shelterbelt, autochthonous tree species, agroforestry

O5_03

Current condition and transformation of dendroflora in Protected area „University city“

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Abstract

The 'University City' complex is the only category VI protected area in Banjaluka. In 2016., in accordance with the law regulation, it has been declared Protected area with sustainable use of natural resources – Park architecture monument 'University city'. The object of study is dendroflora of the protected area, with the focus on its state and change it underwent since 2008, when the first research was carried out. Based on data collected, comparative analysis was made and ten year transformation process of green spaces matrix was determined. The paper shows the inventory of woody plants and species determination based on relevant sources with common name given to each species (number of species in 2008. was 77, and 103 in 2018.). AutoCAD 2014 software was used for cartographic view of inventory and spatial distribution change. This research gives detailed data on dendroflora condition and structure, as well as recommendations in regard to the further development planning of protected area based on principles of actual and future elements of dendroflora integration.

Key words: protected area, University city, dendroflora

O5_04

Diversity of wild bees in the Republic of Srpska and potential for their use in agricultural production

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Abstract

Presence and diversity of bees have great importance for ecosystem since they are the main pollinators of both agricultural and native plants. According to The European Red List of Bees there are 2051 species of bees present in Europe. Despite the fact that literature states Balkan peninsula as one of the most important areas of wild bee diversity in Europe, there are no reports of survey on wild bees in the Republic of Srpska or the rest of Bosnia and Herzegovina (B&H). Official list of Fauna of B&H states that there are only 12 species of bees present in the country, including *Apis mellifera* L. However, three different biogeographical regions combined with information on bee diversity from neighboring countries allow us to expect that around 600-700 species are present in the country. In 2018 following locations in the north-east part of the Republic of Srpska have been sampled for the presence and diversity of wild bees: Prijedor, Stričići, Banja Luka, Teslić, Šamac, Rogatica. Identification of species was based on morphological characteristics while classification has been done according to Michener (2000). Over 40 species from 12 genera belonging to four families have been found in total. Some species of genera *Bombus* and *Osmia* that are found in the Republic of Srpska can be successfully used in agricultural production and contribute in overcoming problems in pollination of fruit and vegetables. Rearing possibilities of these species as well as developing and maintaining their populations within orchards or vegetable fields are commented in the paper.

Key words: diversity, wild bees, Republic of Srpska, fruit production

O5_05

EU Policy on Food Quality and legislative framework in Bosnia and Herzegovina

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Abstract

Priorities of Europe 2020 Strategy include goal of achievement of competitive economy based on science and innovations as well as promotion of high-employment economy delivering social and territorial cohesion. In order to achieve better recognizability of products, to promote products with specific characteristics and to protect producers from unfair practice at the same time, quality policy of agricultural products should enable appropriate resources to producers. That requires their ability to inform customers and consumers on the importance of their products subject to fair market competition. In this way, systems of quality could contribute to and complete policy of rural development and policies of market and income support to Common agricultural policy (CAP). Particularly, systems of quality could help to areas with high economic significance of agricultural sector and to areas with impeded economic conditions. The area of protection of food products by designation of origin, geographical indication and traditional specialities guaranteed designation in Bosnia and Herzegovina was, inter alia, subject of recommendations of European Commission and technical conclusions of the 1st EU-BiH SAA Sub-Committee on agriculture and fisheries in 2016, with the recommendation to approximate legislation in Bosnia and Herzegovina to Regulation (EU) No 1151/2012. Council of Ministers of Bosnia and Herzegovina on its 157th session adopted a Rulebook on quality systems for foodstuffs (Official Gazette of BiH, No 90/18) which is approximated to Regulation (EU) No 1151/2012 of the European Parliament and of the Council of 21 November 2012 on quality schemes for agricultural products and foodstuffs and Commission Implementing Regulation (EU) No 668/2014. The Rulebook prescribes registration process for designations of origin, geographical indications, and traditional specialities guaranteed in Bosnia and Herzegovina and procedure of submition of the application for registration on EU level as well.

Key words: Food Quality, legislation in B&H

O5_06

Detection of viruses using next generation sequencing technologies: Experience with fruit tree and grapevine viruses

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Abstract

Crops, such as fruit trees and grapevine, due to their way of vegetative propagation and grafting, are infected by many viruses, which are readily transmitted through infected plant material. Some of these pathogens cause severe crop losses and often reduce the productive life of the plants. Although detection and characterization of these agents are challenging, the wide application of next generation sequencing (NGS) technologies has significantly facilitated this task during the last years. In this work experiences obtained through detection of fruit trees and grapevine viruses and virus-like agents accomplished by NGS approaches are presented. Sampling was done in several location in Bosnia and Herzegovina. Preparation of RNA samples from leaf tissue of grapevine and fruit tree samples was done using commercial *Spectrum* Plant Total *RNA* Kit was done. Genius bioinformatics tool was used for data assessment and RT-PCR for the results validation. Applied methodologies, including the use of different molecules as templates, as well as advantages and disadvantages and future directions of NGS are discussed, also.

Key words: NGS, virus agents, Bosnia and Herzegovina

O5_07

Local background values of the lead in the soils of the Banja Luka area

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Abstract

The aim of this paper was determination of the total contents and local background values of the lead (Pb) in the soils of the Banja Luka area. The research was carried out by analyzing the 200 samples of the agricultural soils, taken from the crop soil-layer (0-25 cm). Total contents of the Pb were determined by atomic absorption spectrophotometry after acid digestion (HNO_3+HCl). Background values for lead contents have not been established for the investigated area before. These values have been evaluated by several methods: classical [Mean ± 2σ], [Median ± 2MAD], iterative 2σ method, box plot-upper whiskers and graphical methods (box plot and cumulative probability graphs). Total Pb in all examined samples were lower (range: 15,41-98,06 mg Pb kg^{-1}) than maximal allowed content for unpolluted soils (100 mg Pb kg^{-1}). The average background value in the investigated soils was 44,34 mg Pb kg^{-1} (range: 36,13 and 50,72 mg Pb kg^{-1}). The results imply to geogenic occurrence of Pb in the investigated soils, with anthrophogenic loads, probably from traffic, agriculture and other sources.

Key words: heavy metals, environment, pollution, risk.

O5_08

Rare Earth Elements in Rocks, Soils, and Plants of Banja Luka Region, Republic of Srpska (RS)

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Abstract

Rare Earth Elements (REE) mainly belong to the lanthanides group (Lanthan to Lutetium). They are absolutely indispensable in every modern technology, with an extremely strategic significance, since regular mining is restricted to very few places (China) worldwide. Innovative procedures in solving these problems, e.g. "phytomining" or “phytoextraction", have been discussed for the past thirty years. It is proposed to combine such processes with alternative, regenerative bioenergy production in biogas plants. In a first approach, both soil and plant samples, after undergoing total acid digestion, were analyzed using ICP-MS and ICP-OES methods. Moreover, REE were determinated in a sample of dried biogas fermentation residues produced at a Lower Bavarian farm from grass silage prepared from perennial ryegrass *Lolium perenne*. Rock samples taken in Jaruga hills digested by *aqua regia* acid showed very low figures but in perfect correlation with the soil sample. Contamination with uranium and thorium as well as lead is present at low levels. Indicator fern species *Pteridium aquilinum* collected on Jaruga showed higher contents of lanthan (La) than cerium (Ce). On the other hand, *Lolium perenne* grass extracted more La than Ce. From the analytical results, one can conclude that it is promising to develop a gentle, environmentally sustainable and commercially attractive technique for “phytomining” REE from RS plant biomass.

Key words: Rare earth elements, rock, soil, plant, *Lolium perenne, Pteridium aquilinum*

O5_09

EcoStack first Horizon 2020 research and innovation project at University of Banja Luka

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Abstract

EcoStack is a new EU-project at University of Banja Luka, Faculty of Agriculture that will run during next five years. The project gets 10 million euros from the European Union's Horizon 2020 research and innovation programme. Faculty of Agriculture is one of the 24 partners in EcoStack consortium that has overall aim to study how to improve ecosystem services within different European climatic conditions and production systems. Within the framework of this project the research will cover diverse cropping systems: conventional and organic; arable, horticultural and permanent crops; pastoral and mixed systems, and all pedoclimatic production zones of Europe. Sustainable management of beneficial organisms within the field is the main focus of the project. To achieve project goals advanced molecular and other technical tools will be used to determine source populations of beneficial organisms, and to monitor and record movements and interactions. To implement and demonstrate project results comprehensive farm networks covering all of Europe will be included. The latest precision agriculture technologies, advanced molecular techniques aim to determine ecosystem service providers including modelling and the latest monitoring instruments for examining interactions of ecosystem service providers within agroecosystems. Faculty of Agriculture will take part in three working packages that include field experiments and surveys: WP2 - Actor groups and actor interactions for co-designed practices and innovation, WP3 - Linking crop yields with off-crop functional biodiversity, WP4 - Agronomic practices for in-crop generation of ecosystem services.

Key words: diverse cropping systems, management of beneficial organisms, functional biodiversity, modelling

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