5TH INTERNATIONAL SYMPOSIUM ON
AGRICULTURAL SCIENCES

AGRORES
2016

BOOK OF ABSTRACTS

February 29 - March 3, 2016
Banja Luka, Republic of Srpska, Bosnia and Herzegovina

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February 29 – March 3, 2016; Banja Luka, Bosnia and Herzegovina

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February 29 – March 3, 2016
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5th INTERNATIONAL SYMPOSIUM
ON AGRICULTURAL SCIENCES

AGRORES
2016

ORGANIZERS

University of Banja Luka
Faculty of Agriculture

in cooperation with

University of Ljubljana
Biotechnical Faculty

University of Novi Sad
Faculty of Agriculture

Mediterranean Agronomic
Institute of Bari

University of Banja Luka
Genetic Resources Institute

SUPPORTED BY

Ministry of Science and Technology of Republic of Srpska
Ministry of Agriculture, Forestry and Water Management of Republic of Srpska
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SYMPOSIUM PROGRAMME

	Monday, February 29th, 2016 Hotel Bosna
10:00 - 13:30	Registration
13:30 - 14:00	Welcome Coctail
14:00 - 14:15	Press Conference
14:15 - 15:00	Symposium Opening and Welcome Working Committee: Nikola Mićić, Peter Dovč, Branko Ćupina Welcome speeches of organisers: Prof. Gordana Đurić, University of Banjaluka, Faculty of Agriculture Prof. Peter Dovč, University of Ljubljana, Biotechnical Faculty Prof. Branko Ćupina, Vice Dean, University of Novi Sad, Faculty of Agriculture Welcome speech of chairman of Banja Luka City Council Budimir Balaban Welcome speech of Minister of Agriculture, Forestry and Water Management, Government of Republic of Srpska Prof. Stevo Mirjanić Welcome speech of Minister of Science and Technology, Government of Republic of Srpska Prof. Jasmin Komić
15:00 - 16:30	Plenary Lectures Working Committee: Gordana Đurić, William Meyers, Fateh Toumi
15:00 - 15:30 [P1]	Isabel Lopez Noriega; *Bioversity International, Rome, Italy* INTERNATIONAL LAW FOR GENETIC RESOURCES FOR FOOD AND AGRICULTURE: CHALLENGES TO IMPLEMENTATION IN THE WESTERN BALKANS
15:30 - 16:00 [P2]	Jan Schakel; *University of Wageningen, Netherlands* AGRICULTURAL SCIENCES: TOWARDS A 'NEW HORIZON OF RELEVANCE'
16:00 - 16:30 [P3]	Marija Pecina; *University of Zagreb, Faculty of Agriculture, Croatia* THE USE OF BIOMETRICS IN AGRICULTURAL RESEARCH: WHAT DO WE DO WRONG?
16:30 - 17:00	Discussion on Plenary Lectures
17:00 - 17:15	Presentation of Sponsors

17:15 - 19:00	Round Table EU STANDARDS IN PLANT HEALTH AND QUALITY CERTIFICATION OF SEEDS AND PLANTING MATERIALS Moderators: Dr Eligio Malusa; *Council for Agricultural Research and Economics, Torino, Italy* MSc Branimir Nježić; *University of Banja Luka, Faculty of Agriculture,* Introductory speakers: Jolanta Wyszatkiewicz; *Senior officer from Ministry of Agriculture and Rural Development of Poland, and Polish representative at several EU Standing Committees dealing with seeds and planting materials, as well as to OECD and ESCAA* Alessandra Sommovigo; *Head of the Bologna Office of CRA-SCS (Italian only seed certifying body) for the seed control and certification in North-East and Central Italy, as well as responsible for listing of new varieties of industrial species* Roman Chaloupka; *Secretary-general of the Union of Fruit Growers of the Czech Republic*

	Tuesday, March 1st, 2016 Faculty of Agriculture

08:30 - 09:00	Registration

	SECTION: PLANT SCIENCES Room: 39 (1st floor)
09:00 - 10:00	Introductory Lectures Working Committee: Vladimir Meglič, Brankica Tanović, Dimitrije Marković
09:00 - 09:20 [PSI1]	Azeddine Si Ammour; *Fondazione Edmund Mach/CRI, Italia* EPIGENETIC MECHANISMS DURING DORMANCY AND VERNALIZATION IN CROPS
09:20 - 09:40 [PSI2]	Dragutin Mihailović; *University of Novi Sad, Faculty of Agriculture, Serbia* Gordan Mimić; *University of Novi Sad, Faculty of Sciences, Serbia* CLIMATE CHANGE EFFECTS ON CROP YIELDS IN SERBIA UNDER THE A1B AND A2 SCENARIOS

09:40 - 10:00 [PSI3]	Velemir Ninković; *Swedish University of Agricultural Sciences, Sweden* Dimitrije Marković; *University of Banja Luka, Faculty of Agriculture* COMMUNICATION BETWEEN PLANTS – NEW MECHANISM IN BIOLOGICAL PEST CONTROL
10:00 - 10:30	Discussion on Introductory Lectures
10:30 - 11:00	Coffee break
	Subsection: Horticulture Room 39 (1st floor)
11:00 - 12:00	Introductory Lectures Working Committee: Tatjana Jovanović Cvetković, Viktor Gjamovski, Azeddine Si Ammour
11:00 - 11:20 [HI1]	Henryk Flachowsky, Magda-Viola Hanke; *The Julius Kühn Institute (JKI, Federal Research Centre for Cultivated Plants), Germany* THE USE OF GENETIC RESOURCES IN THE DRESDEN-PILLNITZ APPLE BREEDING PROGRAM
11:20 - 11:40 [HI2]	Pierfederico La Notte; *Institute for Sustainable Plant Protection, Italia* RECOVERY, CHARACTERIZATION AND VALORIZATION OF AUTOCHTHONOUS WOODY CROP GERMPLASM IN APULIA
11:40 - 12:00	Discussion on Introductory Lectures
12:00 - 13:10	Oral Presentations Working Committee: Miljan Cvetković, Henryk Flachowsky, Snježana Hrnčić
12:00 - 12:10 [HO1]	I. Glišić, T. Milošević, R. Ilić YIELD AND FRUIT WEIGHT OF RASPBERRY CV. 'POLKA' AS AFFECTED BY HIGH TEMPERATURES DURING HARVEST IN AGROENVIRONMENTAL CONDITIONS OF ČAČAK
12:10 - 12:20 [HO2]	V. Gjamovski, M. Kiprijanovski, T. Arsov EFFECT OF ROOTSTOCK ON GROWTH, FLOWERING AND FRUIT SET AT APPLE CULTIVAR 'GRANNY SMITH'
12:20 - 12:30 [HO3]	M. Blesić, N. Spaho, M. Smajić Murtić, O. Mušić INFLUENCES OF TRADEMARK AND ROOM LIGHTING CONDITIONS ON SENSORY PERCEPTION OF WINE QUALITY
12:30 - 12:40 [HO4]	M. Tkalec, T. Mirković, M. Mitrović, N. Parađiković, J. Kraljičak, S. Zeljković, T. Vinković SEED GERMINATION OF SOME FLOWER SPECIES UNDER INFLUENCE OF DIFFERENT LIGHT CONDITIONS
12:40 - 12:50 [HO5]	N. Latinović, D. Pavlović, J. Latinović DIFFERENT WATER CONSUMPTION IN DIFFERENT MODES OF SPRAYING AGAINST GRAPEVINE DOWNY MILDEW

12:50 - 13:00 [HO6]	V. Petkova, I. Mladenoska, T. Gjuladin-Hellon UTILIZATION OF DIFFERENT TYPES OF GLUCOSE OXIDASE FOR REDUCTION OF GLUCOSE CONCENTRATION IN SYNTHETIC GRAPE JUICE
13:00 - 13:10 [HO7]	B. Bosančić, M. Pecina, N. Mićić MAIN EFFECT META PRINCIPAL COMPONENT ANALYSIS (ME-METAPCA) OF PLANT GROWTH REGULATOR TREATMENT EFFECT ON SIMULATED MULTIPLE APPLE DATA
13:10 - 13:40	Discussion on Oral Presentations
13:40 - 15:00	Lunch
15:00 - 15:20	Poster Presentations - 1st floor Working Committee: Duška Delić, Dragan Nikolić
15:20 - 15:45	Discussion on Poster Presentations
15:45 - 16:00	Presentation of Sponsors
16:00 - 17:30	City Tour
17:00 - 18:30	Workshop PROJECTS AND PROGRAMS OF THE EUROPEAN COMMISSION – A REAL POSIBILITY OR A STUMBLING BLOCK FOR THE ACADEMIC COMMUNITY Moderator: Dr Miljan Cvetković, *University of Banja Luka, Faculty of Agriculture* Introductory Speakers: Marijana Dimitrovna, *International relations Center - EU Project Offices* Jelena Nastić Stojanović, *Sound Project Management of EU Funds: Dos and Don'ts* Marko Stojanović, *EU Funding Opportunities in Agriculture and Rural Development: From Idea to Signing a Contract*
20:00	Theater Performance "KUMOVI" National Theatre of the Republic of Srpska (http://www.np.rs.ba/) Director: Luka Kecman Script: Dušan Kovačević Actors: Admir Mešić, Draško Vidović, Renata Agostini, Miljka Brđanin, Velimir Blanić

	Subsection: Crop Science Room 60 (2nd floor)
11:00 - 12:00	Introductory Lectures Working Committee: Novo Pržulj, Snježana Mladenović Drinić, Jasmina Knežević
11:00 - 11:20 [CSI1]	Dragan Perović; *Julius Kuhn-Institut, Quedlinburg, Germany* ASSESSMENT OF GENOMIC RESOURCES AND NEXT-GENERATION-SEQUENCING TECHNOLOGY FOR RESISTANCE BREEDING IN BARLEY
11:20 - 11:40 [CSI2]	Desimir Knežević; *University of Pristina, Faculty of Agriculture, Serbia* Danijela Kondić; *University of Banja Luka, Faculty of Agriculture, Banja Luka,* Aleksandra Yu. Dragović; *Vavilov Institute of General Genetics, Russia* CONCEPT OF WHEAT BREEDING FOR YIELD AND QUALITY IMPROVEMENT
11:40 - 12:00 [CSI3]	Fateh Toumi (*Institute for Agricultural and Fisheries Research; Faculty of Bio-Science Engineering, Belgium*); Jan De Riek (*Institute for Agricultural and Fisheries Research, Belgium*); Lieven Waeyenberge (*Institute for Agricultural and Fisheries Research; Faculty of Bio-Science Engineering, Belgium*); Nicole Viaene (*Institute for Agricultural and Fisheries Research; Faculty of Sciences, Belgium*); Abdelfattah A. Dababat (*International Maize and Wheat Improvement Centre, Turkey*); Julie M. Nicol (*International Maize and Wheat Improvement Centre, Turkey*); Francis Ogbonnaya (*International Center for Agricultural Research in the Dry Areas, Syria; Grains Research and Development Corporation, Australia*); Maurice Moens (*Institute for Agricultural and Fisheries Research; Faculty of Bio-Science Engineering, Belgium*) CEREAL CYST NEMATODES: IDENTIFICATION, QUANTIFICATION AND CONTROL
12:00 - 12:15	Discussion on Introductory Lectures
12:15 - 13:25	Oral Presentations Working Committee: Danijela Kondić, Dragan Perović, Desimir Knežević
12:15 - 12:25 [CSO1]	N. Pržulj, D. Perović, M. Mirosavljević, M. Nožinić DIGNUM LAUDE VIRUM MUSA VETAT MORI
12:25 - 12:35 [CSO2]	S. Mladenović Drinić, J. Mesarović, M. Kostadinović, D. Kovačević, V. Anđelković BREEDING FOR MAIZE GRAIN QUALITY TRAITS
12:35 - 12:45 [CSO3]	D. Kondić, M. Kostadinović, D. Knežević THE YIELD OF WINTER WHEAT (*Triticum aestivum* L.) DEPENDING ON THE SOWING DENSITY

12:45 - 12:55 [CSO4]	B. Popović, S. Tanasković, S. Gvozdenac, S. Kárpati, C. Bógnar, M. Erb POPULATION DYNAMICS OF EUROPEAN CORN BORER AND WESTERN CORN ROOTWORM IN BEČEJ REGION, VOJVODINA PROVINCE
12:55 - 13:05 [CSO5]	M. Genişel, H. Turk, S. Erdal LIPOIC ACID STIMULATES THE GERMINATION AND EARLY SEEDLINGS GROWTH OF MAIZE BY MODULATING PROTEIN AND CARBOHYDRATE METABOLISM
13:05 - 13:15 [CSO6]	N. Malić, D. Kondić SPIKE LENGTH AND NUMBER OF GRAIN PER SPIKE OF WINTER WHEAT (*Triticum aestivum* L.) GROWN IN MELIORATED DEPOSOL
13:15 - 13:25 [CSO7]	V. Dragičević, B. Nikolić, S. Živković, H. Waisi, S. Đurović, V. Jovanović, N. Kravić, D. Dodig THE EFFECT OF NON-STANDARD FOLIAR FERTILIZERS ON HARVEST AND QUALITY OF GRAIN OF BARLEY
13:25 - 13:50	Discussion on Oral Presentations
13:50 - 15:00	Lunch
15:00 - 15:20	Poster Presentations - 2nd floor Working Committee: Branko Đurić, Željko Lakić
15:20 - 15:45	Discussion on Poster Presentations
15:45 – 16:00	Presentation of Sponsors
16:00 - 17:30	City Tour
17:00 - 18:30	Workshop PROJECTS AND PROGRAMS OF THE EUROPEAN COMMISSION – A REAL POSIBILITY OR A STUMBLING BLOCK FOR THE ACADEMIC COMMUNITY
20:00	Theater Performance "KUMOVI" National Theatre of the Republic of Srpska (http://www.np.rs.ba/)

Tuesday, March 1st, 2016

Faculty of Agriculture

08:30 - 09:00	Registration
	SECTION: ANIMAL SCIENCES **Room 46 (2nd floor)**
09:00 - 10:20	Introductory Lectures Working Committee: Lidija Perić, Vesna Gantner, Daniel Falta
09:00 - 09:20 [ASI1]	Lars Erik Ruud; *Hedmark University College, Norway* IS HOUSING QUALITY INFLUENCING ANIMAL WELFARE?
09:20 - 09:40 [ASI2]	Nikola Kezić; *"Uliste Association for Promotion of New Possibilities in Beekeeping"* Maja Dražić; *Croatian Agricultural Agency* Janja Filipi; *University of Zadar, Department of Ecology, Agronomy and Aquaculture* Goran Mirjanić; *University of Banja Luka, Faculty of Agriculture* INTERACTION OF RESEARCH AND BEEKEEPING PRACTICE
09:40 - 10:00 [ASI3]	Nada Plavša; *University of Novi Sad, Faculty of Agriculture* Stoja Jotanović; *University of Banjaluka, Faculty of Agriculture* Đorđe Savić; *University of Banjaluka, Faculty of Agriculture* DISPOSAL OF ANIMAL WASTE AS A RISK FACTOR IN THE SPREAD OF ZOONOTIC PATHOGENS
10:00 - 10:20 [ASI4]	Peter Dovč; *University of Ljubljana, Biotechnical Faculty* GENOMIC SELECTION: CHANCES AND PITFALLS IN SMALL POPULATIONS
10:20 - 10:40	Discussion on Introductory Lectures
10:40 - 11:00	Coffee Break
11:00 - 13:00	Oral Presentations Working Committee: Nikola Kezić, Dragutin Matarugić, Lars Erik Ruud
11:00 - 11:15 [ASO1]	M. Marković, B. Marković, D. Radonjić IN-SITU PROGRAM OF CONSERVATION OF AUTOCHTHONOUS BREED OF CATTLE BUSHA IN MONTENEGRO
11:15 - 11:30 [ASO2]	M. Đukić Stojčić, L. Perić, D. Žikić, N. Milošević EFFECTS OF DIFFERENT FORMS OF ZINC ON MORPHOMETRIC PARAMETERS OF TIBIA OF TWO HYBRIDS OF BROILER CHICKENS
11:30 - 11:45 [ASO3]	G. Cilev, N. Pacinovski, Z. Gacovski, B.M. Petrovska, T. Isjanovska QUALITY AND HYGIENIC CORRECTNESS OF GOAT MILK IN THE SKOPJE REGION OF R. MACEDONIA

11:45 - 12:00 [ASO4]	V. Gantner, K. Kuterovac, M. Šperanda, P. Mijić, K. Potočnik METABOLIC DISORDERS PREVALENCE RISK AND SUBSEQUENT MILK PRODUCTION IN FIRST LACTATION IN HOLSTEIN COWS IN CROATIA
12:00 - 12:15 [ASO5]	S. Nedić, O. Stevanović, Lj. Jovanović, S. Stevanović Đorđević, M. Đurić, D. Nedić, D. Kirovski, BREED DIFFERENCES IN BLOOD BIOCHEMICAL PARAMETER CONCENTRATIONS BETWEEN LACTATING BUSHA AND HOLSTEIN COWS
12:15 - 12:30 [ASO6]	M. Urošević, D. Drobnjak, B. Špoljarić, M. Stojiljković, O. Stevanović CRANIOLOGICAL PARAMETERS OF YUGOSLAVIAN SHEPHERD DOG –SHARPLANINAC
12:30 - 12:45 [ASO7]	S. Navrátil, D. Falta, M. Večeřa, G. Chládek TWO SEASONS INTAKE AND PREFERENCES OF THE MINERAL BLOCKS WITH DIFFERENT CA:P ELEMENTS RATIO AT FALLOW DEER (*Dama dama*)
12:45 - 13:00 [ASO8]	D. Budimir, P. Mijić, V. Gantner, T. Bobić, M. Pejić RESEARCH OF MILK UREA CONCENTRATION IN HOLSTEIN COWS IN CROATIA
13:00 - 13:30	Discussion on Oral Presentations
13:30 - 15:00	Lunch
15:00 - 15:20	Poster Presentations - 2nd floor Working Committee: Tatjana Pandurević, Goran Mirjanić
15:20 - 15:45	Discussion on Poster Presentations
15:45 – 16:00	Presentation of Sponsors
16:00 - 17:30	City Tour
17:00 - 18:30	Workshop PROJECTS AND PROGRAMS OF THE EUROPEAN COMMISSION – A REAL POSSIBILITY OR A STUMBLING BLOCK FOR THE ACADEMIC COMMUNITY
20:00	Theater Performance "KUMOVI" National Theatre of the Republic of Srpska (http://www.np.rs.ba/)

	Wednesday, March 2nd, 2016
	Faculty of Agriculture
08:30 - 09:00	Registration

	SECTION: AGRICULTURAL ECONOMICS AND RURAL DEVELOPMENT Room 25 (1st floor)
09:00 - 10:40	Introductory Lecture Working Committee: Nebojša Novković, Zorica Vasiljević, Ernst Stadlober
09:00 - 09:20 [AERDI1]	Andrej Udovč; *University of Ljubljana, Biotechnical Faculty, Slovenia* Majda Černič Istenič; *University of Ljubljana, Biotechnical Faculty* Irma Potočnik Slavič; *University of Ljubljana, Faculty of Arts* Barbara Lampič; *University of Ljubljana, Faculty of Arts* Duška Knežević; *Research Centre of the Slovenian Academy of Sciences and Arts* Anton Perpar; *University of Ljubljana, Biotechnical Faculty* DEVELOPMENT ORIENTATION OF SLOVENIAN FAMILY FARMS
09:20 - 09:40 [AERDI2]	Dragi Dimitrievski, Ana Kotevska; *Ss. Cyril and Methodius University, Skopje* IMPLEMENTATION OF THE RURAL DEVELOPMENT SUPPORT AND IPARD IN MACEDONIA – CHALLENGES AND MILESTONES
09:40 - 10:00 [AERDI3]	Natalija Bogdanov; *University of Belgrade, Faculty of Agriculture* THE STATE OF SMALL FARMING IN SERBIA AND POLICY CHALLENGES
10:00 - 10:20 [AERDI4]	Zoran Njegovan; *University of Novi Sad, Faculty of Agriculture* THE PLACE AND ROLE OF FAMILY FARMS IN RURAL DEVELOPMENT
10:20 - 10:40 [AERDI5]	Martin Banse; *Johann Heinrich von Thünen, Institut (VTI)* TEN YEARS OF EASTERN ENLARGEMENT OF THE EU – LESSONS LEARNED AND NEW CHALLENGES AHEAD
10:40 - 11:00	Discussion on Introductory Lectures
11:00 - 11:30	Coffee break
11:30 - 13:00	Oral Presentations Working Committee: Natalija Bogdanov, Željko Vaško, Andrej Udovč
11:30 – 11:40 [AERDO1]	W.H. Meyers, K.G. Schroeder COMMODITY MARKETS AND POLICIES: WHAT IS IT THAT IS DRIVING THESE CHANGES?

11:40 – 11:50 [AERDO2]	A. Radosavac, S. Srdić, D. Knežević OPTIMIZING AGRICULTURE FOR GLOBAL FOOD SECURITY
11:50 – 12:00 [AERDO3]	Z. Vasiljević, V. Kovačević, M. Bojčevski FINANCIAL LITERACY OF RURAL POPULATION IN SERBIA
12:00 – 12:10 [AERDO4]	T. Stojanović, V. Mrdalj, B. Pašalić ROLE AND SIGNIFICANCE OF INSURANCE AS AN INSTRUMENT OF AGRICULTURAL RISK MANAGEMENT IN THE REPUBLIC OF SRPSKA
12:10 - 12:20 [AERDO5]	A. Figurek, E. Stadlober EXPLORATORY ANALYSIS OF FACTORS AFFECTING THE PERFORMANCE OF THE FARMS WITH MILK PRODUCTION IN THE REPUBLIC OF SRPSKA
12:20 - 12:30 [AERDO6]	N. Novković, B. Mutavdžić, D. Ivanišević, M. Matković ANALYSIS AND PREDICTION OF CABBAGE PRICE IN SERBIA
12:30 - 12:40 [AERDO7]	V. Zarić, S. Novićević, M. Đuđić, M. Urošević Z. Vasiljević MARKETING AND QUALITY CONTROL OF HONEY IN THE REPUBLIC OF SERBIA
12:40 - 12:50 [AERDO8]	D. Cvijanović, D. Dončić MARKET CHARACTERISTICS AND MARKETING RESEARCH WORK FOR INCREASING THE PEPPER PRODUCTION IN BOSNIA AND HERZEGOVINA
12:50 - 13:00 [AERDO9]	V. Jovanović, A. Deljanin, D. Petković, Đ. Pavlović, V. Zarić ANALYSIS OF FACTORS INFLUENCING NET VALUE ADDED OF SERBIAN AGRICULTURAL HOLDINGS
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13:30 - 15:00	Lunch
15:00 - 15:20	Poster Presentations - 1st floor Working Committee: Vesna Mrdalj, Zoran Njegovan
15:20 - 15:45	Discussion on Poster Presentations
15:45 – 16:00	Presentation of Sponsors
16:00 - 16:30	Coffee Break
16:30 - 18:00	Round Table PROTECTION OF TYPICAL PRODUCTS Moderator: Dr Aleksandar Ostojić; *University of Banja Luka, Faculty of Agriculture* Introductory speaker: Dr Marija Cerjak; *University of Zagreb, Faculty of Agriculture* Regulative, procedure, necessities of protection of typical products and examples of protection of typically and autohtonious products in Croatia

18:00 - 19:00	General discussion and conclusions Closing of the Symposium Faculty of Agriculture
20:00	Social Dinner Hotel Bosna

	Wednesday, March 2nd, 2016
	Faculty of Agriculture
	SECTION: SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES Room 39 (1st floor)
09:00 - 10:20	Introductory Lectures Working Committee: Suzana Gotovac Atlagić, Radovan Savić, Jelka Šuštar Vozlič
09:00 - 09:20 [SMNRI1]	Goran Trbić; *University of Banja Luka, Faculty of Sciences, Bosnia and Herzegovina* Vladimir Đurđević; *Faculty of Physics, University of Belgrade, Serbia* EXPECTED CLIMATE CHANGES IN BOSNIA AND HERZEGOVINA (BIH)
09:20 - 09:40 [SMNRI2]	Atila Bezdan, Radovan Savić; *University of Novi Sad, Faculty of Agriculture, Serbia* SOME ASPECTS OF EXTREME WATER LEVELS OF THE DANUBE RIVER
09:40 - 10:00 [SMNRI3]	Eligio Malusa, Loredana Canfora, Flavia Pinzari, Anna Benedetti; *Council for Agricultural Research and Economics, Italy* MICROBIAL-BASED FERTILIZERS AND PESTICIDES: PRODUCTION, USE AND REGULATORY NEEDS TO ASSURE CROP PRODUCTION
10:00 - 10:20 [SMNRI4]	Siniša Mitrić; *University of Banja Luka, Faculty of Agriculture, Bosnia and Herzegovina* MOBILITY OF PESTICIDES IN SOIL FOR GROUNDWATER AND SURFACE WATER PROTECTION
10:20 - 10:40	Discussion on Introductory Lectures
10:40 - 11:00	Coffee break
11.00 - 13.00	Oral Presentations Working Committee: Vida Todorović, Eligio Malusa, Siniša Mitrić
11:00 - 11:10 [SMNRO1]	H. Čivić, S. Murtić, P. Drkenda, F. Behmen, K. Huseinbašić DYNAMICS OF HEAVY METALS IN INTENSIVE ORCHARDS OF DIFFERENT APPLE CULTIVARS

11:10 - 11:20 [SMNRO2]	M. Maras, B. Pipan, J. Šuštar Vozlič, V. Todorović, G. Đurić, M. Vasić, S. Kratovalieva, A. Ibusoska, R. Agić, Z. Matotan, T. Čupić , V. Meglič GENETIC DIVERSITY OF COMMON BEAN FROM SOUTH EAST EUROPEAN REGION
11:20 - 11:30 [SMNRO3]	S. Gotovac Atlagić, K. Zrnić, B. Bjeljac, D. Stanišljević EVALUATING THE INFLUENCE OF NITRATE IONS ON CHEMICAL OXYGEN DEMAND IN SURFACE WATERS, RIVERS: VRBAS, BOSNA AND DRINA
11:30 - 11:40 [SMNRO4]	S. Rizani, P. Laze, A. Ibraliu ASSESSMENT OF IRRIGATION WATER QUALITY OF KOSOVO PLAIN
11:40 - 11:50 [SMNRO5]	D. Delić, B. Lolić, G. Đurić, T. Jovanović Cvetković, M. Radulović EVALUATION OF SANITARY STATUS OF THE GRAPEVINE GERMPLASM COLLECTION
11:50 - 12.00 [SMNRO6]	J. Nikitović, J. Sjeničić, G. Đurić ANALYSIS OF LEGISLATION IN THE FIELD OF CONSERVATION OF ANIMAL GENETIC RESOURCES OF THE REPUBLIC OF SRPSKA
12:00 - 12:10 [SMNRO7]	P. Nikić Nauth, T. Predić, A. Predić LUCAS TOPSOIL SURVEY IN BOSNIA AND HERZEGOVINA
12:10 - 12:20 [SMNRO8]	D. Benedikova, M. Benkova, I. Čičova MORPHOLOGICAL AND POMOLOGICAL VARIABILITY OF SOME INDIGENOUS CHERRY TREES IN DIFFERENT REGIONS OF SLOVAKIA
12:20 - 12:30 [SMNRO9]	M. Vasić, V. Todorović, G. Petrović, Z. Nikolić, G. Đurić, A. Savić, M. Dimitrijević CHARACTERIZATION OF COMON BEAN (*Phaseolus vulgaris* L.) LANDRACES THROUGH BASIC MORPHOLOGICAL CHARACTERISTICS AND PROTEIN MARKERS
12:30 - 12:40 [SMNRO10]	S. Stanivuković, M. Kajkut Zeljković, G. Đurić PRELIMINARY EVALUATION OF COLLECTED FRUIT ACCESSIONS IN THE GENE BANK
12:40 -12:50 [SMNRO10]	L. Sinkovič, V. Meglič, D. Žnidarčič SELECTED NUTRIENT EVALUATION OF SLOVENIAN LEAFY VEGETABLE GENETIC RESOURCES
12:40 - 13:10	Discussion on Oral Presentations
13:10 - 15:00	Lunch
15:00 - 15:20	Poster Presentations - 1st floor Working Committee: Mihajlo Marković, Mirjana Vasić
15:20 - 15:45	Discussion on Poster Presentations
15:45 – 16:00	Presentation of Sponsors
16:00 - 16:30	Coffee Break

16:30 - 18:00	Round Table: PROTECTION OF TYPICAL PRODUCTS
18:00 - 19:00	General discussion and conclusions Closing of the Symposium Faculty of Agriculture
20:00	Social Dinner Hotel Bosna

	Thursday, March 3rd, 2016
	Faculty of Agriculture
10:00 - 14:00	21st Scientific – Professional Conference of Agricultural Engineers of Republic of Srpska in Organization of the Chamber of Agricultural Engineers of Republic of Srpska
09:00 - 14:00	Excursions (optional) 1. Fruit growing and viticulture, regional production 2. Animal husbandry and dairy, regional production Participants that want to go on excursions should apply before begining of the Symposium or during registration. Depending on the number of participants, detailed plan of excursions will be announced during symposium

LIST OF POSTER PRESENTATIONS

Section	Plant Sciences
Subsection	Horticulture
Time & place	Tuesday, March 1st, 2016; 1st floor Poster Viewing: 15:00 - 15:30 Discussion on Poster Presentation: 15:30 - 16:00
Working Committee	Duška Delić, Dragan Nikolić

HP1	N. Panyotov, A. Popova BIOLOGICAL CHARACTERSTICS AND PRODUCTIVITY OF CAPE GOOSEBERRY (*Physalis peruviana* L.) PLANTS ACCORDING TO DIFFERENT TERM OF SEEDLING SOWING
HP2	D. Jakšić, P. La Notte, V. Perović, D. Ivanišević, M. Vujadinović, M. Beader, A. Vuković SOME CHARACTERISTICS OF KNJAŽEVAC *TERROIR* – FIRST SERBIAN MODERN WINE PDO

HP3	I. Koleška, V. Todorović, R. Oljača, D. Hasanagić, B. Bosančić, N. Đekić INCREASED SALINITY IMPACT ON PHOTOSYNTHETIC EFFICIENCY PARAMETERS IN TOMATO (*Lycopersicon esculentum* Mill.)
HP4	J. Kraljičak, N. Parađiković, M. Tkalec MORPHOLOGICAL CHARACTERISTICS OF ROSES CUT FLOWER AFTER VASE LIFE
HP5	H. Turk, M. Genişel, S. Erdal THE CHANGES IN NITROGEN METABOLISM IN RESPONSE TO MELATONIN APPLICATION ON PLANTS
HP6	M. Pešaković, J. Tomić, Ž. Karaklajić Stajić, M. Lukić SOIL MICROBIAL ACTIVITY AS INFLUENCED BY FERTILIZATION AND SUBSTRATE UNDER THE INTEGRATED STRAWBERRY PRODUCTION PROGRAM
HP7	D. Tešanović, R. Spasić, D. Jerinić Prodanović PSYLLID SPECIES (*Cacopsylla* SPP.) IN PEAR ORCHARDS OF EAST SARAJEVO
HP8	M. Feldeždi, R. Iličić, S. Vlajić, S. Maširević TESTING THE EFFICIENCY OF EKSTRASOL® (*Bacillus subtilis* F 13) AGAINST SOME ISOLATES OF PHYTOPATHOGENIC FUNGI *IN VITRO*
HP9	J. Davidović Gidas PRODUCTION OF STONE FRUIT PLANTING MATERIAL IN THE REPUBLIC OF SRPSKA
HP10	V. Gjamovski, M. Kiprijanovski, M. Popovska, T. Arsov NURSERY CHARACTERISTICS OF SOME BITTER ALMOND ECOTYPES USED AS A PEACH ROOTSTOCK
HP11	T. Arsov, V. Gjamovski , M. Kiprijanovski THE INFLUENCE OF PLANTING DISTANCE ON DISTRIBUTION AND GROWTH OF THE ROOT SYSTEM AT APPLE CV. JONAGOLD GRAFTED ON M9 ROOTSTOCK
HP12	M. Cvetković, B. Bosančić N. Mišić, Lj. Radoš BRANCHING OF APPLE YOUNG TREES IN THE NURSERY BY USING 6-BENZYLADENINE (6-BA6) AND PROGERBALIN (6-BA AND GA4+7)
HP13	D. Drobnjak, B. Milić, J. Vejnović, THE EFFECT OF CHEMICAL FRUIT THINNING OF 'GOLDEN DELICIOUS' APPLE
HP14	I. S. Glišić, Ž. Karaklajić Stajić, M. Lukić, S. Marić, O. Mitrović 'ANĐELIJA' - NEW PEAR CULTIVAR DEVELOPED AT FRUIT RESEARCH INSTITUTE IN ČAČAK

HP15	N. Fajt, E. Komel INFLUENCE OF IRRIGATION ON PRODUCTIVITY AND QUALITY OF SWEET CHERRIES CV. REGINA- PRELIMINARY RESULTS
HP16	S. Ercisli FRUIT POMOLOGICAL CHARACTERISTICS OF SEA BUCKTHORN (*Hippophae rhamnoides* L.) FROM TURKEY
HP17	N. Ersoy, M. Salman Özen SOME PHYSICO-CHEMICAL CHARACTERISTICS IN FRUITS OF ROSE HIP (Rosa spp.) GENOTYPES FROM BOLU PROVINCE IN WESTERN PART OF TURKEY
HP18	R. Kizilkaya, T. Askin, C. Tarakcioglu, S. Sushkova HAZELNUT YIELD AND SOIL NUTRIENT CONTENTS INFLUENCED BY HAZELNUT HUSK COMPOST USING MICROBIAL BIOTECHNOLOGICAL TECHNIQUES
HP19	T. Jug CAN WE EXPECT MORE ACETIC ACID IN WINE IN THE FUTURE?
HP20	N. Korać, D. Ivanišević, P. Cindrić, M. Medić, J. Koković, M. Kalajdžić, M. Popov NEW GRAPE VARIETIES FOR ORGANIC GROWING
HP21	Grits A.N., Oleshuk E.N., Popoff E.H., Yanchevskaya T.G. ABIOTIC STRESS RESISTANCE OF GRAPEVINE CULTIVARS DEPENDING ON THEIR PROVENANCE & GENETIC ORIGIN
HP22	A. Škvarč, T. Vaupotič, R. Pelengić, D. Rusjan CLONAL SELECTION OF GRAPEVINE (*Vitis vinifera* L.) VARIETIES IN SLOVENIA
HP23	D. Nikolić, Z. Ranković Vasić CHARACTERISTICS OF PROMISING GRAPEVINE GENOTYPE '9345' OBTAINED FROM CROSSING COMBINATION CRVENI DRENAK × SMEDEREVKA
HP24	Z. Prculovski, Z. Bozinovic, K. Beleski, D. Nedelkovski IMPACT OF FOLIAR FERTILIZERS ON GRAPE YIELD AND QUALITY OF WINE GRAPE VARIETIES VRANEC AND SMEDEREVKA
HP25	T. Jovanović Cvetković, D. Mijatović, B. Prpić, R. Grbić INFLUENCE OF WEATHER CONDITIONS ON PHYSIOLOGICAL STATUS OF WINTER BUDS IN VINE CULTIVARS
HP26	Z. Ranković Vasić, I. Radojević, D. Nikolić, T. Jovanović Cvetković, B.Sivčev THE MOST IMPORTANT INDICATORS OF FRUITFULNESS AND GRAPE QUALITY OF GRAPEVINE CULTIVAR RIESLING AND CLONES 239GM AND B21

HP27	Z. Bešlić, S.Todić EFFECT OF DEFOLIATION ON YIELD, GRAPE STRUCTURE AND QUALITY OF CV. SAUVIGNON BLANC
HP28	S.Todić, Z. Bešlić RESPONSE OF CV MERLOT (*Vitis vinifera* L) TO FOLIAR APPLICATION OF PLANT GROWTH REGULATORS – VEGETATIVE GROWTH, SHOOT MATURITY, BUD WINTER HARDINESS
HP29	M. Putnik Delić, I. Maksimović, Ž. Ilin, R. Kastori, B. Adamović THE EFFECT OF STORAGE CONDITIONS ON CONCENTRATION OF PHOTOSYNTHETIC PIGMENTS IN LETTUCE (*Lactuca sativa*, L.)
HP30	Z. Bogevska, R. Agic, G. Popsimonova, M. Davitkovska, I. Iljovski REDUCING SUGAR AND TOTAL SUGAR CONTENT IN ONION `BUCHINSKA ARSHLAMA` DURING STORAGE IN R. MACEDONIA
HP31	S. Vlajić, S. Maširević, S. Cuca, M. Vasić, A. Savić, J. Gvozdanović Varga , M. Ječmenica THE REACTION OF DIFFERENT COMMON BEAN GENOTYPES, AS STUBBLE CROP, TO THE PRESENCE OF CAUSAL AGENT OF RUST, *Uromyces appendiculatus* (PERS.) UNGER DURING 2015
HP32	D. Beatović, S. Jelačić, V. Zarić, N. Nišavić, Đ. Moravčević, A. Maksimović APPLICATION OF DIFFERENT SUBSTRATE ON BASIL (*Ocimum basilicum* L.) SEEDLINGS PRODUCTION
HP33	V. Filipović, D. Bozić, M. Aćimović, A. Matković, T. Marković, V. Ugrenović, V. Popović THE USE OF HERBAL PREPARATIONS AND FOLIAR NUTRITION IN PRODUCTION OF WHITE MUSTARD
HP34	S. Vuković, S. Krnjajić, D. Inđić, S. Lazić, D. Šunjka USE OF AZADIRACHTIN AND THIAMETOXAM IN PEPPER PROTECTION AGAINST *Myzus persicae* Sulzer
HP35	M. Davitkovska, G. Popsimonova, R. Agic, Z. Bogevska, B. Dorbić, I. Iljovski EXAMINATION OF SEEDLINGS QUALITY OF Pelargonium X Hortorum L. H. Bail. TREATED WITH FERTILIZERS WITH DIFFERENT CONCENTRATION OF Ca $(NO_3)_2$
HP36	A.Ibraliu, S. Karaj, N. Gruda SITUATION OF MAPS IN ALBANIA
HP37	U. Šušak, S. Zeljković, I. Dervić GROWTH AND DEVELOPMENT OF SAGE (*Salvia officinalis* L.) IN DIFFERENT SOIL SUBSTRATES
HP38	D. Damjanić, S. Hrnčić, Z. Đurić, G. Mirjanić, B. Đurić ENTOMOFAUNA ON SWEET BASIL, POT MARIGOLD AND PHACELIA IN FLOWERING PHENOPHASE

HP39	M. Trubarac, M. Mladenović, G. Mirjanić, B. Đurić, Z. Đurić ATTRACTIVENESS OF POT MARIGOLD, LACY PHACELIA AND SWEET BASIL AS PLANTS FOR HONEY BEE PASTURE
HP40	B. Popović, G. Drašković, M. Marjanović, I. Đurđić, S.Tanasković POPULATION DYNAMICS OF POTATO TUBER MOTH Phthorimea operculella IN THE TERRITORY OF ČAČAK, WEST SERBIA
HP41	B. Tanović, B. Mirković, J. Hrustić, M. Mihajlović, G. Delibašić GROWTH RATE AND FROST HARDINESS OF THIOPHANATE-METHYL RESISTANT STRAINS OF *Botrytis cinerea* Pers. ORIGINATING FROM ORNAMENTAL PROTECTED CULTIVATION
HP42	T. Prentović, B. Ristakoska, Z. Dimov, Z. Arsov, R. Kabranova, I. Iljovski RESPONSE OF GREEN FORAGE YIELD AND YIELD COMPONENTS ON SOME RAPESEED GENOTYPES (*Brassica napus* L.) TO SOWING DATE AND HARVEST STAGE
HP43	Đorđe Moravčević, Zorica Vasiljević, Marija Urošević, Vlade Zarić INNOVATIONS IN GHERKIN PRODUCTION IN THE REPUBLIC OF SERBIA AND ITS IMPACT ON ECONOMIC RESULTS
HP44	V. Vukosavljević, D. Žunić, S. Matijašević, M. Garić THE IMPACT OF APPLIED DEFOLIATION ON QUALITY OF GRAPES AND WINE OF *VITIS VINIFERA* L. CV. MERLOT

Section	Plant Sciences
Subsection	Crop Science
Time & place	Tuesday, March 1st, 2016; 2nd floor Poster Viewing: 15:00 - 15:30 Discussion on Poster Presentations: 15:30 - 16:00
Working Committee	Branko Đurić, Željko Lakić

CSP1	V. Đurović, B. Popović, S. Tanasković, D. Knežević EFFICIENCY OF THE AQUEOUS EXTRACTS Ailanthus altissima IN SUPPRESSION OF Rhyzopertha dominica ON WHEAT
CSP2	S.Vuković, M. Mezei, S. Gvozdenac, S. Tanasković, G. Andrić EFFECTS OF ESSENTIAL OILS AND PLANT EXTRACT ON Sitophilus oryzae L.
CSP3	S. Mladenović Drinić, M. Filipović HETEROSIS FOR YIELD AND YIELD COMPONENTS IN DIALEL CROSSES OF MAIZE

CSP4	M. Biberdžić, B. Knežević, S. Barać, M. Jelić, D. Lalević INFLUENCE OF AMELIORATIVE FERTILIZATION ON YIELD AND SOME QUALITATIVE CHARACTERSTICS OF SMALL GRAINS
CSP5	P. Vuckov, M. Ilievski, D. Spasova, Lj. Mihajlov, N. Markova Ruzdic PRODUCTION CHARACTERISTICS OF SOME GENOTYPES OF FLAX (*Linum usitatissimum L.*) IN STRUMICA REGION
CSP6	H. Waisi, B. Nikolić, B. Lalević, V. Raičević, L. Đukanović, M. Milojković, D. Kovačević THE EFFECT OF 24-EPIBRASSINOLIDE ON SEED VIGOUR OF TWO MAIZE HYBRIDS
CSP7	H. Waisi, B. Nikolić, B. Lalević, V. Raičević, V. Dragičević, M. Milojković, M. Ormai INFLUENCE OF 24-EPIBRASSINOLIDE ON SEEDLINGS OF TWO MAIZE HYBRIDS
CSP8	B. Kiprovski, I. Koleška, Đ. Malenčić, M. Rajković, S. Đurić, V. Sikora LIPID PEROXIDATION INTENSITY IN SOYBEAN AND MAIZE PLANTS INOCULATED WITH PGPR
CSP9	J. Cvetkovic, T. Stafilov, K. Baceva, H. Poposka, D. Andreevska, D. Andov GENETIC VARIATION OF MACRO AND MICROELEMENTS IN RICE GRAINS *(Oryza sativa L.)*
CSP10	J. Antosovsky, P. Ryant CAN THE YIELD AND QUALITY OF SUGAR BEET BE AFFECTED BY SULFUR?
CSP11	D. Tomić, V. Stevović, D. Đurović, Đ. Lazarević, R. Stanisavljević FORAGE YIELD OF RED CLOVER CULTIVARS ON ACID SOILS
CSP12	D. Tomić, V. Stevović, D. Đurović, Đ. Lazarević, J. Knežević THE EFFECT OF FOLIAR APPLICATION OF LIQUID ORGANIC FERTILIZER ON RED CLOVER FORAGE YIELD
CSP13	Ž. Dolijanović, D. Kovačević, S. Oljača, Z. Jovović WEEDINESS OF ALTERNATIVE SMALL GRAINS IN ORGANIC GROWING TECHNOLOGY
CSP14	J. Knežević, D. Knežević, N. Gudžić, M. Aksić, N. Savić, D. Tomić, D. Terzić CORRELATION ANALYSIS - MONITORING PERFORMANCE OF SPRING MALTING BARLEY AT DIFFERENT LEVELS OF NITROGEN NUTRITION
CSP15	K. Uzundzalieva, G. Desheva, E. Valchinova, B. Kyosev COMPARATIVE EVALUATION OF EINKORN ACCESSIONS (*Triticum monococcum* L.) BY SOME MAIN AGRONOMIC CHARACTERS

CSP16	Ž. Lakić, M. Nožinić, S. Vojin THE VARIABILITY AND QUANTITATIVE CHARACTERISTICS OF JERUSALEM ARTICHOKE SELECTED POPULATIONS *(Helianthus tuberosus L.)*
CSP17	V. Dragičević, M. Simić, M. Stojiljković, B. Kresović, M. Brankov NUTRITIONAL QUALITY OF ORGANICALLY PRODUCED SOYBEAN AND SPELT
CSP18	B. Milenković, A. Vuković, S. Barać INFLUENCE OF THE OPERATION SPEED SELF-PROPELLED FORAGE HARVESTER ON HIGH CUTTING OF WHOLE PLANT CORN SILAGE
CSP19	J. Maksimović, R. Pivić, A. Stanojković Sebić, Z. Dinić, V. Gavrilović, Ž. Dželetović ASSESSMENT OF THE WEED VEGETATION INFLUENCE ON GROWING CONDITIONS AND YIELD OF BIOENERGY CROP MISCANTHUS X GIGANTEUS GREEF ET DEU
CSP20	M. Simić, V. Dragičević, M. Brankov, M. Filipović, Ž. Dolijanović PROTEIN CONTENT VARIATION IN MAIZE GRAIN DEPENDING ON PRODUCTION SYSTEM
CSP21	S.V. Jovanović, M. Tabaković, G. Todorović, S. Drinić Mladenović, D. Ranković, R. Štrbanović, R. Stanisavljević EFFECTS OF VARIOUS FERTILE TO STERILE PLANTS RATIO ON YIELD OF HYBRID ZPSC 341
CSP22	D. Prvulović, Đ. Malenčić, J. Miladinović ANTIOXIDANT ACTIVITY AND PHENOLIC CONTENT OF SOYBEAN SEEDS EXTRACTS

Section	**Animal Science**
Time & place	Wednesday, March 2nd, 2016; 2nd floor Poster Viewing: 15:00 - 15:30 Discussion on Poster Presentations: 15:30 - 16:00
Working Committee	Tatjana Pandurević, Goran Mirjanić

ASP1	S. Jotanović , R. Mijatović, I. Stančić, Đ. Savić, M. Vekić REPRODUCTIVE PERFORMANCES OF HOLSTEIN COWS WITH DIFFERENT MILK FAT TO PROTEIN RATIO DURING SUCCESSIVE STAGES OF LACTATION
ASP2	T. Pandurević, S. Mitrović, B. Ristanović EFFECT OF AGE ON SOME QUALITY PROPERTIES OF EGGS IN ISA BROWN PROVENANCE

ASP3	M. Urošević, D. Matarugić, M. Urošević, D. Drobnjak, B. Živković BASIC MORPHOMETRIC PARAMETERS OF ANTLERS IN ROE DEER (*Capreolus capreolus L.*) FROM HOMOLJE AREAS
ASP4	M. Urošević, D. Drobnjak, M. Urošević, P. Stojić, D. Matarugić, N. Pračić MORPHOMETRIC PARAMETERS OF DONKEYS BODY
ASP5	S. Mičić, J. Vlačić ASSESMENT OF THE REPRODUCTIVE TRAITS PHENOTYPIC CORRELATION IN THE COW FIRST THREE LACTATIONS
ASP6	J. Vlačić, S. Mičić PHENOTYPIC CORRELATION BETWEEN IMPORTANT PRODUCTIVE TRAITS OF COWS IN THE FIRST THREE LACTATIONS
ASP7	R. Roljić, D.Matarugić, D.Mikavica PARATYPHOID INFECTION IN DOMESTICATED PIGEONS
ASP8	M. Vekić, M. Đukić Stojčić, S. Trivunović BANAT NAKED NECK HEN - AUTOCHTHONOUS BREED OF POULTRY
ASP9	R. Dekić, M. Manojlović, J. Friščić, S. Lolić, D. Golub MORPHOMETRIC AND PHYSIOLOGICAL CHARACTERISTICS OF BROWN TROUT (*Salmo trutta*) FROM RIVER PONOR
ASP10	B. Petrovska, N. Petrovska, Z. Gasovski, G. Cilev, N. Pacinovski, I. Zdraveski OFFER AND DEMAND OF GOAT'S MILK PRODUCTS
ASP11	D. Mikavica, N. Savić, D. Đurđević REPRODUCTIVE CENTER FOR SALMONID FISH KLAŠNIK - BANJA LUKA
ASP12	D. Falta, M. Večeřa, G. Chládek HEAT STRESS AND ITS EFFECT ON THE BEHAVIOUR AND PERFORMANCE OF DAIRY COWS - A REVIEW
ASP13	M. Večeřa, M. Přibilová, D. Falta, G. Chládek THE EFFECT OF COWSHED TEMPERATURES ON BEHAVIOUR AND MILK PERFORMANCE OF HOLSTEIN DAIRY COWS
ASP14	R. Roljić, D. Mikavica, D. Matarugić DIVERSITY COCCIDIA OF THE GENUS EIMERIA IN DOMESTICATED PIGEONS IN BANJA LUKA
ASP15	M.Gregić, M. Baban, P. Mijić, T. Bobić, B. Antunović, M. Pejić TRAINING HORSES IN SHOW JUMPING EQUESTRIAN SPORTS
ASP16	M. Přibilová, P. Horký, M. Večeřa THE EFFECT OF HIGH TEMPERATURE ON SELECTED PARAMETERS OF SEMEN QUALITY OF DUROC BOARS

ASP17	M. Lazić, Z. Spasić, M.D. Petrović, Z. Z. Ilić, R. Rajčić ANALYSIS OF CORRELATION BETWEEN EXTERIOR PROPERTIES OF SIMMENTAL COWS
ASP18	I. Stančić , D. Bošnjak, J. Apić, Radović I., S. Jotanović, Đ. Savić EXAMINATION OF OVULATION RATE IN GILTS TREATED WITH VARIOUS HORMONE PREPARATIONS

Section	**Agricultural Economics and Rural Development**
Time & place	Wednesday, March 2nd, 2016; 1st floor Poster Viewing: 15:00 - 15:30 Discussion on Poster Presentations: 15:30 - 16:00
Working Committee	Vesna Mrdalj, Zoran Njegovan

AERDP1	S. Jelić. Lj. Keča, M. Marčeta ANALYSIS OF SOCIO-ECONOMIC DISPARITIES OF SERBIAN REGIONS
AERDP2	N. Vukelić, V. Rodić, N. Novković TEHNICAL AND ECONOMIC EFFICIENCY OF BROILER FARMS IN VOJVODINA: DEA METHOD
AERDP3	G. Roković, Ž. Vaško STAGES OF DEVELOPMENT OF AGRICULTURAL EXTENSION SERVICE IN BOSNIA AND HERZEGOVINA
AERDP4	Lj. Drinić THE IMPORTANCE OF OTHER INCOME GENERATION ACTIVITIES FOR AGRICULTURAL HOUSEHOLDS IN REPUBLIC OF SRPSKA
AERDP5	J. Premović, A. Boljević, Z. Milićević TOURISM AS A GENERATOR OF RURAL DEVELOPMENT IN SERBIA
AERDP6	D. Ubiparip, M. Radovanović, N. Novković ANALYSIS AND FORECASTING OF TOMATO EXPORT FROM SERBIA
AERDP7	A. Ostojić, N. Savić, J. Pavličević, Ž. Vaško, Z. Balta CONSUMERS' ATTITUDES ABOUT BUYING FISH IN BANJA LUKA
AERDP8	I. Yilmaz, S. Yilmaz, M.T. Olguner ASSESSMENT OF FISHERY PRODUCTS CONSUMPTION BEHAVIOR: THE CASE OF TURKEY
AERDP9	M. Yilmaz, S. Yilmaz EMPLOYMENT AND PROBLEMS IN TURKISH AQUACULTURE INDUSTRY

Section	**Sustainable Management of Natural Resources**
Time & place	Wednesday, March 2nd, 2016; 1st floor Poster Viewing: 15:00 - 15:30 Discussion on Poster Presentations: 15:30 - 16:00
Working Committee	Mihajlo Marković, Mirjana Vasić

SMNRP1	L.Sinkovič, V. Meglič, Š. Velikonja Bolta, Z. Luthar, M. Nečemer, R.Vidrih NUTRIENT EVALUATION OF DIFFERENT BUCKWHEAT GENETIC RESOURCES
SMNRP2	G. Đurić, N. Mićić, J. Davidović, N. Travar 'VILINA BUKVA' BEECH TREES FROM ČAJNIČE
SMNRP3	V. Ivanova, V. Panchev VEGETATIVE PROPAGATION OF *TILIA* USING SEMI - HARDWOOD CUTTINGS
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SMNRP9	S. Lazić, D. Šunjka, B. Konstantinović, N. Samardžić, M. Jelić, S. Vuković FIELD DISSIPATION STUDY OF HERBICIDE CLOPYRALID IN SOIL
SMNRP10	R. Capone, H. El Bilali, P. Debs, F. Bottalico, G. Cardone, S. Berjan, G.A.G. Elmenofi, A. Abouabdillah, L. Charbel, S. Ali Arous, K. Sassi BREAD WASTE IN MEDITERRANEAN ARAB COUNTRIES

SMNRP11	Z. Kovačević, B. Kelečević, S. Mitrić WEED VEGETATION OF ALLIANCE POLYGONO-CHENOPODION KOCH 1926 EM SISSING. 1946 IN THE VINEYARDS OF BOSNIA AND HERZEGOVINA
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PLENARY LECTURES

P1

INTERNATIONAL LAW FOR GENETIC RESOURCES FOR FOOD AND AGRICULTURE: CHALLENGES TO IMPLEMENTATION IN THE WESTERN BALKANS

Isabel López Noriega

Bioversity International

The last twenty years have seen a remarkable evolution in the international law on biodiversity, including, the diversity of plant genetic resources for food and agriculture. The Convention on Biological Diversity, adopted under the auspices of the United Nations Environment Programme (UNEP) in 1992, defined the principles for a comprehensive approach to conservation and sustainable use of genetic resources, and to the equitable sharing of the benefits arising from the use of these resources. Twelve years later, the International Treaty on Plant Genetic Resources for Food and Agriculture, adopted under the auspices of the United Nations Food and Agriculture Organization (FAO), embraced and translated the principles of the Convention on Biological Diversity taking into consideration the special characteristics of plant genetic resources for food and agriculture and their crucial importance for food security worldwide. In 2010, country members of the Convention on Biological Diversity adopted the Nagoya Protocol on Access and Benefit-Sharing, which elaborates on the rights and obligations of countries in relation to the provision of genetic resources and the sharing of the monetary and non-monetary benefits that arise from their utilization. While the Convention on Biological Diversity, its Nagoya Protocol and the International Treaty on Plant Genetic Resources were designed to complement and support each other, a number of overlaps between them and uncertainties around their actual scopes have resulted in a number of challenges at the time of implementing these international conventions at the national level. A number of intergovernmental and nongovernmental initiatives have raised the awareness and facilitated the domestication of these international conventions among actors at the national level. Working hand-in-hand with the Governing Body of the International Treaty on Plant Genetic Resources, the FAO Commission on Genetic Resources for Food and Agriculture has contributed to generating planning and monitoring tools that support the implementation of the Treaty, such as the First and Second State of the World's Report on Plant Genetic Resources for Food and Agriculture and the Global Plan of Action for Plant Genetic Resources. The level of engagement of countries in the Western Balkans in these international conventions and initiatives varies considerably from country to country, ranging from not being a party to the convention to having passed laws and regulations inspired by the obligations arising from these international agreements. In addition to the usual challenges involved in the implementation of international agreements, the particular circumstances of countries in the Western Balkans generate additional challenges and also opportunities for the implementation of international conventions dealing with plant genetic resources. Changes in governmental priorities, population aging and migration, agricultural intensification, changes in food consumption, integration in the European Union, the move to a more open world trade in agriculture and involvement of agricultural research and development institutions in European and international projects are among the factors that influence the efforts of these countries to observe their obligations and protect their rights under these international conventions.

Key Words: Convention on Biological Diversity, International Treaty on Plant Genetic Resources for Food and Agriculture, European Union.

P2

AGRICULTURAL SCIENCES: TOWARDS A 'NEW HORIZON OF RELEVANCE'

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After decades of successful modernisation, Western agriculture faces a serious crisis. In terms of Jurgen Habermas, first a rationalisation crisis (in the seventies), after that a motivation crisis, then a legitimation crisis in the nineties, and more lately an identity crisis: neither goals nor means or structure were clear. Nowadays, both reflection and therapy are on the agenda, and the 'agricultural identity' is at stake. Diagnoses of this crisis have been made at different levels: from simple 'blaming the others' till 'deep philosophy'. New actors take part in the debate, and further horizons are explored. Paraphrasing Thomas Kuhn: after a long period of 'normal agriculture', the system has turned into a period of 'revolutionary agriculture'. In this 'revolutionary period', agricultural science is still rather privileged. First of all, it claims (still quite successful) to be the motor of rationalisation of agriculture. Secondly: it also claims to be the ultimate source to solve and (at the end) to overcome the agricultural crisis. And third (best of all): it takes the debate into its own hands, and frames the debate. So, the agricultural science seems to be successful out of any doubt and beyond criticism. In this paper, the focus will be at science. By analysing the differences between natural science and applied sciences, agricultural science will become part of the debate and central in my reflections. Contrary to mainstream views, the agricultural science will be conceptualised as 'local', 'particular', 'narrow minded', 'culturally embedded' and strongly rooted in 'time and space conditions' and 'private interests'. The central theme of this paper is: Does the 'horizon of relevance' of agricultural science still reflect the former concept of modernisation? And, if so: Is it therefore an obstacle to enter a new paradigm. Or should agricultural science be reformed in terms of methodology? In terms of Michael Gibbons, also 'new modes of knowledge' should be explored, to make agricultural sciences (eventually) successful again to help overcome this agricultural crisis. Mono-, multi, inter-, trans- and post-disciplinary approaches will be examined, and illustrated with examples from plant, crop and the animal sciences.

Key Words: Science, Technology, Agriculture, Modernisation, Practice

P3

THE USE OF BIOMETRICS IN AGRICULTURAL RESEARCH: WHAT DO WE DO WRONG?

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Biometric analyses are an irreplaceable and powerful tool in agricultural scientific research. Moreover they are constantly evolving into advanced and more complex biometric models; they are adapting and developing simultaneously with the basic topics and objectives of the research. However, before using the complex models the researchers need to be aware of potential errors and omissions at the very beginning of the study as well as of the misuse of generally known and widely used biometric techniques.A significant increase in the use of statistical methods has been documented in a wide range of biotechnical journals. However, a large portion of the published agricultural research contains statistical errors and flaws, or is rejected for publication by higher ranking journals due to generally low quality of the statistical analyses. Most of the problems arise from the lack of understanding of statistical techniques, their proper use, and their limitations. The availability of a 'user-friendly' statistical software has caused authors to become increasingly careless about the logic of interpreting their results and to rely uncritically on a computer output. It has become common and comfortable to use the 'default option' although a slightly different option would be more correct or at least more appropriate. Therefore biometricians should be involved in the early stages of planning the experimental design as mistakes at this point can have major negative repercussions affecting all subsequent stages of agricultural research. My intention is to present some of the common statistical pitfalls which may occur at different stages in the scientific research process, ranging from planning studies, through conducting statistical data analyses and documenting statistical methods applied, to interpreting and presenting the study results.

Key Words: Statistics in Agricultural Research; Common Pitfalls and Errors; Experimental Design; Statistical Analysis; Interpretation; Presentation

Section: PLANT SCIENCE

Introductory Lectures

PSI1

EPIGENETIC MECHANISMS DURING DORMANCY AND VERNALIZATION IN CROPS

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Some crop plants require long exposure to chilling temperature to acquire competency to flower when environmental conditions become favorable. This mechanism is known as dormancy in perennial plants and vernalization in winter annual plants. Global warming and adverse weather conditions can impair this response to cold resulting in a delay in flowering and therefore causing important economical losses. The mechanisms regulating dormancy and vernalization occur at the apex of the plants or inside the terminal buds in the case of fruit trees. The current knowledge about regulation mechanisms controlling vernalization derives from extensive studies using the plant model Arabidopsis. These works showed that epigenetic regulation of the MADS-box gene FLC is the core mechanism by which *Brassicaeae* species repress flowering during winter. Recent studies showed that the epigenetic control of MADS-box transcription factor genes also occur in buds of *Prunus persica* (peach) and *Pyrus pyrifolia* (Japanese pear). Similar mechanisms were investigated in other *Rosaceae* species and the results shall be discussed. We shall present evidence that repression of MADS-box genes by a recruitment of the repressive histone mark H3K27me3 is a conserved mechanism in plants to repress growth and flowering in response to chilling temperatures. These findings are of relevance to agriculture and will help develop novel cultivars with low chilling requirements.

Key words: Brassicaceae, Dormancy, MADS-box gene, Rosaceae, Vernalization.

PSI2

CLIMATE CHANGE EEFFECTS ON CROP YIELDS IN SERBIA UNDER THE A1B AND A2 SCENARIOS

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We considered climate change impact on the crop yields in Serbia by comparing (1) the results of downscaling with the ECHAM5 and regional EBU-POM model for the A1B and A2 scenarios over 2001–2030 and 2071–2100 and (2) the present climate simulations for the period 1961−1990. The yields of winter wheat, maize and soybeans were evaluated with the Decision Support System for Agrotechnology Transfer (DSSAT) model. In the future, the climate simulations indicate warmer and drier climate. Yields of crops (winter wheat, maize and soybeans) will increase on average under both scenarios, with the exception of maize in non-irrigated conditions and under the A2 scenario.

Key Words: Serbia; Climate; Crop Yield Change

PSI3

COMMUNICATION BETWEEN PLANTS – NEW MECHANISM IN BIOLOGICAL PEST CONTROL

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Modern crop productionimplies a simplification of the environment structure over vast areas, replacing natural plant diversity with only a limited number of cultivated species allowing insect pests to spread easily from plant to plant. Increased plant diversity within crops, such as plant species mixtures (intercropping) and variety mixtures, has been shown to improve ecosystem processes and functions, including insect pest management, productivity and system stability. Apart from competition, the co-existence with other plants can take other forms of interactions through the release of volatile signals, which have implications for neighbouring plants. The results of our studies provide evidence that volatile exchange between undamaged plants has effects on biomass allocation1, leaf temperature2, plant volatile emission3, aphid settling responses4-6 and searching behaviour of aphid natural enemies7,8. For example, certain cultivars respond to volatiles from other cultivars more frequently than others, showing that the responses are specific to certain cultivar combinations4,5. Interestingly, older barley cultivars were generally more frequently affected by volatiles than modern ones9. Volatile interactions between barley and certain weed species have also been found to be species dependent10. These findings indicate that the interaction between the emitting and receiving plants works in a lock and key fashion, where the exact dynamics of this interplay are still to be discovered. Recently, we have found that direct interactions, between neighbouring plants by touching, can also induce responses in the receiving plants reducing aphid host acceptance and negatively affect habitat searching behaviour of ladybirds. Such insect response can be explained by changes in the plant volatile emission induced with short contact with a neighbouring plant11. Taken all together, our studies show that herbivores and their natural enemies are closely adapted to plant physiology and are highly sensitive to plant responses induced by volatiles. The results obtained in these studies stimulate discussion on different farming approaches that intend to promote the application of info chemical signals in intercropping system as an effective biological control agent and thus contribute to reduce the use of insecticides.

Key Words: Species Mixture, Volatile Cues, Induced Resistance, Plant-Plant Interactions, Pest Management

Subsection: Horticulture

Introductory Lectures

HI1

THE USE OF GENETIC RESOURCES IN THE DRESDEN -PILLNITZ APPLE BREEDING PROGRAM

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The current climatic changes will lead to a number of future problems in European fruit production. Endemics of known and new diseases are expected just as problems with fertilization and optimal fruit development because of missing chilling hours in the winter season and the more frequent spring frost, respectively. This situation is additionally strengthened by the decreasing number of permitted plant protection products just as the always growing consumer demands. Breeding and provision of new varieties better adapted to the changing conditions offer one possibility to meet the new challenges. As breeding of fruit crops is much more time consuming and expensive the availability of well characterized genetic resources is a basic requirement for each forward-looking fruit breeding program. In Germany, most of the breeding activities in fruit trees are done at the publically funded JKI Institute for Breeding Research on Fruit Crops in Dresden. The institute is mainly working on breeding of apple, cherry, strawberry and raspberry. Beside this, the Institute is owner of extensive gene-bank collections of different fruit species and it acts as coordinator for a national network, aiming on preservation of fruit genetic resources in Germany. Besides, preservation of genetic resources is continuously evaluated for economically important traits using traditional and modern phenotyping and genotyping tools, respectively. Genotypes with outstanding characteristics are selected and consequently subjected to breeding. This consistent activity over several decades has resulted in a number of new apple varieties and advanced breeding clones with pyramidized resistances to apple scab and powdery mildew for example. Currently the research is focused on improvement of the resistance to fire blight and Marssonina apple blotch.

Key Words: Fruit Breeding, Germany, Genetic Resources, Resistance

HI2

RECOVERY, CHARACTERIZATION AND VALORISATION OF AUTOCHTHONOUS WOODY CROP GERMPLASM IN APULIA

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The agricultural biodiversity, in addition to the need of protecting the genetic and historical-cultural heritage, is a significant untapped economic potential that, albeit slowly, was started to be used. Its contribution to the local agricultural economy can be declined in several ways: the growing demand for new products strictly territorial in response to the product's standardization on the global markets; the placement of biodiverse products in new marketing channels such as direct sale or direct consumption in the agritourisms; the use of more adaptable local cultivars in marginal areas with lower costs and energy inputs. The agro-biodiversity, in the logic of the diversification of the agricultural activities, is being re-evaluated especially in the small multifunctional farms interested in the receptivity and valorisation of the territory. The same in-situ and ex-situ germplasm collections represent a further important tourist attraction to be exploited for increasing, especially out of season, the flow of food and wine enthusiasts in the rural areas. The Apulia Region, through the EU Rural Development Plan (RDP 2007-2013), decided to fund 5 "Integrated projects for biodiversity" aimed to identify, collect, protect and characterize the rich germplasm of the main crops represented by hundreds of old/minor/neglected cvs threatened by genetic erosion just before their irreversible loss. With big multidisciplinary efforts, the projects Re.Ge.Vi.P., Re.Ger.OP and Re.Ge.Fru.P., dealing respectively with grape, olive and fruits crops, allowed to make a sensible progress in the recovery and study of regional germplasm representing the prerequisite for its economic valorisation. The wide partnerships, through 8 activities, including bibliographic research, meetings and interview with the farmers, identified, geo-referenced, collected, multiplied and planted several hundred new selections/varieties, enriching the existing ex-situ gene banks; all the germplasm was studied and characterized by morphological, genetic, agronomic, technological and sanitary approaches in order to verify the varietal identity, to register officially the new varieties as well to evaluate its real economic and productive potential. The field collections with improved facilities/labs, the new knowledge acquired in open data-bases, the new regional law "Protection of indigenous genetic resources" and the RDP funds 2014-2020, all together represent the necessary elements of our long-term germplasm valorization' strategy.

Key Words: Biodiversity, Woody Crops, Autochthonous Germplasm, Apulia Region

Subsection: Horticulture

Oral Presentations

HO1

YIELD AND FRUIT WEIGHT OF RASPBERRY CV. 'POLKA' AS AFFECTED BY HIGH TEMPERATURES DURING HARVEST IN AGROENVIRONMENTAL CONDITIONS OF ČAČAK.

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This paper presents the results of a two-year study on growing raspberry cv. 'Polka' under the agroenvironmental conditions of Čačak (390 m a.s.l, medium - to fine-textured soil, plot with southwest exposure, irrigation). 'Polka' is a primocane-fruiting raspberry cultivar that shows a tendency to spread throughout the raspberry production regions in Serbia but also outside typical production areas. A typical raspberry production region in Serbia is characterised, inter alia, by pleasantly warm summers with sufficient rainfall. Fruit ripening started on 18th July in 2014 and on 27th July in 2015. The harvest season in 2014 was long, lasting until the beginning of November, while that in 2015 was considerably shorter (until 8th October). Yield was 10.26±0.41 t ha-1 (178.20±8.59 g per cane) in 2014 and only 2.84±0.11 t ha-1 (49.20±2.49 g per cane) in 2015. Fruit weight differed significantly not only between the experimental years, but also between harvests in a single year. Fruit weight in 2014 was 3.22±0.19 g on average, ranging between 2.23±0.11 g (harvest on 12 September) and 5.47±0.29 g (harvest on 22 July). In 2015, the fruits were significantly smaller, with an average weight during harvest of 2.54±0.10 g. The average SSC of fruits was 9.91±0.79 °Brix in 2014 and 11.90±0.92 °Brix in 2015. Raspberry cv. 'Polka' had poorer performance under the agroenvironmental conditions of Čačak than under conditions occurring in typical raspberry production regions. This was particularly pronounced in the year with unfavourable climatic conditions i.e. in 2015, which had a period of very warm weather between the end of summer and early autumn i.e. exactly during the 'Polka' harvest season.

Key Words: Raspberry, Polka, Fruit Traits, Productivity, Heat Stress

HO2

EFFECT OF ROOTSTOCK ON GROWTH, FLOWERING AND FRUIT SET AT APPLE CULTIVAR 'GRANNY SMITH'

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Tree growth, flowering, fruit set and some productivity characteristics were assessed at apple cultivar 'Granny Smith' grafted on nine different rootstock ('M.9 T 984', 'M.9 T 337', 'Jork 9', 'Mark 9', 'Budagowski 9', 'M.9 EMLA', 'Pajam 1', 'Pajam 2' and 'Supporter' 4). The experimental orchard was established in 2004, with a planting distance 3.5 m × 1.5 m, in Prespa region (Resen, Republic of Macedonia). The trees were trained as slender spindle. The study has been performed during three consecutive years (2008-2010). The following characteristics were investigated: flowering and ripening time, number of floral buds per tree, number of flowers per floral bud, floral buds density, fruit set and some yield characteristics of the trees. Generally, it can be concluded that the obtained results show significant variation on a number of evaluated parameters. Number of flower buds was varied from 167 up to 218 buds per tree. Trees grafted on Budagowski 9 have the highest floral buds density, while trees grafted on Pajam 1 were characterized with largest number of flowers per floral bud. Satisfactory fruit set were obtained at the trees grafted on all evaluated rootstocks. The highest productivity has been registered at the trees grafted on M9 EMLA (22.3 kg/tree), and the lowest at the trees grafted on Budagowski 9 (16.1 kg/tree). Some of the studied rootstocks showed positive characteristics and can be recommended for widely growing in the Prespa region.

Keywords: Apple, Grafted, Floral Buds, Density, Productivity

HO3

INFLUENCES OF TRADEMARK AND ROOM LIGHTING CONDITIONS ON SENSORY PERCEPTION OF WINE QUALITY

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A number of studies indicated influences of factors such as temperature of wine, space temperature, space lighting conditions, tiredness of panelists, their previous experience and information on the reputation of wine on results of wine sensory analyses. The aim of this study was to determine the possible impacts of trademarks and reputation of the wine and the conditions of room lighting (daylight, complete darkness) on sensory perception of quality of 10 white and red still regional wines. Wine sensory analyses were organized in three sessions (open tasting, blind tasting in daylight, and blind tasting in the dark) conducted by the panel of 13 tasters. The tasters had previously completed theoretical and practical training for the wine taster and could be, therefore, categorized as semiskilled laymen. Wine quality was evaluated according to two evaluations schemes: OIV method of scoring up to 100 points and Buxbaum method of scoring up to 20 points. Although a very high positive correlation coefficients were noted between the ratings assigned to the wines using the OIV and Buxbaum schemes (0.96 to 0.98), due to the higher value of the average variation coefficient in Buxbaum scheme (12.70%) results were analyzed on the basis of ratings assigned by OIV scheme (average coefficient of variation 10.09%). ANOVA applied separately to the scores for white and red wine showed that in all three sessions different wines were evaluated with statistically significantly different scores. Both white and red wines had slightly lower average scores received at the tasting in the dark. Evaluation conditions in the three sessions have resulted in statistically significant differences between the average scores for only three out of 10 white and for four out of 10 red wines, with no reported regular tendencies. The results showed that, except certain influence of trade brand on evaluated quality of red wines, there were no significant effects of conditions in the three review sessions on the average scores assigned to the sensory analyzed wines.

Key Words: Wine, Sensory Analysis, Wine Trademark

HO4

SEED GERMINATION OF SOME FLOWER SPECIES UNDER INFLUENCE OF DIFFERENT LIGHT CONDITIONS

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Investigation was conducted in the laboratory for vegetables, floriculture, medical and aromatic herbs on Faculty of Agriculture in Osijek during the year 2015. Seeds of *Zinnia elegans* Jacq., *Dianthus caryophyllus L.* and *Callistephus chinensis* (L.) Nees that were used in the research were purchased in local store. In preparation for germination, petri dishes were sterilized with 96 % ethanol and seeds of every flower species were counted. Experiment was set up in three replicates for each light treatment and each flower species. Counted seeds were placed in petri dish on filter paper that was moistened with 5 mL of distilled water. Prepared petri dishes with seeds were then placed in growth chamber under artificial white and blue light under 12hL/12hD photoperiod. Temperature during the research was constant (23 ± 1 °C). During the first week, number of germinated seeds was recorded daily, and on the seventh and the fourteenth day germination energy and total germination were determined respectively. Seedlings length and mass were recorded at the end of experiment. Results of the research showed no significant difference in germination energy and total germination of all investigated flower species in respect of light. *Zinnia* seedlings were significantly longer on white light, while *Dianthus* seedlings were longer on blue light. Both, length and mass of *Callistephus* seedlings were greater on white light. The research suggests that, in the initial stage of germination, *Zinnia*, *Dianthus* and *Callistephus* are not photosensitive and therefore no significant differences in the estimated parameters occurred. The assumption is that, in further stages of development, these differences certainly would have occurred so we can conclude that this research should be continued throughout the growth and all development stages of investigated flower species.

Key Words: *Zinnia*, *Dianthus*, *Callistephus*, Germination, Light

HO5

DIFFERENT WATER CONSUMPTION IN DIFFERENT MODES OF SPRAYING AGAINST GRAPEVINE DOWNY MILDEW

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Aim of the work was to determine the importance of fungicide applications by motorized backpack sprayer, backpack sprayer and tractor sprayer (atomizer), as well as the importance of consumed water quantities during the treatment in the control of grapevine downy mildew (Plasmopara viticola). Treatments were performed by those sprayers in 2015 at the experimental field of the Biotechnical Faculty in Podgorica. Assessment of the treatment efficacy was done on the basis of infected leaves examination (EPPO methodology). Four treatments were carried out with different water consumption depending on the sprayers. Two treatments were made by motorized backpack sprayer in two different positions (3 and 6) set up by the dosing mechanism to provide different water consumption. The third treatment was performed by backpack sprayer, while the fourth treatment was done by tractor atomizer. In all treatments identical control program against the disease had been applied. During the vegetation two sprayings were carried out to protect grapevine from downy mildew, while in the control no spraying was done. Studied treatments showed the following efficacy: in application made by motorized backpack sprayer (position 3) the efficacy was 54.4% while at position 6 efficiency was 88.2%. In backpack sprayer achieved efficacy amounted to 81,9%, and in the treatment where tractor atomizer was used, efficiency reached 100.0%, at disease intensity in the control of 63.65%. After statistical analysis, the results showed that all the treatments differ significantly in comparison to the control and between each other there was also statistically significant difference. The highest and total efficacy was achieved in the treatment with tractor atomizer. It is followed by the efficacy realized in application made by motorized backpack sprayer (position 6), and then by backpack sprayer. The lowest efficacy was gained when spraying has been done by motorized backpack sprayer (position 3).

Key Words: Grapevine, Sprayers, Downy Mildew

HO6

UTILIZATION OF DIFFERENT TYPES OF GLUCOSE OXIDASE FOR REDUCTION OF GLUCOSE CONCENTRATION IN SYNTHETIC GRAPE JUICE

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There are different techniques for reduction of the amount of glucose in the grape juice. One of the most promising techniques is the biotechnological, the utilization of the enzyme glucose oxidase for oxidation of glucose into a gluconic acid. Grape juice with lower concentration of glucose can then be used for production of wine with reduced alcohol level. In order to optimize the process of lowering the glucose concentration in grape juice prior to fermentation, two types of enzymes were used as catalysts for glucose oxidation in several model synthetic grape juices. The first one is a food grade enzyme Alphamalt Gloxy 5080 from Aspergillus niger, commercial preparation for utilization in baking industry. The other one is pure enzyme from Aspergillus niger, used as a sole or in a combination with catalase isolated from beef liver. Both the pure glucose solution and the synthetic grape juice were used as substrates for enzymatic pretreatment. The Alphamalt Gloxy 5080 enzyme, when used in a concentration of 1 g/L, showed 77.60% substrate conversion of the glucose used in a concentration of 10 g/L. It was very interesting that the pure glucose oxidase having concentration of 25 mg/L converted only 1.32% of glucose, while when combined with 15 μL catalase, the conversion was even 49.25%.

Key Words: Glucose, Glucose Oxidase, Grape Juice

HO7

MAIN EFFECT META PRINCIPAL COMPONENT ANALYSIS (ME-METAPCA) OF PLANT GROWTH REGULATOR TREATMENT EFFECT ON SIMULATED MULTIPLE APPLE DATA

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Meta-Analysis as a statistical and analytical method for combining and synthesizing several independent studies and integrating results into a common result and conclusion has not been established in agricultural research yet. Moreover, combination of Meta-Analysis and Principal Components Analysis of main treatment effects (ME-MetaPCA) is a novel approach for analysis of experimental treatment effects. The aim of this paper is to introduce this approach through agricultural model, where it is required, in order to objectively and effectively summarize and generalize conclusions through multiple researches with multiple variables. Simulated data are modeled as real multiple fruit characteristics that define both yield quantity and fruit quality in apple, which is the case in most studies of agricultural crops. Treatment generally affects several fruit characteristics and its effect typically varies throughout different studies and varieties. Finding the real underlying treatment effect size and grouping the studied varieties accordingly would be of practical use for both agricultural researcher and producer. The simulated data were modeled as Plant Growth Regulator (PGR) treatment in several studies where multiple apple varieties were treated and multiple fruit characteristics measured. Results are displayed in form of forest plots related to Meta-Analysis for individual characteristics followed by graphical presentation in principal component space of main effect's eigenvectors of measured characteristics in studied varieties. This leads to better and more objective understanding of the general rules regarding the effect of the PGR treatment and its influence over various measured fruit characteristics and studied varieties, their grouping and dispersion.

Key Words: Meta-Analysis, PCA, Multivariate, Biometrics, Fruit Characteristics

Subsection: Crop Science

Introductory Lectures

CSI1

ASSESSMENT OF GENOMIC RESOURCES AND NEXT-GENERATION-SEQUENCING TECHNOLOGY FOR RESISTANCE BREEDING IN BARLEY

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The aim of this work was to assess the usability of modern technologies and barley genomic resources in deciphering novel sources of resistance identified in landraces and Hordeum bulbosum and their use in barley breeding. Firstly, the doubled haploid (DH) population derived from the cross between the landrace MBR1012 and the cultivar Scarlett that was previously used for the mapping of resistance to leaf rust was genotyped on the 9K iSelect chip. A map of 2863 markers covering 1468,34 cM was used for the genetic dissection of the resistance to three monoconidial isolates and QTL detection of field resistances to net blotch and for construction of a consensus map that holds a total of 6,405 markers. The second aim was to exploit the BYDV tolerance of DH-lines derived from the backcross (Emir×H.bulbosum)×Emir. The analysis included localization of the introgressed fragment, mapping of PCR and 9K iSelect markers, exome capture screening and RNASeq profiling after virus infection. Analysis allowed narrowing down the introgression carrying the BYDV-tolerance to about 3 cM and detection of 12 cis down regulated genes. The third aim was to estimate the convergence of barley genomic resources, GenomeZipper (GZ) and POPSEQ, at the genome-wide level and to assess their usefulness in breeding by analyzing seven known loci. Comparison of barley GenomeZipper and POPSEQ maps to a consensus map yielded an accuracy of 97.8% and 99.3%, respectively. The fine scale comparison involved seven genetic regions on five chromosomes harbouring major genes and quantitative trait loci (QTL) for disease resistance. In total, 179 GenomeZipper loci were analyzed and 69 polymorphic markers were developed. 89.1% of these were allocated within the targeted loci. Forty-four markers allowed the identification of fingerprinted contigs. The results revealed the presence of novel resistance genes and provided the tools for their efficient deployment in barley breeding.

Key Words: Map Based Cloning, CAPS, Cleaved Amplified Polymorphic Sequence; GBS, Genotyping-by-Sequencing; GZ, GenomeZipper; MAS, Marker-Assisted Selection; NGS, Next-Generation Sequencing; POPSEQ, Population Sequencing; QTL, Quantitative Trait Loci; SNP, Single Nucleotide Polymorphism

CSI2

CONCEPT OF WHEAT BREEDING FOR YIELD AND QUALITY IMPROVEMENT

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Breeding of wheat up to nowadays contributed to grain productivity in an average increase of yield of 1% a year-1, approximately. The progress achieved in grain quality created new enhanced wheat cultivars. The wheat yield potential could be increased through a genetic improvement of morphological, anatomical, physiological, biochemical characteristics. The breeding concept comprises a lot of tasks and challenges: a) stable yield through high adaptation to abiotic stress factors (moisture deficit, soil salinity, heat), and biotic stress factors (fungi, bacteria, insects, etc.); b) resistance to lodging (biotypes with strong culm, reduced stem); c) improvement of quality parameters (protein content, gluten content, dough traits, excellent milling quality, water absorption of flour, large and heavy loaf of bread); d) low-input and high-output cultivars. The wheat potential for yield and quality breeders can achieve in wheat genotypes with improved photosynthetic efficiency, nutrient use efficiency that require research on cellular and subcellular processes. Nitrogen nutrition is one of the major factors that limits growth and production of crop plants. It affects many processes, such as development, architecture, flowering, senescence and photosynthesis. In wheat, there is a great potential to make progress for breeding drought tolerance, salinity resistance through use of wild relatives, as gene resources, and apply new genomic technology for genome mapping and accelerating selection of novel cultivars carrying desirable traits. The quality improvement could be achieved through selection of genotypes with the best composition and contents of gliadin, glutenins and amino acids based on exploration of genetic variability of plant genetic resources. This work will present concept of wheat breeding and key direction of selection of improved wheat cultivars.

Key words: Breeding, Wheat, Gene, Yield, Quality, Adaptation

CSI3

CEREAL CYST NEMATODES: IDENTIFICATION, QUANTIFICATION AND CONTROL

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Wheat, maize and rice occupy the most important position among grain crops in terms of production, acreage and source of nutrition, mainly in developing countries. Like all crops, cereals are exposed to biotic and abiotic stresses. Among the biotic stresses, plant-parasitic nematodes, mainly cereal cyst nematodes (Heterodera spp.), can have significant impact in decreasing the yield. The losses caused on cereals are increased under drought stress and wheat monoculture system. Cereal cyst nematodes (CCN) are spread worldwide and have been reported frequently from several countries in West Asia and North Africa. Currently, cysts are mainly identified on the basis of both morphology and morphometrics, which is time consuming and hardly applicable when species mixtures need to be identified and quantified. Hence, a rapid and reliable method to identify and quantify cyst nematodes is needed. Three species-specific PCR assays for the identification of the three major species of CCN (H. avenae, H. latipons and H. filipjevi) were developed. Each of the developed assays was sensitive, robust and allows the detection of each species specifically whether they occur alone or in mixed populations with other Heterodera spp. Two qPCR assays were established for the identification and quantification of H. avenae and H. latipons. The PCR and qPCR assays provide a sensitive and valid tool for rapid detection and quantification of the two species. One of the most cost efficient, environmentally friendly and accessible options for controlling CCN is the use of genetic host resistance, and unlike rusts the capacity of CCN to change is very slow so a breakdown of resistance is not considered a major threat. A total of 230 synthetic winter wheat germplasms representing three groups were phenotyped against H. filipjevi under growth room conditions. These germplasms were also genotyped using the Amplified Fragment Length Polymorphism (AFLP) technique. Within each group, some of the germplasms had relatively lower numbers of cysts compared to the others. Interestingly, the biplot based on the 2 functions of the discriminant analysis of the AFLP DNA markers, showed a clear evidence of the genetic differentiation of the resistant germplasms in all three groups.

Key words: Heterodera filipjevi, AFLP, Resistant Cultivar, Wheat

Subsection: Crop Science

Oral Presentations

CSO1

DIGNUM LAUDE VIRUM MUSA VETAT MORI

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In 1865 Gregor Mendel presented lectures "Experiments in Plant Hybridization" about his results from cross-breeding experiments with different types of garden pea that he performed in his monastery garden in Brno. Mendel studied easily observed pairs of opposite traits such is purple or white flower, and discovered dominant and recessive traits. He concluded that these hereditary traits residue in units that he called elements or characters and we call genes. The scientific community did not understand that indeed it was beginning of what has become genetics. The lectures had published in 1866 and Mendel sent them to more than 30 of biologists across Europe, but almost no one commented on them. These papers were only three times cited in the next 35 years. The genetics became more important at the beginning of the 20th century when three different research groups (Hugo de Vries, Carl Erich Correns and Erich von Tschermak with their co-workers) independently re-discovered Mendel's Laws. However, as soon as the work was rediscovered, it created controversy. The closeness of Mendel's experimental observations to those predicted by his theories has led to numerous articles and ongoing debate about whether the data could have been obtained in the published form without some falsification. There have been many plausible arguments made for and against this view by a range of eminent statisticians and geneticists. Some have gone so far as to suggest that the theories behind Mendel's two laws were not even correctly articulated in his original paper. The strongest supporters of Mendel's theory became biologist William Bateson and zoologist and geneticist Thomas Hunt Morgan. Morgan argued that genes are on chromosomes and the chromosomes of cells were thought to hold the actual hereditary material, and created what is now known as classical genetics. Morgan received the Nobel prize for his results. As the architect of genetic experimental and statistical analysis, Mendel remains the acknowledged father of genetics.

Key Words: Gregor Mendel, Genetics, Inheritance, Controversy

CSO2

BREEDING FOR MAIZE GRAIN QUALITY TRAITS

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Maize is a high yielding crop that provides a relatively high calorie source of food and feed, but focus on yield has not improved nutritional qualities. Biofortificaiton with selective breeding is a way to improve the nutritional qualitites of maize grain. The useful breeding techniques are conventional breeding, marker assisted selection, and transgenic approach. Conventional breeding is possible only if high variation among genotypes is present in gene pools that control desired trait. In maize kernels, both macro- and micronutrients are present, including carbohydrates, lipids and proteins (macronutrients), carotenoids, tocopherols, minerals, phytic acid, anthocyanins and other phenolic compounds (micronutrients). At Maize Research Institute programs for improvement quality of protein, and micronutritiens as beta carotine, tocopherols and minerals are conducted. Marker assisted backcross was used for conversion of normal maize lines to Quality Protein Maize (QPM) lines adapted for growing in temperate regions. The process of conversion of the standard inbred line in line with improved proteins quality using molecular markers consisted of two cycles of backcross which included three cycles of self-pollination Recipient parent and donor lines were clearly distinguishable with three opaque2 specific SSR markers so they will be used for marker assisted selection for the opaque2 gene. Plants without o2 alleles could be discarded prior to pollination, reducing the size of the breeding population and saving both time and money. More than 100 inbred lines are screened for concentration of microelements as well as beta carotene and tochopherols. A high amount of variation for micronutrients is present among genotypes and genotypes with high concentration of micronutrients are chosen for further crossing. Breeding for low phytate maize genotypes is an effective strategy for decreasing the content of kernel phytic acid as a chelator of mineral cations. Local maize population with red kernal could be used as donor for improvment of α, γ and δ tocopherol content of five inbred lines, parental components of commercial hybrids. In breeding for increased concentrations of carotenoids and tocopherols, it is important to know what effect male and female genotypes contribute to content for these compounds when different genotypes are crossed.

Key words: Maize, Marker-assisted Selection, Quality Protein Maize, Micronutritiens

CSO3

THE YIELD OF WINTER WHEAT (*TRITICUM AESTIVUM* L.) DEPENDING ON THE SOWING DENSITY

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Experiment on winter wheat in the conditions of different sowing densities (seeds/m2), 384 and 588 (in a honeycomb arrangement), 424, 451, 504, 544, 584 and 604 (standard grain arrangement), was carried out during the vegetation period 2013/14 and 2014/15 in agro ecological conditions in the region of Banja Luka. Winter wheat varieties Nova Bosanka, Prima and NS40S were examined. Experiment on wheat in terms of different sowing density was set in a randomized block design with four replications. The vegetation periods during 2013/14 and 2014/15 were not under the droughts influence and the standard agronomic practices were applied. Hand seeding was carried out on 96 experimental plots area in 1 m2. Wheat harvest was performed manually in fenological stage of full maturity and wheat yield was expressed in 14% of moisture. Factorial analysis of variance 2 × 8 × 3 [F block system: years (2) × sowing density (8) × variety (3)] showed that there is a highly significant effect of variety on yield and significant effect of sowing density, while others did not showed statistically significant differences. Since interaction effects were not statistically significant, the conclusions are made on the basis of the statistical significance of the basic factors. Wheat varieties NS40S (8,39 t/ha) and Prima (8,22 t/ha) gave statistically higher yield compared to variety Nova Bosanaka (7,25 t/ha) regardless of the sowing density and year of observation. There were not statistically significant differences between yields of varieties NS40S and Prima. The highest wheat yield was achieved with the sowing density with 588 seeds/m^2 (8,75 t/ha), regardless of the variety and the year of observation. Achieved wheat yields with sowing densities with 544, 584 and 604 seeds/m^2 were statistically significantly higher than the yield achieved with sowing densities with 424, 451 and 504 grains/m^2, while the yields in this two groups have not showed statistically significant differences. Achieved wheat yields with the sowing densities with 424, 451 and 504 seeds/m^2 were statistically significantly higher than the yield obtained with densities of 384 seeds/m^2. The average increase in yield of 803,6 kg/ha or 10,63% which is obtained in sowing density with 544-588 grains/m^2 compared to the group with sowing densities from 384 to 504 seeds/m^2 can be estimated as indicative and economically justified.

Keywords: Wheat, Sowing Density, Yield

CSO4

POPULATION DYNAMICS OF EUROPEAN CORN BORER AND WESTERN CORN ROOTWORM IN BEČEJ REGION, VOJVODINA PROVINCE

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Population dynamics of *Diabrotica virgifera* spp. *virgifera* Western Corn Rootworm (WCR) and *Ostrinia nubilalis* European Corn Borer (ECB) are characterized by different population density and harmfulness in last decade. Optimal temperature and low moisture represent favorable conditions for the development and occasional mass appearance of WCR and ECB. North part of Serbia is a leading maize production region. WCR and ECB can cause serious plant damages from 50 to 100% and large yield losses up to 100%. A field experiment was set up in Bečej, Province of Vojvodina (Serbia), in 2014 and 2015, with Serbian cultivar NS-640. The experiment was carried out from June to September in 2014 and 2015. We marked 96 maize plants and arranged them in to 48 pairs. In each pair we had a plant artificially infested whit 4 mL of WCR eggs suspension (D), and control plant (C) infested whit same amount of distilled water. After artificial infestation we set up pheromone traps for ECB and WCR in corn field. Field inspection carried out at seven days intervals for three months from July until September 2014 and 2015. Sticky bases of traps were inspected and every time all caught specimens were removed or bases replaced. Different weather conditions in these years influenced the different dynamics of populations of both pests. The number of WCR specimens was progressive during 2014 and 2015. In second year (2015), the number of caught specimens was higher by 100% if compared with caught adult number in previous year. The number of ECB was fluctuating in 2014, but in 2015 was progressive with highest number of caught specimens at the end of vegetation.

Key Words: *Diabrotica virgifera* spp. *virgifera*, *Ostrinia nubilalis*, Population Dynamic, Maize, Vojvodina

CSO5

LIPOIC ACID STIMULATES THE GERMINATION AND EARLY SEEDLINGS GROWTH OF MAIZE BY MODULATING PROTEIN AND CARBOHYDRATE METABOLISM

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The germination and early seedling growth are among the most critical stages of the plant life. These periods may be viewed as a primary phase for a healthy life cycle. Along with its own structural features, several biotic and abiotic factors have crucial influences on the seed germination. Vitamin A like compound, lipoic acid (LA) is a powerful antioxidant molecule and plays critical roles in metabolic processes; however, there is no report regarding its effects on seed germination. In this study, we investigated the effect of LA on seed germination and early seedling growth parameters of maize (Zea mays L.). Compared to control plants, LA applications resulted in a remarkable rise in germination ratio. As parallel to this elevation in germination ratio, root and coleoptile lengths were significantly promoted by LA applications. In LA-applied plants, amylase activity was much higher than in control plants. The change in isozymes also supported LA-induced rise in amylase activity. Also, soluble sugar content was concomitant to high amylase activity. On the other hand, in accordance with the increase in soluble protein content, LA application caused significant changes in protein profile in comparison to the control. All these findings suggest that LA has a considerable stimulative effect on seed germination and this effect is associated with several physiological and biochemical pathways including protein and sugar metabolism.

Key Words: Lipoic Acid, Maize, Germination, Amylase, Protein

CSO6

SPIKE LENGTH AND NUMBER OF GRAIN PER SPIKE OF WINTER WHEAT (*TRITICUM AESTIVUM* L.) GROWN IN MELIORATED DEPOSOL

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This paper presents the two-year research results (2010/11 and 2011/12) on impacts of different agro-technical measures to the yield components of four varieties of winter wheat (Nova Bosanka, Prijedorcanka, Orion and Eevropa 90), grown on meliorated Deposols in the process of reclamation in Stanari lignite mine area. The aim of the research is to determine the impacts of years, different doses of fertilizers (five treatments: $N_{60+90}P_{60}K_{60}$, $N_{60+40}P_{60}K_{60}$, $N_{60+90}P_{37}K_{37}$, $N_{60+40}P_{37}K_{37}$ and $N_0P_0K_0$) and variety to quantitative properties of spike (spike length and grain number per spike). A field experiment was set up according in a randomized block design with four replications. The effect of all three-factor: year (A), variety (M) and fertilizers (K) were researched. Comparative analyses of the researched wheat varieties for length of spike and graine number per spike were performed by analysis of variance 2x4x5. The analyses of significant differences were done by LSD test. The highest average wheat spike length was 8.5 cm in the variety Orion, while the smallest average spike length was 5.0 cm in the variety Evropa 90. Depends of fertilizer treatments, the largest number of grain per spike (48.75) and the smallest number of grain per spike (13.00) were found at variety Nova Bosanka. The lowest medium values were measured in control. The applied ameliorative measures impact the production traits of cultivated crops in the researched agro-ecological conditions.

Key words: Reclamation, Variety, Fertilization, Yield, Stanari.

CSO7

THE EFFECT OF NON-STANDARD FOLIAR FERTILIZERS ON HARVEST AND QUALITY OF GRAIN OF BARLEY

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Barley grain is rich in mineral nutrients, but its bioavailability to humans and monogastric depends on antinutrients (phytate, phenolics etc.) which restrain bioavailability and promoters (β-carotene, thiolic amino acids, etc.) which promote mineral nutrients bioavailability or decrease the activity of inhibitors. The aim of this study was to test various non-standard foliar fertilizers (Zircon, Chitosan, Siliplant, Propikonazole), including some hormone preparations (Epin Extra, Benzyladenine), as potential biofortification measure on chemical composition of barley grain, including phytate and phenolics as antinutrients, β-carotene as promoter and mineral elements, such as Ca, Mg, Fe, Zn and Mn. Growing year affected significantly grain yield and its chemical composition. Chitosan increased grain yield to the highest extent, glutathione concentration and decreased ratio between phytate and β-carotene, thus increasing potential bioavailability of examined mineral elements. Unfavorable meteorological conditions (high precipitation level) were partly mitigated by application of Benzyladenine and Siliplant, increasing potential bioavailability of P, Mg, Ca and Fe. Generally, Epin Extra, Benzyladenine and Siliplant increased potential availability of examined mineral elements: Pi (+≈10% from control in both years), Zn (+≈30% from control in both years) and Fe (+≈90% from control in 2014) (Epin Extra), Ca (+≈12% from control in 2013 and +≈3% from control in 2014) and GSH (+≈15% from control in 2014) (Benzyladenine) and Mn (+≈10% from control in 2014) and Si (+≈100% from control in 2013 and +≈2% in 2014) (Siliplant) in barley grain.

Key words: Barley Grain Composition, Antioxidants, Mineral Elements, Bio-fortification

Section: ANIMAL SCIENCE

Introductory Lectures

ASI1

IS HOUSING QUALITY INFLUENCING ANIMAL WELFARE?

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Good animal welfare conditions are of importance to the animal itself (e.g. due to health), for the farmer (due to economy), and also for the public (due to food safety). The last decades a massive research job is performed worldwide to improve knowledge on animal welfare also within the dairy production, e.g. as lately seen in an EU-project called Welfare-Quality. However, often the focus on practical implications are scarce. The aim of this presentation is therefore to exemplify animal welfare traits of importance for modern dairy production. According to Broom (1988), the welfare of an individual is its state as regards its attempts to cope with its environment. Welfare varies within a continuum from very good to very poor. Individuals vary in the coping methods which they use, so any one measure may indicate good or poor welfare. However, absence of evidence using one or a few measures does not mean that there is no welfare problem. Due to the lacking possibility to properly "ask" the individual animals regarding their welfare status, welfare indicators are used as an indicator of their welfare (e.g. www.welfare-quality.net). Welfare indicators may be physiological, behavioral, or concerned with individual production or disease (Broom, 1988). EFSA (2012) classes welfare indicators into animal based (result) or resource based indicators. Early approaches to animal welfare assessment were mainly based on the absence of negative states, however, today, the presence of actual 'positive states' are also considered to be relevant for animal welfare. Animals kept for farming purposes are typically coping with a man-made housing as their environment. Any environment may be looked upon as a resource, and hence the amount or level of the resource may also be used as a welfare indicator. Food is however, exemplifying that more is not necessarily better; too little or too much may both be problematic. Lately the 12 criterias of the Welfare Quality project (Botreau et al., 2009) are used to illustrate factors of major importance for animal welfare;

1. Animals should not suffer from prolonged hunger
2. Animals should not suffer from prolonged thirst
3. Animals should have comfort around resting
4. Animals should have thermal comfort
5. Animals should have enough space to be able to move around freely
6. Animals should be free of physical injuries
7. Animals should be free of disease
8. Animals should not suffer pain induced by inappropriate management, handling, slaughter, or surgical procedures (e.g. castration or dehorning).
9. Animals should be able to express normal, non-harmful, social behaviours
10. Animals should be able to express other normal behaviours
11. Animals should be handled well in all situations
12. Negative emotions such as fear, distress, frustration or apathy should be avoided whereas positive emotions such as security or contentment should be promoted

To conclude on the initial question; housing quality is influencing animal welfare, however, often by simple means, welfare may be substantially improved. When animal welfare is improved, farmers often also experience improved herd health and increased income, as yield and product quality may improve and health costs may be reduced.

Keywords: Dairy, Cattle, Housing, Animal Welfare, Welfare Quality

ASI2

INTERACTION OF RESEARCH AND BEEKEEPING PRACTICE

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European honeybee races are spread throughout the world, however, the main gene pool is in Europe, which is necessary to investigate, monitor and maintain. The effect of different environment on bees was investigated from 1992 to 1994 in collaboration with the Austrian National Institute of Beekeeping. The research was conducted in Mala Dapčevica in Croatia and in Lunz am See, Austria. At each location there were 12 colonies of Croatian and 12 colonies of Austrian origin. Research results have confirmed a better adaptation of local bees, which was evident through better survival, colony development and pasture utilization. Research on the influence of inbreeding and varroa infestation on the mating ability of drones was carried out within the same cooperation in the period from 1995 - 1997, and the results showed a reduced competitiveness of these drones at the drone congregation areas. The results of these two studies influenced the definition of the Croatian national honeybee breeding program adopted in 1997. The main objective of the breeding program is an increase of the economic value of the queens, which, in parallel, needs to preserve adaptation of bees to local climate, pasture and environmental conditions and to avoid inbreeding. Equally important is to maintain biodiversity within the breed. To achieve these goals, each breeder has to carry out selection and breeding in their own colonies and to improve their own breeding line. The success of the selection is measured by independent performance tests in similar field conditions and laboratory quality control of the queens. The interaction of genotype and environment on the vitality of honey bees was investigated in the framework of the COST COLOSS project from 2009 to 2012 on 21 research apiaries through almost all European climate zones. Queens from Croatia were monitored in two apiaries in Poland, three in Macedonia and on the island of Unije. The apiary on the island of Unije was established with the queens from Croatia, Germany, France, Finland, Macedonia and Denmark. In all 21 apiaries, the development of colonies was measured, their weight, disease load (varroa, Nosema, and viruses) and behaviour (calmness on the comb, swarming tendency, aggressiveness). In this study, the local bees had much better indicators of survival in comparison with bees brought from another region. The average length of life of colonies of foreign origin was 470 days and for the local colonies it was 553 days (83 days longer). It was also found out that the pathogen load in the colonies of local origin was lower, which might be due to better adaptation to the local environment. The results of this study have prompted the European Union to announce a tender for a research project aimed at preserving the local populations of bees and their selection for economic traits and tolerance to the diseases. The SmartBees Project was launched in November 2014. This project is expected to standardize selection criteria in the most of Europe, and promote the treatment against bee diseases using biotechnical methods and breeding. In parallel with this research, the Research Network for Sustainable Bee Breeding (RNSBB, TF COLOSS) carries out a preliminary study on the presence of varroa infertility in European honeybee populations, which would probably be included in the national selection programs.

Key words: Honeybee, Breeding, Queens, Drones, Project

ASI3

DISPOSAL OF ANIMAL WASTE AS A RISK FACTOR IN THE SPREAD OF ZOONOTIC PATHOGENS

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Animal waste disposal is a very important prophylactic measure aimed to detection, prevention, suppression and eradication of infectious and parasitic diseases in humans and animals. The process of disposing of animal waste starts from the manufacturer, who is responsible for ensuring safe storage of waste in the cooling unit to the final removal in the processing facilities. By processing of animal waste of categories 1 and 2, finished products as technical fat and meat-and-bone meal, used in industrial use as energy source, are obtained. The utilization of this material is at the level of 10-15% for technical fat and 20-25% for meat and bone meal. Animal waste, which includes animal carcasses, slaughterhouse confiscates, slaughter by-products, high-risk tissues, the blood of slaughtered animals and others, represent specific hazardous materials that may be a source of infection and environmental pollution. Disposal of animal waste must be done in a safe manner, otherwise dangerous pathogens can be spread by water, air and soil at different distances where they may endanger public health. In the European Union (EU), and consequently in the Republic of Serbia, a legislation regulating the ways of managing animal waste is introduced. The EU adopted Directive 999/2001, which regulates rules on the prevention, control and eradication of transmissible spongiform encephalopathies and Directive 1774/2002 with its Annexes, about the categorization of hazardous waste and ways of safe remediation, where member states are obliged to apply the methods of safe treatment of the by-products of animal origin. In October 2009, a new Regulation (EC) No. 1069, which defines health rules as regards animal by-products and their products not intended for human consumption, was issued, and previous Regulation Directive No. 1774 from 2002 expired. On the basis of European legislation, Republic of Serbia adopted the Law on Waste Management ("Off. Gazette of the RS", No. 36/2009 and 88/2010), and in 2011 the Regulation on the Classification and treatment of the by-products of animal origin, veterinary - sanitary conditions for the construction of facilities for the collection, processing and disposal of the by-products of animal origin, method of official control and self-control, as well as conditions for animal cemeteries and graves pits ("Off. Gazette of RS", No. 31/2011) was adopted. On two occasions, these Regulations were updated ("Off. Gazette of RS", No. 97/2013 and "Off. Gazette of RS", No. 15/15). All technological processes in animal husbandry also produce byproducts potentially harmful to the environment, such as solid and liquid manure. This waste can be exploited only if it is properly treated, and after laboratory controls of obtained product. One of economic and safe way of disposing of such waste is the process of composting, especially in biovators, to give the final product – compost, which is very desirable in agricultural land fertilization, especially in organic farming.

Key Words: Animal Waste, Zoonotic Pathogens, Pathogen Survival, Safe Disposal

ASI4

GENOMIC SELECTION IN ANIMAL BREEDING

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The vast majority of genetic improvement in farm animal species during the last 50 years was achieved using classical selection approaches based on phenotypic testing and predicting breeding values of potential parents. The classical selection was based on infinitesimal model for quantitative traits assuming that quantitative traits are depending on large number of genes with very small effects. Some two decades ago the idea of quantitative trait loci (QTL) with relative big effects promised that genotyping of only few loci for every trait will allow good prediction of the genotypic value of breeding animals. This expectation was the base for so called marker assisted selection (MAS) which promised that targeted genotyping could replace expensive phenotyping of large number of animals. In spite of the fact that MAS is very successful in plant breeding, in animal breeding this strategy proved to have many shortcomings. The real effects of QTL are on average much smaller than initially expected, association between markers and phenotypic traits is often breed- and population specific and due to often too large distances between markers and causal genomic regions for the trait, the broken linkage between marker and causal genomic regions significantly reduce genetic progress. The development of genomic technology in the last decade enables simultaneous genotyping of relative large number of markers using so called Single Nucleotide Polymorphism (SNP) micro arrays for accessible price. For the majority of farm animal species SNP arrays containing between 50.000 and 800.000 SNPs are available. This allows precise genotyping with average distance between markers between 5.000 – 8.000 bp. Since in many species large populations were genotyped in the past and biological samples of those animals are available, it is possible to establish association between markers and phenotypic traits in the so called reference or training population. Based on this exercise, the prediction equations can be established which can than serve for prediction of breeding value of not phenotyped animals. This allows immediate breeding value estimation after birth, shortens the time needed for prediction of breeding value and saves costs for phenotyping. Certainly, sporadic checking of relationship between genetic markers and phenotypic traits will still be necessary, but genomic estimation of breeding values (GEBV) seems to be very promising strategy for some farm animal species. Which limitations are associated with this new technology? The first limitation is the size of the phenotyped reference population. Small populations with small sets of phenotypic data will probably not be able to adopt this strategy. On average, the reliability of GEBV is somewhat lower than reliability based on phenotypic data of large sets of offspring, however the generation interval can be significantly reduced and genetic progress per year even increased. Since the prediction equations are still breed specific, the use of predictions across breeds is not possible. It seems that dairy cattle populations due to their population structure, which is heavily affected by the use of artificial insemination, and due to favourable genetic architecture of dairy traits, represent an ideal case for application of genomic selection. Less favourable may be the situation in beef cattle breeds, because of smaller data sets available and because of less favourable population structure.

Key Words: Genomic Selection, Molecular Markers, Candidate Genes, Small Populations, GEBV (Genomic Estimation Ofbreeding Value).

Section: ANIMAL SCIENCE

Oral presentation

ASO1

IN-SITU PROGRAM OF CONSERVATION OF AUTOCHTHONOUS BREED OF CATTLE BUSHA IN MONTENEGRO

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Busha is the autochthonous breed of cattle of Balkan Peninsula originating from a special indigenous native form of the cattle called Bos Brachyceros Adametz. Busha population has been the most numerous population of cattle (approx. 95%) in Montenegro by the middle of XX century. In the second half of XX century, in the time of intensive development of cattle production, Busha breed had been crossed with Tyrolean Grey, Brown Swiss and Simmental breed or just replaced by these much more productive breeds. Currently, due to the constant negative trend in population size, Busha breed is endangered of extinction. According to the results of monitoring and estimation made by Biotechnical Faculty – University of Montenegro, the current number of Busha population in Montenegro is up to 300 animals. Having in mind a risk status of Busha breed and its importance for diversity of animal genetic resources, the program of in-situ conservation was established in 2008. The program is supported by the Government's subsidies, which are allocated per breeding animal included in the program. Until now, 9 private farms with total of 94 animals (83 breeding cows and 10 bulls) have been included in the program.
The main areas of Busha rearing in Montenegro are: a) the villages in South East part - around of Skadar Lake and mouth of Bojana river; b) municipality Niksic in Central region and c) the areas on North East part of Montenegro (municipalities Berane, Plav and Gusinje). According to the results of the latest investigation and monitoring of current Busha, animals are very small cattle, almost dwarfed. The body weight of adult animals is 290 kg in average, with variation between 190 kg and 350 kg. The average height to withers is 113 cm (ranged from 100 cm to 122 cm), stature (height to hips) is 118 cm (ranged from 111 cm to 123 cm), body length 126 cm (ranged from 107 cm to 142 cm) and chest circumferences 157 cm (ranged from 135 cm to 175 cm). A big variation in the exterior measures is primarily due to different rearing conditions.

Key Words: Autochthonous Breed, Busha, In-Situ Conservation, Body Measures.

ASO2

EFFECTS OF DIFFERENT FORMS OF ZINC ON MORPHOMETRIC PARAMETERS OF TIBIA OF TWO HYBRIDS OF BROILER CHICKENS

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The objective of the study was to investigate the effects of dietary organic and inorganic forms of zinc on morphometric parameters of tibia of ROSS 308 and COBB 500 broiler chicks. A total of 420 one-day old broilers of each hybrid were randomly allotted to 2 groups with 6-replicates of 35-chicks each. First group was fed with standard corn-soybean diet supplemented with organic Zn (Vevomin Zn 13 % DSM - at 50% of the broiler strain recommendations), and second group with inorganic Zinc sulphate (at 100% of the broiler strain recommendations). At the end of the experiment, 48 birds (6 males and 6 females from each group and each hybrid) were slaughtered for determination of morphometric parameters of tibia. Tibias were cleaned manually to clear off residual muscles and cartilages. The following parameters were measured: tibia weight, tibia length, tibia diameter, tibia volume, tibia weight/length index, and robusticity index. Tibia weight was measured on a precision scale. The tibia length and tibia diameter were measured with nonius. The tibia circumference was measured with meter tape. The Tibia weight/length index was calculated by dividing the tibia weight by its length. The robusticity index = bone length/cube root of bone weight. The results showed that ROSS 308 and COBB 500 broilers fed with diet supplemented with organic Zn improved some characteristics of tibia quality (length and circumference). There was no treatment impact on tibia weight, diameter, tibia weight/length index, and robusticity index. The hybrid showed a statistically significant influence on the tibia volume and tibia diameter in favor of ROSS 308 hybrid. Both hybrids in all measured parameters had statistically significant difference between the males and females.

Key Words: Broiler Chickens, Zinc, Morphometric Parameters, Tibia

ASO3

QUALITY AND HYGIENIC CORRECTNESS OF GOAT MILK IN THE SKOPJE REGION OF R. MACEDONIA

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The aim of this experiment was to examine the quality and hygienic correctness of goat milk. The researches were conducted in the production conditions in 3 goat farms "Taor", "Kozhle" and "Ajvatovci" in the villages near by Skopje, R. Macedonia. The experiment was carried out on goats in lactation period with 9 milk controls per each farm. Experiment was conducted in April-May 2015 year, when 27 samples were collected per month. Average Milk Fat Content (AMFC) and Average Milk Protein Content (AMPC) at the three tested goat farms in April/2015 were 3.68% and 3.34 respectively, while AMFC and AMPC at the same farms in May/2015 were 3.74% and 3.23% respectively. Average Somatic Cells Content (ASCC) at the tested farms in April/2015 were 924.667/ml milk while in May/2015, ASCC were 518.667/ml milk. Average Bacteria Content (ABC) at the tested farms in April/2015 were 1.688.667/ml milk, while Average Bacteria Content (ABC) in May/2015 were 1.517.333/ml milk. Based on conducted research it could be observed that the chemical composition of goat's milk in Skopje region is in correlation with article 7 from Regulation for quality of raw milk (Gazette of RM No. 96/11). The situation is similar for somatic cells in goat's milk in Skopje region that is it is in correlation with article 7 from Regulation for quality of raw milk (Gazette of RM No. 96/11). Regarding the total number of bacteria in goat's milk in Skopje region, it is increased and did not correspond to Regulation for microbiological quality of raw milk which classified goat's milk in the second class of quality. This work attemps to present the quality and hygienic correctness of goat milk in a separate region of R. Macedonia and future measurements aiming better quality of goat's milk.

Key Words: Goat'S Milk, Quality, Milk Fat, Milk Protein, Somatic Cells Count, Bacteria Count

ASO4

METABOLIC DISORDERS PREVALENCE RISK AND SUBSEQUENT MILK PRODUCTION IN FIRST LACTATION IN HOLSTEIN COWS IN CROATIA

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The objectives of this research were to determine the metabolic disorders prevalence risk regarding the lactation stage and the effect of subclinical disorders on subsequent daily milk traits (yield and contents) in first parity Holstein cows using monthly test day records in Croatia. The individual test day records collected in regular milk recording in period from January 2004 to December 2013 in Croatia were used for analysis. Milk recording was performed according to the alternative milk recording method (AT4/BT4). Daily milk yield and fat content was projected from partial measurement using the DeLorenzo and Wiggans (1986) correction factors. Logical control of milk data was performed according to ICAR standards (2003). Records with missing or nonsense values were deleted from dataset. Regarding the lactation stage, 16 classes by 5 days were formed: L1 (< 10)… L16 (> 90). Regarding the test date, month-year classes were formed. The metabolic disorders (ketosis/acidosis) prevalence risk was indicated by the F/P ratio. The F/P ≥ 1.5 was taken as indicator of ketosis prevalence risk, while F/P < 1.0 was taken as indicator of acidosis prevalence risk. The metabolic disorders prevalence risk was calculated as frequency of cows indicated with risk in total number of cows in regard to lactation stage classes. Subclinical disorder (ketosis/acidosis) was indicated by the F/P ratio and cows daily production (Eicher, 2004). The F/P ≥ 1.5 in cows that yielded between 33 to 50 kg/day was taken as indicator of subclinical ketosis, while F/P < 1.0 in cows that yielded between 20 to 43 kg/day was taken as indicator of subclinical acidosis. Only cows with detected subclinical disorder were included in this analyses. Milk traits measured on the test day when subclinical disorder occurred were used as the reference level. The disorder index was defined regarding the number of days after the subclinical disorder indication as follows: D–0 = test-day milk yields collected when subclinical disorder was indicated, A–1 = within 35 days, A–2 = between 35 and 70 days, A–3 = between 70 and 105 days, and A–4 = more than 105 days. The effect of subclinical disorders (ketosis/acidosis) on daily milk traits were tested by Scheffe's method using mixed model (SAS/STAT). The highest ketosis prevalence risk with indication in 33% of cows occurred in first 15 day of lactation, thereupon a continuous declining trend was noticed. High acidosis prevalence risk with indication in 19% of cows occurred in first 10 day of lactation, and after that the risk declined in next 5 days. Second increase of the prevalence risk was observed from 20th lactation day with a continuous increasing trend. Analysis of the effect of subclinical disorders on subsequent daily milk traits (yield and contents) showed highly significant ($p<0.01$) negative effect. Decrease in milk yield in amount of 4.24 kg/day was determined within 35 days after the detection of subclinical ketosis, while the drop of 1.4 kg/day was determined in the same period after the detection of subclinical acidosis. The milk reducing effect continued in subsequent milk controls. Regarding the daily fat content, subclinical ketosis resulted in significant decrease, while subclinical acidosis induced significant increase. Finally, daily protein content significantly dropped due to occurrence of both subclinical disorders. Results of this research indicate that test day records (TDR) could be used as cost effective and non-invasive method for monitoring the herd health enabling the farmer early reaction and prevention of development of strong clinical symptoms. In this way, the farmer's economic losses and the cow's malaise could be significantly decreased or completely avoided.

Key Words: Metabolic Disorders, Prevalence Risk, Daily Milk Traits, First Parity Holsteins

ASO5

BREED DIFFERENCES IN BLOOD BIOCHEMICAL PARAMETER CONCENTRATIONS BETWEEN LACTATING BUSHA AND HOLSTEIN COWS

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Thirty-eight early lactating animals, 25 Holstein and 13 Busha cows, both aged from 4 to 8 years, were selected for the study. The blood samples were taken for estimation of glucose, total protein, albumin, globulin, urea, non-esterified fatty acid (NEFA) and total bilirubin concentrations, as well as for alkaline phosphatase activity. In Holstein cows, compared to Busha cows, significantly higher concentrations of albumin, urea ($P < 0.001$, respectively), total bilirubin ($P< 0.05$) and glucose ($P < 0.01$) were determined. On the other hand, blood globulins and NEFA were higher in Busha than Holstein ($P = 0.052$ and $P=0.054$, respectively). No significant difference in total protein concentrations and alkaline phosphatase activity was observed. The higher glucose in Holstein than Busha cows may indicate possible stress reaction in Holstein cows. Nevertheless, combined results for higher glucose, albumins and urea in Holstein cows indicate an influence on feeding regiment, since Holstein, contrary to Busha cows, cover their entire nutrient needs by TMR. Higher NEFA in Busha compared to Holstein cows indicate initiation of lypomobilisation probably caused by insufficient dietary energy supply. Globulin values were slightly higher in Busha cows, probably due to immune response as a result of holding those cows on the pasture and exposure to parasites. Higher total bilirubin concentration was determined in Holstein compared to Busha breed. Nevertheless, since the values were within physiological range, it cannot be concluded that liver function is damaged in any of examined cows. Based on the results provided for biochemical parameters it may be concluded that those parameters are strongly influenced by feeding in both breeds.

Key Words: Holstein, Busha, Blood, Biochemical Parameters

ASO6

CRANIOLOGICAL PARAMETERS OF YUGOSLAVIAN SHEPHERD DOG – SHARPLANINAC

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Yugoslavian Shepherd Dog - Sharplaninac is one of the oldest breeds in the Balkan Peninsula. Dogs of this breed have always been grown in mountainous southeastern regions of the former Yugoslavia, primarily in the Shar Planina mountain, on the basis of which the breed was named Yugoslavian shepherd dog Sharplaninac. The breed was registered in the International Cynology Federation (FCI) in 1939 under the number 41 under the name of the Illyrian Shepherd. International Cynology Federation in 1957 approved the proposal of the Yugoslavian Kennel Club and renamed race in Yugoslavian shepherd dog Sarplaninac. Today, according to the classification of FCI, the breed is placed in the second group. The countries of origin of this breed are Macedonia and Serbia. The aim of the study was assessment and analysis of 8 head exterior parameters in this population of dogs. Measurement was carried out on 109 dogs (44 males and 65 females). The age examined dog population ranged from 9 months to 9 years. All dogs were bred in Serbia, and it owned the pedigrees issued by the Kennel Club of the Republic of Serbia. The following parameters on the head were measured: head length, length of muzzle, length of skull, length of the ears, nose width, skull width, muzzle depth and muzzle scope. Measurements were performed with floating criterion with vernier scale and ribbon. The average length of head in males is 29.03 cm, and females 27.28 cm. The average length of skull in males is 17.32 cm and 16.69 cm in females. The skull of the males is on average 14.59 cm wide and 13.60 cm for females. Muzzle in males is 11.78 cm long, and in females 10.59 cm. Width of muzzle in males is 8.49 cm, and 7.76 cm in females and the muzzle depth is 10.73 cm in males and 10.09 cm in the females.
The results in this study are partially different from the past results in which the same exterior parameters were measured . The values of the measured exterior parameters do not match the current standard values.

Key Words: Sharplaninac, Head, Exterior Parameters

ASO7

TWO SEASONS INTAKE AND PREFERENCES OF THE MINERAL BLOCKS WITH DIFFERENT Ca:P ELEMENTS RATIO AT FALLOW DEER (*DAMA DAMA*)

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Mineral content in the licking blocks is essential for development of every farm animal. This includes farmed deers. This article is targeted on the content of calcium and phophorus in mineral blocks. It reviews Ca:P (0.5-2:1) ratio for cervidae as well as total intake of mineral blocks. The experiment took place on a small farm in Highlands region in Czech republic, between May 2013 and July 2015. Experiment was divided in 2 parts, one was from May 2013 till February 2014, second from August 2014 till July 2015. First part evaluates frequency of visits, second is dedicated to weight analysis. Size of the experimental farm had 20 heads of fallow deer. This species was chosen because it is the most favorite species of the Czech deer breeders and deer meat producers, as well as hobby breeders. Data collection was provided by camera trap. This device monitored surroundings of mineral blocks for the whole experiment duration. Another method of data gathering was monthly weighting of each block. Data was then evaluated by standard statistic methods. Results show, that the biggest frequency of visits was between July and September, 9.2 times in average. Block with the highest intake was block B where the ratio was 1.5:1.

Key Words: Mineral Intake, Deer, Frequency, Ca:P, Ratio

ASO8

RESEARCH OF MILK UREA CONCENTRATION IN HOLSTEIN COWS IN CROATIA

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The paper study impact of some environmental factors (the order and stage of lactation, age at first calving, calving season, region and herd) and genetic parameters for milk urea concentration in cows in Croatia. The study involved 114.768 Holstein cows in the period from 01. 01. 2003 to 31.12. 201. A total of 2.109.598 records processed from the daily quantity of milk production. The results showed that the content of urea visible changes during lactation. In the first lactation was recorded the highest milk urea concentration (23,6 mg / 100 ml), but only in the period between 110 and 170 days. In the second lactation were recorded the highest value of milk urea concentration of all monitored lactation in the period immediately after calving until 70 days of lactation (21,5 mg/100 ml). Due to the age at first calving, it was found that the lowest value of milk urea concentration was observed in the cows calved in the age of 18 months (<20 mg / 100 ml), while the highest value of milk urea concentration was observed in cows that have calved in age from 24 to 28 months (23,2 mg / 100 ml). Taking into account the season, the highest milk urea concentration (24 mg / 100 ml) were observed in the autumn, and lowest in winter. The model used to estimate the heritability showed a value of 0,08 for urea content in the milk. The calculated phenotypic correlations between the content of urea and features of milk and daily milk, daily quantity and fat content and protein were statistically significant (P <0.0001). Positive and low phenotypic correlation (0.15) was found between the content of urea and daily milk, between the urea concentration and the daily amount of fat (0.10), and between the content and the protein content of urea (0.16). Proper selection and breeding work and selection of bulls with the preferred values for the educational content of urea in milk can result in a lower content of urea in the herd, and lead to the possibility to select those animals that have a higher concentration of protein, which are necessary for the production of cheese.

Key Words: Urea, Holstein Breed, Heritability, Environmental Impacts

Section: AGRICULTURAL ECONOMICS AND RURAL DEVELOPMENT

Introductory Lectures

AERDI1

DEVELOPMENT ORIENTATION OF SLOVENIAN FAMILY FARMS

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The objectives of the paper are to present the results of the evaluation of the factors, both tangible and intangible in nature, which (de)motivate farmers to farming, during the decision-making process for a transfer of a farm as well as in the subsequent life-cycle and different development directions of farmers and their conditionality with tangible and intangible factors. An objective is also to develop proposals for agricultural policy measures on the basis of research results. In the research we used the following methodological approaches: 1) analysis of relevant statistical data and existing databases on farms (we analysed their basic socio- economic characteristics); 2) online survey, which included a sample of 346 farms. On the acquired survey data, bivariate statistical analysis of differences between groups of farms that were defined on the basis of the method of clustering was conducted. Thus the patterns showed the main development directions of farms in Slovenia and specific target groups and their conditionality with more tangible factors. 3) In-depth semi- structured interviews with farmers and their families. The sample of selected farms is covering 13 market-oriented farms: 5 organic and 8 integrated, differing in type of production. For verification of the results of the survey and semi-structured interviews we conducted a focus group meeting. The findings from statistical data analysis, online surveys, semi-structured interviews and focus groups were used to evaluate and rank the factors identifying farms development strategies. The findings of this analysis were used to create a multi criteria decision making model based on DEXi platform. Available statistics as well as a variety of applied research results indicate significant changes within the agricultural sector as well as the dynamic spatial and social processes. In the context of the biggest changes is to highlight the positive first: the process of specialization of farms, all favourable size structure of farms, improved level of general and agricultural education of farmers and increasing enforcement of supplementary activities, such as activities in the field of on-farm tourism, food processing and others. To improve the situation some measures are required to be taken primarily in the areas of access to agricultural land, adequate and effective education and marketing. As for the results of the analysis of more "intangible factors", and in accordance with the changing dynamics of relationships between members of farm families and their employment on the farm or outside, we find that no factor alone is determinative for a decision to a particular direction of development of an individual farm, but this is a result of interlaced as well as cumulative effects of a number of factors and events. Using the clustering procedure (method of average distances within groups) we grouped surveyed farms into four major groups, which we call "the farm between the subsistence and the market", "commercial farm", "subsistence farm" and "in control of the costs oriented farm". In the final stage of the analysis of survey data, we were using discriminant analysis to identify that the four groups are most distinguished to each other by gained education in the field of agriculture, the share of income generated by agricultural activity, type of production (livestock), and changes on the farm during the farming career of the respondent (renovation of farm buildings). These variables are representing the framework for the creation of multi criteria decision support model based on the DEXI platform. The results of testing of the developed model show that the model allows some assessment of the development potential of the farms.

Key Words: Farm, Development Orientation, Decision Support System, DEXI, Development Potential

AERDI2

IMPLEMENTATION OF THE RURAL DEVELOPMENT SUPPORT AND IPARD IN MACEDONIA: – CHALLENGES AND MILESTONES

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The trend of intensive migration from rural areas and insufficient use of the land resources puts substantial pressure on policy makers. Since 2008, the rural development policy in Macedonia takes a new form by adopting the conceptual, administrative and financial model of the Common Agricultural Policy. The aim of this paper is to present the main challenges and milestones in the implementation of the national rural development support and IPARD in Macedonia for the period 2008-2014. The quantitative analysis is based on the Agricultural Policy Measures table (APM) for systematization and classification of the programmed and implemented measures. The qualitative analysis is based on secondary reports and evaluation of the implementation of both, the national and IPARD programs. Although recognized as important, the national support for structural and rural development is still very low (25 Euro/ha or comparatively at about 10%-level of the EU average). The EU pre-accession instrument for rural development (IPARD), as an additional support, has a particularly low rate of absorption (7.2%). Therefore, establishing and maintaining an effective institutional framework is an essential milestone. One of the obstacles in the process is the insufficient preparedness of farmers and institutions; thus, understanding those challenges will contribute to an improved policy implementation.

Key Words: IPARD, Macedonia, Rural Development Policy

AERDI3

THE STATE OF SMALL SCALE FARMING IN SERBIA AND POLICY CHALLENGES

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This paper is about the definition, current state, challenges and prospects of small scale farms in Serbia. The attitude towards small farms is one of the most controversial issues in agro economic theory and policy practice, which has an economic, social and political connotation. Although the scientific community and policy-makers, until the end of the twentieth century, have been convinced that the small farms would disappear, they continue to dominate in the agrarian structure of many European countries to the extent that their role cannot be ignored. The small farms debate has taken a new turn since 2000s. New global challenges (increase in global demand for food, growing biofuel industry, the environmental impacts of agricultural expansion and climate change) have made it necessary to review policy towards small farmsin view of a more rational and environmentally sound management of (limited) land resources, contribution of small farms to food security and social structure of rural areas. The farm structure in Serbia is highly polarized and follows the traditional pattern of the European model of agriculture with big commercial farms on the north and small family holdings in the southern part of the country. Such a state is the result of not only the characteristics of relief, but also is due to a set of complex historical, social and economic factors which have led to different farm types and models of their transformation. Still, the agricultural policy of Serbia over long period has remained quite indifferent to the diversity of farm types, including the small farms. The issue of sustainability of small farms and their treatment in the agrarian policy of Serbia was raised during the last decade. Small farms have received a greater attention of research community and policy makers primarily due to rural poverty and within the framework of recent reforms of agricultural policy and structural reforms in agricultural sector. In this paper, we will discuss the definition of small scale farm households in Serbia from the viewpoint of different criteria for determining their size as well as the challenges facing agricultural policy in order to respond to the need for its more dynamic restructuring.

Key Words: Small Farms, Farm Structure, Agricultural Policy, Serbia

AERDI4

THE ROLE AND POSITION OF FAMILY PEASANT FARM IN RURAL DEVELOPMENT

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A lot of attention was given to the peasant family farm during last centuries in the process of transformation into a capitalist (or socialist) system. The main topic was, and still is, the relation between "big" and "small" familly farm and its productivity as well as its reproductive features. Many of the resulting issues were and still are centered on the peasant as an obstacle to change thus being a social figure that should disappear or be actually removed. On the contrary, the paper is raising quite different issues and seeking for the reasons why there are presently more peasants than ever before as they still constitute two-fifths of humanity. Firstly, discussed is the theory of a peasant economy, the objectives and preconditions for its existance, its unique historical possition and its struggle for authonomy and sustainability in rural areas in the era of domination of global neoliberal and neomercantille concept. Discussed was the issue of labor farm theory and features of the familly farm that cannot be explained from the viewpoint of usual capitalistically organized enterprise. Also, raised is the issue of small familly peasant farm motivation in its economic activity as well as the mechanism of the internal equilibrium of on-farm factors and its features. On the basis of theorethical findings in the paper, discussed was the state of the small scale familly farms in the Republic of Serbia and their possition in the present-day national economy, features as a social and economic whole, links with economy and forms of their relationship to one another from the viewpoint of its sustainability. At the and of the paper, futher are discussed the prospects of familly farms in so called neoliberal age regarding the question of the recomposition of the peasantry and capitalism inability to realise its ideologised promise of theirs dissapierence. New era is bringing the need for peasants organised struggle and formation of a wide movement of small farmers, peasants as well as people of the land. Our task is to look after the earth and our rural people and to defend them in the global context.

Key Words: Peasant Family Farm, Operating Economic Systems, Self Survival Strategy, Labor-consumer Ballance, Neoliberal Economy, New Peasantry

AERDI5

TEN YEARS OF EASTERN ENLARGEMENT OF THE EU LESSONS LEARNED AND NEW CHALLENGES AHEAD

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With the accession to the EU, agricultural policies in the countries of Central Europe (CECs) dramatically changed as being aligned with the Common Agricultural Policy (CAP). These policy adjustments had significant implications for farmers and food consumers in Central Europe, for market balance and trade in agriculture, for budget expenditure and for macro-economic conditions. Several studies tried to estimate the potential implications of an accession to the EU. For example, capital flows between the CECs and Brussels changed fundamentally as 'financial solidarity' under the CAP as well as other EU budget mechanisms come into play. This affected also the exchange rates, which than at the micro-level of agricultural markets had an impact on price formation. Thus, with EU accession, people in the policy area of the agri-food business and researchers expected far reaching consequences for the agri-food sectors and, due to their economic importance, also significant repercussions at overall macro-economic level. Several studies analysing the impact of EU accession indicated that the inclusion in the CAP may have major macro-economic implications and noticeable effects on non-agricultural sectors in all acceding countries. As a result of introducing the CAP, most CEC currencies may exhibit a tendency towards appreciation, and total savings and investment may fall. In CEC with a net agricultural export position, the inclusion in the system of the CAP and of the 'financial solidarity' was expected to have a positive impact on GDP, while GDP was expected to be negatively affected in net importing CEC. However, the analyses indicated that consumers and non-agricultural sectors in most acceding countries are likely to suffer economic losses from extending the CAP to the CEC. A further reform of the CAP prior to Eastern enlargement, however, could have lowered these negative effects. These projected consequences sound quite dramatic. But what about the current situation in the agri-food sectors in the EU-13? Most of the new Member States joined the EU more than a decade ago. Therefore, this paper will review these projections and ask how the projected outcome materialized 'under the sun light of real life' in the different new Member States. This review will also address the question whether the lessons learned so far in the new EU Member States could help and assist the current Candidate Countries in their challenging path of negotiations to become full members of the European Union.

Key Words: EU Enlargement, Common Agricultural Policy, Impact Assessment, Economic Modelling

Section: AGRICULTURAL ECONOMICS AND RURAL DEVELOPMENT

Oral Presentations

AERDO1

COMMODITY MARKETS AND POLICIES: WHAT IS IT THAT IS DRIVING THESE CHANGES?

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Agricultural and other commodity markets continue to be depressed, causing concern among farmers and their organizations as well as among policy makers concerned about the well-being of farmers. This is quite a change in policy concern compared to only a few years ago when high and volatile prices were the growing issue. Low prices generally benefit consumers while farmers suffer, so these give rise to political pressures for change. Factors contributing to these market changes are the excellent crops in recent years and growing stocks, the massive decline in petroleum prices that reduces production cost and slows down the biofuel demand, slowing economic growth in major importing countries like China, changing exchange rate dynamics, trade disruptions arising from trade negotiations and trade sanctions, and perhaps even El Niño. Policies also are changing including trade and domestic policies. There are new EU and new US agricultural policies, continuing WTO negotiations and trade sanctions in Europe and Central Asia. An increased number of countries have joined World Trade Organization and changes are ongoing in the Eurasian Economic Union (EEU) and regional agreements such as the Deep and Comprehensive Free Trade Area of the EU and the recent Trans-Pacific Partnership (TPP) agreement. The foundation for this analysis is the latest global outlook assessment by the Food and Agricultural Policy Research Institute (FAPRI) at University of Missouri. Analysis shows that recent global harvests, reduced energy prices and slowing demand growth have softened demand and reduced prices of major grains. Despite the effects of El Niño the price outlook is still soft and grain stocks remain large. However, interesting trade shifts occur as US exports slow with stronger dollar and Russian exports increase with the weak Ruble and good harvests. As always, however, weather shocks can still disrupt this rosy outlook and FAPRI also analyzes this with stochastic simulation methods.

Key Words: Agricultural Markets, Prices, Trade, Exchange Rates, Policy

AERDO2

OPTIMIZING AGRICULTURE FOR GLOBAL FOOD SECURITY

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Food security is determined by a wide range of factors on global and regional level, including crop yields in agricultural production, socio-economic programs of nutrition, price of food on the market and trading limitations of foreign exchange, climate changes. World agricultural production should be increased due to population growth. In order to satisfy food needs in the future the yields of main crops has to be increased at least for 1.1% to 1.4% per annum. There are challenges to develop sustainable model(s) of agricultural production for food security. The optimizing production in agriculture could be based on breeding high yielding genotypes, improving technology of crop growing, technological innovations, intensive farming with high environmental protection, biotechnology, information technology, revitalization of rural communities etc. The agricultural development and economic growth require a new model of organizing work and trade to use the benefits of globalization. The concept of agriculture with preservation of natural resources, reduction of pollution and challenges to improve productivity with the aim to reduce poverty, require appropriate markets and institutional arrangements. Therefore, attention should be given to improving the quality of the products, manage the nutrient balance, minimize the use of pesticides. The role of extension services and relation between farmers, governments and multinational companies has to change by organizing private advisory services along with a requirement of increasing governmental support to research work of public sector, such as universities, agricultural faculties and institutes.

Key Words: Food Security, Agricultural Production, Poverty, Research

AERDO3

FINANCIAL LITERACY OF RURAL POPULATION IN SERBIA

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Financial literacy is in the spotlight in recent years. It especially gained in importance with the emergence of the financial crisis in 2008. The rapid growth of the credit importance as the financing source, as well as the increasing availability and complexity of financial products caused the need for improving financial knowledge and skills of farmers. The analyses have shown a disturbingly low level of financial literacy of the population in rural areas. Financial literacy can be defined as the ability to understand finance, i.e. acquired skills and knowledge in the field of finance that enable to make the right decisions based on complete information. A high percentage of agricultural and rural population has insufficient knowledge of increasingly complex financial products that are offered with the development of financial markets. They are taken over a high level of risk in contracting and accepting financial obligations. Areas which need greater information and education are the following: sources of financing in agriculture and rural development, savings, loans and borrowing, securities related to agriculture, credit cards, procedures and documentation as the basis for applying for funds, EU pre-accession funds for rural areas and agriculture, risks and insurance in agriculture, legislation relating to the financing of agriculture and rural areas etc. Different methods have been used in the paper, such as the desk research, the comparison method, the method of deduction and the method of descriptive statistics. The analysis has been done on the basis of secondary data. The authors concluded in the paper that it is of great importance for the rural population and farmers to be familiar with basic categories related to finance, loans, insurance. National authorities in charge of agriculture and rural affairs, at all levels (Republic, Province, region, local community), as well as the financial institutions, scientific and professional institutions, advisory services, should unite the efforts and provide maximum support to the process of training the rural population and farmers in order to improve their financial literacy.

Key Words: Financial Literacy, Rural Population, Serbia

AERDO4

ROLE AND SIGNIFICANCE OF INSURANCE AS AN INSTRUMENT OF AGRICULTURAL RISK MANAGEMENT IN THE REPUBLIC OF SRPSKA

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Agricultural production in the Republic of Srpska, is faced with numerous risks. Unlike in Europe, where the surveys on crop, harvest and animal insurance are present for a long time, little attention is paid to this topic here. In the first part of this paper, the authors give an overview of agricultural risks classification, characteristics and role of the insurance as a financial instrument of risk management in agriculture as well as the government's role in decreasing the farmers risk exposure. Based on the data available through the survey conducted between insurance companies and commercial farmers, the second part of the paper addresses presence, significance and acceptance of insurance services in the Republic of Srpska covering five year period (2010-2014). The survey results show that 88% of insurance companies in the Republic of Srpska offer the services of insuring crops, harvest and animals against a number of risks (e.g. hail, flood, drought, frost, animals death), but the insurance agreements covering risks in agriculture approximately represented only 0,07% of total number of insurance agreements concluded during this period of time. Insurance premiums based on these agreements participated with approximately 0,71% in total sum of insurance premiums, while the amount of liabilities paid for damages in agriculture covered approximately 1,88% of total liabilities paid. On the other hand, only 15% of all farmers included in the survey have used the insurance services in last five years. However, even 86% of farmers have suffered severe damages in last three years, while the estimated losses have decreased the expected income for approximately 46,69%. As many as 58,55% of farmers have agreed that the main reason why they did not use insurance services to a larger extent is the omnipresent distrust in private insurance system and high insurance premiums (as stated by 44,74% of examinees). In conclusion, this paper strives to emphasize the need and indicate the ways of stronger cohesion between farmers, insurance companies and government which would contribute to the establishment of integrated and sustainable risk management system in the agriculture of the Republic of Srpska.

Key Words: Agriculture, Risks, Insurance, Republic of Srpska

AERDO5

EXPLORATORY ANALYSIS OF FACTORS AFFECTING THE PERFORMANCE OF THE FARMS WITH MILK PRODUCTION IN THE REPUBLIC OF SRPSKA

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The status and development of milk production are important indicators of a country's development in the agricultural sector. Milk production in the Republic of Srpska (RS) is a major source of income for a large number of farms. Analyzing the eight-year period from 2007 to 2014 inclusive, it is evident that the RS has an average of 132,000 dairy cows and an average annual milk production of 375.2 million liters. The farms' milk is either picked up by a handler who delivers it to a processing plant or the milk remains on the farms in order to feed the cattle or to produce cheese and sour cream for the farmers' own use or for the market. In order to illustrate the advantages of certain methodological solutions regarding the analysis of the factors affecting the result in the production of milk, 17 farms in the Republic of Srpska were analyzed using exploratory data analysis. With this, the inputs and outputs of this production were studied and thoroughly analyzed. Determining the results of agricultural production is the basis for further planning and organizing of production activities on the farms. In addition to quantifying the difference between the production value and expenditures, an important function of exploratory analysis is to establish the origin of crucial costs, as well as values and additional effects connected with the production.

Key Words: Agricultural Economy; Rural Development; Milk Production; Exploratory Data Analysis

AERDO6

ANALYSIS AND PREDICTION OF CABBAGE PRICE IN SERBIA

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Cabbage is one of the most important vegetable crops in Serbia. The average annual production of cabbage has been about 295.000 tons (minimum: 233.000, maximum: 342.000 tons). The topic of this research paper is the analysis of the changes and the future tendencies of the price parameters of cabbage in Serbia, with the aim to forecast the real, absolute and relative (in the parity with wheat) cabbage price, i.e. to predict the economic conditions for the production. The analysis of the time series (1994-2014) has been done by means of descriptive statistics, and the suitable ARIMA (Auto-Regressive-Moving-Average) models were used for the forecast (2015-2020). The average real cabbage price in the period 1994-2014 was 164 euro/ton (minimum: 87, maximum: 267euro/ton) and the average parity price for cabbage/wheat was 1.49 (from 0.84 to 2.89). Cabbage had been showing negative tendencies for the real price. Average yearly change rate was -2.71%. In the same period, cabbage parity price with wheat showed the tendency of harder decreasing, by yearly change rate of -3.29%. Negative tendencies of cabbage price have been predicted for the forecast period as well. This means that both, the absolute and relative price conditions in the cabbage production have been worstening. The predicted cabbage price in 2015 is 136 euro/ton, and in 2020 is 112 euro/ton. The parity price with wheat is 1.34 in 2015 and 1.01 in 2020. The models for the prediction indicated that worstening of real absolute price as well as relative cabbage price, compared to wheat price is going to be stable.

Key Words: Cabbage, Price, Serbia, Prediction

AERDO7

MARKETING AND QUALITY CONTROL OF HONEY IN THE REPUBLIC OF SERBIA

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According to the official statistics, there are app. 30,000 beekeepers with 430,000 hives in the Republic of Serbia. Out of the total honey production, about one half is sold through indirect marketing channels i.e. wholesale, and the other half through direct sales - green markets, fairs, sales on the doorstep and alike. Serbian honey enjoys a reputation of high quality product, with the foreign demand, particularly from the EU consumers. The quality of honey in the marketing channels of Serbia is determined by the Regulations on the quality of honey and other bee products. The Ministry of Agriculture and Environmental Protection, Veterinary Department, regulates the labeling and traceability of animals. Analysis of the quality of honey is made by the Faculty of Chemistry - University of Belgrade. The quality control of the honey marketing is carried out by the Inspection of the Ministry of Agriculture. One has the impression that there is a system in place and that it is functioning properly. However, in the honey marketing there are some cases of honey not matching the necessary quality standards. It is estimated that in the market of the Republic of Serbia there are between 10% and 40% of honey that does not match the required quality. The first aim of this paper is to estimate accurately the amount of honey in marketing channels that does not match the required quality, then to point out the major problems in distribution channels, and finally to propose solutions that will contribute to the cleaning of market from the honey that fails to meet the quality for the consumer. Data for this study were taken from official statistics and information published by the relevant ministries. Important sources of information are experts who are engaged in production and sales of honey and other bee products.

Key Words: Honey, Quality, Trade, Republic of Serbia

AERDO8

MARKET CHARACTERISTICS AND MARKETING RESEARCH WORK FOR INCREASING THE PEPPER PRODUCTION IN BOSNIA AND HERZEGOVINA

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Motives of the research were the marketing problems of domestic producers of pepper in the market of Bosnia and Herzegovina (B&H). The current situation in this important agricultural sector is that marketing business orientation of pepper producers does not exist or is reduced to a minimum. Outdated, inefficient and inadequate business concept used by pepper producers leads to poor results of work, low efficiency, loss of interest and abandonment pepper production, which has harmful consequences both for producers and for society as a whole. The aim of the research was analyzing business trends and proposing marketing activities that continually and systematically strengthened the competitiveness of domestic producer of pepper in the B&H market. The analysis includes the production and import of peppers in B&H, export of pepper from, pepper market size in B&H, the market share of domestic producers of pepper in the B&H market compared to foreign competitors, the business results of domestic producers of pepper. The research in the paper also analyzes the elements of marketing mix of domestic pepper producers. A particular subject of the research was the business results of pepper producers in, region of Lijevče polje. The research methodology applied in this paper is a combination of qualitative and quantitative research. The research instrument used was the structured questionnaire which included a list of questions, mostly open-type questions. In-depth interviews were organized in Lijevče polje. The expected results are development of sustainable production peppers, that considerably used by the population of B&H is sinnificantly in their diet on one hand, with an increase of commodity production and peppers for domestic and foreign markets, on the other hand.

Key Words: Marketing, Market, Pepper, Vegetable Producers, Commodity Production.

AERDO9

ANALYSIS OF FACTORS INFLUENCING NET VALUE ADDED OF SERBIAN AGRICULTURAL HOLDINGS

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Based on Agricultural Census in 2012, in the Republic of Serbia, total number of agricultural holdings is 631.552, of which about one third is over the threshold of 4.000 € standard output. General characteristic of agricultural holdings is low net value added, due to which most of them do not exceed the lower limit of economic size. Objective of this paper is to evaluate the factors that influence the net value added in the group of holdings which exceed the lower limit of economic size. These agricultural holdings may be considered as relatively progressive and competitive for Serbian environment. Researches start from following hypothesis: (a) Net value added depends on type of production; (b) Net value added positively correlates with arable land area, owned or rented; and (c) Lower the labour input means higher net value added. Methodology used included field survey on commercial agricultural holdings, statistical analysis of the questionnaires and desk research of existing scientific literature. Data for this research are taken from preliminary researches on farm accountancy, on random sample of 20 commercial agricultural holdings. Analysis results can be taken as a possible important state of factors and correlation. With this paper authors intend to demonstrate economic situation of commercial agricultural holdings in the Republic of Serbia. Results of the survey demonstrate small chances of survival on the market for small commercial agricultural holdings.

Key Words: Net Value Added, Agriculture, Agricultural Holdings, Republic of Serbia

Section: SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES

Introductory Lectures

SMNRI1

EXPECTED CHANGES OF CLIMATE IN BOSNIA AND HERZEGOVINA ACCORDING TO CLIMATE SCENARIO A2

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This paper presents the Results of the expected climate changes in Bosnia and Herzegovina by the end of the XXI century under Climate Scenario A2 on the basis of a regional climate model EBU-POM. The regional climate model EBU-POM is totally linked atmospheric and oceanic model (Djurdjevic and Rajkovic, 2008; Djurdjevic and Rajkovic, 2010). The atmospheric component of the model is the ETA model and the oceanic component is the Princeton Ocean Model (POM). For limiting conditions of the climate scenario A2 the results of global climate model ECHAM5 (Roeckner et al. 2003) were used. Based on previous research, published in scientific journals, it had been determined that the territory of Bosnia and Herzegovina is significantly affected by climate change. Significant changes of climatic conditions can be expected in the future, especially in the case of climate scenarios which do not provide implementation of appropriate mitigation measures (Trbic, et al., 2013). By the end of this century, possible change in the mean annual temperature, compared to the period 1961-1990, is in the range of 2.4 to 4 ° C, depending on the scenario chosen and a part of the territory in question. Expected change in the mean annual precipitation accumulation is in the range of 0 to -30%, relative to the same period of reference, wherein a greater part of the territory is characterized by negative anomaly. However, by 2040, the climate scenarios predict an increase in the annual amount of precipitation and an increase in the intensity of rainfall in most parts of the territory of Bosnia and Herzegovina. In addition to changes in perennial average temperature and rainfall, the future changes will cause changes in extreme values of climate elements. The paper presents the change projections of sums of precipitation and air temperatures along with changes in extreme daily rainfall and tropical days through the analysis of changes in the corresponding climate indexes for the A2 climate scenarios of future climate towards the end of the XXI century.

Key Words: Climate Change, Climate Scenarios, Bosnia and Herzegovina, Air Temperature, Precipitation

SMNRI2

SOME ASPECTS OF EXTREME WATER LEVELS OF THE DANUBE RIVER

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The extreme water levels of the Danube River, both maximum and minimum values, have a direct impact on a whole range of activities in Vojvodina Province. On the one side, there is a danger of high water, which in case of flooding can cause devastating damage. On the other hand, minimum levels can pose a problem for navigation and shipping, and also it can limit water quantity for various purposes. The paper analyzes the occurrence of extreme water levels of the Danube River on specific water gauging stations: Novi Sad and Bezdan. Analysis of the impact of maximum water levels has been conducted for Novi Sad, primarily because of the importance of this city, but also because of historically recorded catastrophic floods. Therefore this station can be considered as the most significant for the flood risk analysis caused by high water levels of the Danube River in Vojvodina. Water levels recorded at Bezdan are used for analysis of the impact of minimum water levels because it is close to the main water intake for water release from the Danube into the Danube-Tisza-Danube Hydrosystem. Conducted analyses clearly indicate that there has been a significant change in the regime of maximum and minimum water levels. This is reflected in the occurrence of higher and more frequent extreme maximum water levels but also in the significant decrease of the lowest annual water levels. In the last decade, water levels recorded at Novi Sad were getting close to the level of second flood alert (+700cm) more frequently than in the previous period. For example in the year 2006, water level was +745cm, +693cm in 2010 and +687cm in 2013. Average annual duration of water levels lower than +220cm (normal water intake regime) recorded at Bezdan, has increased from 100-150 days per year in the past period, to 200-300 days in the last decade. The consequences of such a situation is manifested in severe difficulties in flood defence, but also in difficulties of water abstraction from the Danube River, with the possibility of aggravation of these problems in the future.

Key Words: Danube, Water-level, Novi Sad, Bezdan

SMNRI3

MICROBIAL-BASED FERTILIZERS AND PESTICIDES: PRODUCTION, USE AND REGULATORY NEEDS TO ASSURE CROP PRODUCTION

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Different kinds of soil microorganisms belonging to several taxa of the bacteria, fungi, and possibly, protozoa kingdoms, colonizing the rhizosphere or the plant tissues and promoting plant growth (PGPM), can be utilized for the production of microbial-based fertilizers (biofertilizers) or pesticides (biopesticides). However, their application in agricultural practice is still hindered by several factors. The main reasons derive from the unpredictability of results, problems to identify and track inoculated strains in the field, the poor understanding of the interrelationships between microorganisms and plants, and the technology of production. A brief description of microorganisms that can be utilized to improve plant productivity, mainly through enhanced nutrition, as well as the possibilities deriving from a new group of microorganisms (e.g. non mycorrhizal fungi) will be presented. Furthermore, the factors affecting the efficacy of biofertilizers and biopesticides on crop productivity, i.e. those related to: i) their production process (including quality and marketing standards), ii) the assessment of persistence and traceability of inoculants, iii) the relations between plant, soil conditions and microorganisms, as well as the effect of farmers practices (fertilization, soil management practices, application method) will be discussed. The aim of the presentation will thus be to support the proper use of microbial-based products, thus developing an integrated management system, sustaining agricultural productivity with low environmental impact.

Key Words: Biofertilizers, Biopesticides, Integrated Crop Management

SMNRI4

MOBILITY OF PESTICIDES IN SOIL FOR GROUNDWATER AND SURFACE WATER PROTECTION

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Mobility of pesticides may result in redistribution within the application site or movement of some amount of pesticide off site. The interaction of pesticides with soils, surface water, and ground water is complex. Pesticide fate is controlled by numerous simultaneous biological, physical, and chemical reactions. Mobility of pesticides is the most conditioned by the processes of sorption. Sorption is a transferring process by which pesticides are dispersed between solid matter and water, in soil. Physical-chemical indicators of the pesticides' destiny in soil, water and air, as the indicators of possible ecotoxical risks which can appear as a result of application of pesticides on particular soil and climate are: distribution coefficient (Kd); sorption coefficient (KOC); time of the semi-decomposition (DT50); water solubility (S); Groundwater Ubiquity Score (GUS); Henry's Law constant (Kh); Vapor pressure (PV) and the dissociation constant (pKa). Indicators of the physical-chemical characteristcs are used for the estimation of the ecotoxical significance of the particular herbicide. Assessments of the behaviour and toxicity of pesticides in the environment are complicated by the environmental and biological availability, which varies greatly across different soils, sediment, and waters (i.e. large influence of pH, clay, organic matter). The aim of this work is Screening Pesticides for Potential to Leach into Groundwater and for Runoff Potential. This screening was done by the analysis of Trigger Values for pesticides used in Bosnia and Herzegovina. The analysis of Trigger Values was done using the criterion Whitford et al. (1996) and EPA. Taking into account the amount of the applied pesticides during a year, time of the application, nearness of the rivers, dynamic of raining as well as physical-chemical indicators of the pesticides destiny in soil, water and air, the results of analysis indicate that following herbicides have Potential to Leach into ground water and surface water: 2,4-D Acet Acid, Dicamba, Dimethenamid-P, Prosulfuron, Nicosulfuron, Rimsulfuron, Tembotrione, AMPA (AMPA= aminomethylphosphonic acid is the primary degradation product of glyphosate), from fungicides Metalaxil, Copper Sulphate and from insecticides Imidacloprid and Dimetoate.

Key Words: Pesticides, Mobility, Soil, Leach, Runoff

Section: SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES

Oral Presentations

SMNRO1

DYNAMICS OF HEAVY METALS IN INTENSIVE ORCHARDS OF DIFFERENT APPLE CULTIVARS

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The aim of this study was to examine the content of heavy metals Cr, Pb, Zn, Cu, Ni and Cd in pseudogley soil of apple orchards located in the Gradačac region and to determine the accumulation of these elements in fruits of apple Idared, Jonagold and Golden Delicious. The content of heavy metals in samples of soil and apple fruits was determined by atomic absorption spectrophotometry. Average content of Cr in examined pseudogley soil was 33.87, Pb 0.19, Zn 53.6, Cu 15.01 and Ni 24.12 mg kg-1 of dry matter. The content of these elements was significantly below the limits prescribed by soil legislation in Bosnia and Herzegovina. The presence of cadmium in soil was not determined. The accumulation of heavy metals in fruits of examined apple cultivars was also extremely low. The research results showed that in terms of the degree of soil contamination with heavy metals, the examined location can be considered as suitable for the production of healthy apple fruits, provided that the cultivation is done in accordance with the principles of integrated production.

Key words: Heavy Metals, Soil, Apple

SMNRO2

GENETIC DIVERSITY OF COMMON BEAN FROM SOUTH EAST EUROPEAN REGION

Marko Maras, Barbara Pipan, Jelka Šuštar Vozlič, Vida Todorović, Gordana Đurić, Mirjana Vasić, Suzana Kratovalieva, Afrodita Ibusoska, Rukie Agić, Zdravko Matotan, Tihomir Čupić, Vladimir Meglič

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In the present study genetic diversity of 119 accessions of Common Bean (Phaseolus vulgaris L.) from five former Yugoslav republics constituting Western Balkans was assessed by 13 microsatellite markers, that efficiently distinguish between bean genotypes belonging to the Andean or the Mesoamerican gene pool. In the present study 118 alleles were detected or 9.1 per locus on average. Very high average values of expected heterozygosity (0.76), Shannon's information index (2.44), and polymorphic information content (0.72) were scored indicating wide genetic diversity of the studied germplasms. Four germplasms, i.e. Slovene, Croatian, Bosnia and Hercegovina, and Serbian, showed similarly high levels of genetic diversity as estimated by a number of different alleles, number of effective alleles, Shannon's information index and expected heterozygosity. Mildly narrower genetic diversity was identified within a group of Macedonian accessions; however, this germplasm yielded highest number of private alleles. All five germplasms share a great portion of genetic diversity as indicated by analysis of molecular variance. Based on the scored number of migrants we conclude that the most intensive gene flow in the region exist in Bosnia and Herzegovina. Macedonia, on the other hand, scored the lowest value of this parameter. The distinctness of Macedonian germplasm was further evidenced by cluster analysis which classified it most distant to other germplasms in the UPGMA dendrogram. Cluster analysis based on collected molecular data successfully distinguished all studied single accessions. The accessions classified into two large clusters that corresponded to two gene pools of origin, i.e. Andean and Mesoamerican. We found that Andean genotypes prevail in all studied countries by the frequency larger than 60%, except Macedonia, where the two gene pools are represented evenly. This could indicate that Common Bean was introduced into Western Balkans mainly from Mediterranean Basin. A moderate but notable shift in the pattern of genetic diversity on the southern boundaries might be explained by the influence of surrounding regions, e.g. Bulgaria and Greece, which were reported elsewhere to comprise distinctive germplasm. Bayesian cluster analysis revealed that in the area studied additional variation exists which is genetically distinctive to both major gene pools of Common Bean.

Key Words: Common Bean, Genetic Diversity, Western Balkans, SSR's

SMNRO3

EVALUATING THE INFLUENCE OF NITRATE IONS ON CHEMICAL OXYGEN DEMAND IN SURFACE WATERS, RIVERS: VRBAS, BOSNA AND DRINA

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The nitrate ion is an extremely valuable component of the agricultural mineral fertilizers, widely used. Inevitably, some excess quantities get washed out to the ground and surface waters through the natural processes of precipitation, or by water coming through the irrigation. Based on the data from only few case studies, it is widely cited that nitrate ion can cause the methemoglobinemia, a life-threatening blood condition. However, these cases were reported in late 1940's, when the pesticides and other, more serious environmental contaminants, often present in water together with nitrate, were not measurable. No clinical evidence was ever given, nor the evidence through the animal toxicity experiments. On the other hand, it is well known that nitrate is relatively inert ion in a highly oxidized state and it is proven as one of the most readily-absorbed nitrogen source for protein synthesis by plants. Present study, used series of the measurements of nitrate influence on chemical oxygen demand (COD) in regional rivers as the tool to farther explore nitrates chemical behavior. The nitrate concentrations artificially added in form of KNO3 salt, into the water matrixes has shown only slight fluctuation of the COD of up to 5% which is much less then the measurement uncertainly of the method applied (the most up-to-date standard method). Therefore, it was clear that nitrate ion presents a very inert ion within different water matrixes. The data is than compared with the annual medical reports on blood diseases in the areas of the Republic of Srpska where nitrate from agricultural activities is present in the drinking waters and there were zero cases of the methemoglobinemia and similar diseases reported. The findings support the possibility that the toxicity of the nitrate was over-exaggerated in the past.

Key Words: Nitrate, Water, Fertilizers, Toxicity

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SMNRO4

ASSESSMENT OF IRRIGATION WATER QUALITY OF KOSOVO PLAIN

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This study was carried out in Kosovo Plain which is a large karst field located in the northwest- south direction of Kosovo. It aims to assess the quality of irrigation water of the area. Twelve water samples were collected from sampling points in the peak of dry season in July 2015. Samples were taken from rivers, canals and pumping stations. The contents of the samples have been analyzed. The classification used to assess qualities and the suitability of irrigation water is based on FAO's and USSL's classification criteria of irrigation water. The study revealed that important constituents which influence the quality of irrigation water such as: electrical conductivity (EC), total dissolved solids (TDS), sodium adsorption ratio (SAR), soluble sodium percentage (SSP), residual sodium bicarbonate (RSBC), permeability index (PI) and Kelly's ratio (KR), were found within the permissible limits of water for irrigation purposes. The results of physic-chemical analyses and calculated water quality parameters suggest that all of the water samples are suitable for irrigation purposes. Therefore, the surface water of this area is deemed to be of an excellent quality and its use is highly recommended for the irrigation of crops.

Key Words: Irrigation Water; Quality; Classification; Assessment; Kosovo Plain.

SMNRO5

EVALUATION OF SANITARY STATUS OF THE GRAPEVINE GERMPLASM COLLECTION

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In the framework of the project of clonal and sanitary selection fostered by the Ministry of Science and Technology of Republic of Srpska, for the improvement of grapevine germplasm collection, 179 ecotypes belonging to 20 grapevine autochthonous cultivars were assessed for sanitary status using immunoenzymatic assay for virus and nested PCR for phytoplasma presence. To this aim, visual observations were made for the presence of virus and phytoplasma-induced symptoms. At the beginning of July 2015, leaf samples were collected from grapevines for testing for virus infection. The presence of four economically important viruses was evaluated using ELISA (enzyme linked immunosorbent assay): one nepovirus, Grapevine fanleaf virus (GFLV) and three closteroviruses Grapevine leafroll-associated virus 1 (GLRaV-1), Grapevine leafroll-associated virus 2 (GLRaV-2) and Grapevine leafroll-associated virus 3 (GLRaV-3). Survey for the phytplasma presence was conducted at the beginning of September 2015 on cultivars which were not positive in DAS ELISA test for the presence of the four viruses. Out of 179 tested samples with DAS ELISA test 146 (81%) were positive for the presence of at least one virus. The most widespread viruses were GFLaV- 1 and GFLaV- 3 with approximately 80 % of vines infected. Out of 33 grapevine samples tested using nested–PCR/RFLP techniques 2 samples were positive for the presence of phytoplasmas from stolbur 16SrXII group. Sanitation of infected grapevine clones is needed in near future.

Key Words: Grapevine Fanleaf Virus; Grapevine Leafroll-associated Virus, Phytoplasma

SMNRO6

ANALYSIS OF LEGISLATION IN THE FIELD OF CONSERVATION OF ANIMAL GENETIC RESOURCES OF THE REPUBLIC OF SRPSKA

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Basic international standards that define the objectives, priorities, measures and commitments, both in conservation of biological diversity and protection of genetic resources in livestock production, i.e. protection of indigenous breeds of domestic animals, are contained in the Global Action Plan of the World Organization for Food and Agriculture (FAO) as well as in the Convention on Biological Diversity. By accession to international conventions B&H / Republic of Srpska pledged to establish a system of measures which will enable the conservation of biodiversity and the protection of indigenous and endangered breeds of domestic animals.Nonexistence of registry of indigenous breeds that would contain precise information on the type, numbers and locations of the cattle, made impossible taking any measures for protection of local breeds and prevention of their illegal exports, thus jeopardizing their survival. Legislation that would regulate inventorying and protection of the gene pool does not exist yet. In the field of genetic diversity, a very small number of scientific papers and professional works have been related to indigenous species. Also, existence of no plan or regulation framework governing introduction of appropriate subspecies of wildlife threatens the survival of indigenous subspecies, which also represent a little-known field of genetic resources and a valuable part of the indigenous gene pool. From the aspect of preservation of animal genetic resources and analysis of the situation in the neighboring countries, our country has to make considerable efforts ranging from the regulation of legislation and raising public awareness about the importance of conservation of genetic resources, to the work in the field, i.e. to make a detailed analysis of the situation in our country, to establish a concept and a purpose, in order to preserve animal genetic resources and protect indigenous breeds. It is necessary, within the shortest possible time, to propose and adopt a Law on Genetic Resources of the Republic of Srpska, as well as amendments to the Livestock Act of the Republic of Srpska, and to bring programs and define rules of key importance for the management of genetic resources in livestock breeding all in accordance with international standards.

Key Words: Indigenous Race, Wildlife, Gene Pool

SMNRO7

LUCAS TOPSOIL SURVEY IN BOSNIA AND HERZEGOVINA

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PI Agricultural Institute of Republic of Srpska, Banja Luka, Department of Agroecology participated in the implementation of the part of the EU project Land Use/ Cover Area Frame Survey- LUCAS in 2015. The objective of LUCAS program is to set up area frame surveys for the provision of coherent and harmonized statistics on land use and land cover in the European Union. Since 2006, the statistical office of the European Union (Eurostat) implemented the LUCAS project for the EU member states every three years. Since last year Bosnia and Herzegovina, Serbia, Montenegro, Macedonia and Albania have been included in the part referring to the locations where soil samples were taken. Soil samples were taken from 10% of the examined locations. The project is funded by the JRC (Joint Research Centre). Based on the coordinates of the regular grid in accordance with LUCAS Grid in the EU and on the basis of Corine LC for Bosnia and Herzegovina 250 sites were selected (includes all types of LC). Locations are selected according to the principle of "triplets", i.e. for each type of LC 3 possible points were determined. JRC has chosen 750 sites for Bosnia and Herzegovina. Thereof, the Department of Agroecology selected 250 sites. The choice of points is carried out using topographic maps, orthophoto and satellite images, Google Earth and data about areas where there is danger of mines. Locations on the ground were found on the basis of Global Positioning System devices. Soil composite samples were taken to an approximate depth from 0-20 cm. The composite soil sample consists of 5 individual sub-samples taken from the circle of 3m in diameter: one from the center and 4 of the circle intersects the direction of east, west, north, south. At each site 20 data on land, LC/LU were taken and photographed for a maximum of 8 parameters: location (point), land cover, landscape (cardinal directions), irrigation, and soil sample. The fieldwork took place from June, 2015 to November 15, 2015, and 246 locations were processed during that period. Four sites were unavailable (mountains, cliffs). The total mileage is 13567 km and the average distance between two points is 55,1 km. The soil samples were exported to the JRC. Soil samples from across the EU will be analyzed in one laboratory in Europe during 2016. This project created the basis for Bosnia and Herzegovina to be included in the complete LUCAS project 2018.

Key Words: LUCAS, Soil, Sampling, Land Cover

SMNRO8

MORPHOLOGICAL AND POMOLOGICAL VARIABILITY OF SOME INDIGENOUS CHERRY TREES IN DIFFERENT REGIONS OF SLOVAKIA

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This paper considers description of morphological and pomological characteristics of several indigenous cherry trees (Prunus avium L.) that were found in different regions of Slovakia. The experimental work has been performed during two years (2014 – 2015). On the selected territory in Slovakia old trees of cherry with an estimated age of 60-80 years were monitored. The trees were studied from the viewpoint of identification and characterization. The following characteristics were investigated: period of flowering and ripening, morphological characteristics of the flowers, fruit size, fruit weight, and description of quality characteristics of the fruits. Descriptor list of genus Cerasus Mill. was used for description. The results have shown high variation of attributes levels among evaluated genotypes. From the 14 monitored localities, the most valuable genotypes were found in the locality Horna Streda – Cachtice, Krakovany, Nitra and Brdarka. During the collecting expeditions 170 genotypes of sweet cherry fruit of the different quality were found. The most interesting 96 genotypes have been grafted onto rootstocks with different intensity of growth (Cerasus avium (L.) Moench., Cerasus mahaleb and GISELA5). Trees will be used for the establishment of experimental genetic resources orchards. Some of selected cherry genotypes can be used for commercial growing after tests, while some of them can be used only for collection of genetic resources.

This work was accomplished with the support of project no. APVV-0174-12 the Agency for Research and Development (APVV) of Slovak Republic.

Key Words: Fruits, Genetics Resources, Prunus avium L., Monitoring, Evaluation, Regeneration

SMNRO9

CHARACTERIZATION OF COMON BEAN (*PHASEOLUS VULGARIS* L.) LANDRACES THROUGH BASIC MORPHOLOGICAL CHARACTERISTICS AND PROTEIN MARKERS

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The Balkan Peninsula is the region of a great diversity of dry beans and green beans due to its transient position, differen tsoil and climate conditions and presence of many nations. Beans were introduced to the region from two directions: Turkey and Western Europe; and from two centres of origin: Mesoamerican and Andean. Landraces of dry beans and green beans can still be found on small farms. In total 26 landraces were collected in the area of Republika Srpska and basic traits- stalk growth type, pod characteristics (colour, shape), and grain characteristics (colour of seed coat, shape and seed size) were evaluated after the collection and storage. In addition phaseolin type (protein marker) was determined. 14 accessions had indeterminate growth, and12 accessions determinate. Two indeterminate green beans, belonging to the cultivar Trebinjska Roga, have typical green flat pods and different grain colour. They were compared to cultivars of indeterminate green beans from Serbia - Tisa and Resava. Indeterminate beans differed by seed size and coloured seed coat. The following landraces were tested together with high beans: landraces of indeterminate beans from Macedonia (9 samples), cultivars Levač (Serbia) and Ludogorje (Bulgaria). Determinate accessions had coloured grain and could be used both as dry beans and green beans, which is a common trait found in landraces and old varieties. They were compared to cultivars (6) from Serbia and landraces (8) from the collection of beans of the Institute of Field and Vegetable Crops, Novi Sad. Results of the biochemical analyis showed that the T type of phaseolin was prevalent and present in 24 of 26 landraces tested from Republika Srpska, indicating their Andean gene centre of origin. Results showed that accessions from both centres of origin are grown in our agro-climate area. Accessions with S type of phaseolin (in this case newly bred cultivars) are grown increasingly, which could be related to the temperature increase during the growing season.

Key Words: *Phaseolus vulgaris*, Morphological Characteristics, Phaseolin

SMNRO10

PRELIMINARY EVALUATION OF COLLECTED FRUIT ACCESSIONS IN THE GENE BANK

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During 2013 two fruit collections in the Gene Bank of the Republic of Srpska were raised: in the Botanical Garden of the University of Banja Luka and in the municipality of Čajniče (Miljeno). Preliminary evaluation of collected accessions was made in 2015 and the following parameters were monitored: cropping, fruit weight, length and width of the fruit and stem, firmness, soluble solids content and the relationship between healthy and aborted seeds in the fruit. In the fruit collection in the Botanical Garden from 97 pear trees (57 varieties) yielding was present on 7 trees (6 varieties), while from 152 apple trees (84 varieties) yielding was present on 87 trees (55 varieties). Yielding was registered on one cherry tree out of 7 (5 varieties) and on 9 plum trees (5 varieties) there was no yielding. In the fruit collection in Čajniče from 75 pear trees (15 varieties) yielding was present on 2 trees (2 varieties), while all 26 varieties of apple recorded yield (from 130 trees yielding was recorded on 128 trees). These analyses were carried out on the fruits of apple varieties which were harvested at the stage of physiological maturity, while the fruits of pear, plum and cherry hadn't reached it. The fruits of apple variety Canada had the highest weight (337.64 g), which is in complete correlation with the highest measured values fruit width (98.04 mm). The highest values of the firmness measured by penetrometric method have been reported in apple variety Krompiruša which also had the highest soluble solid content (20.1% Brix). The best ratio of healthy and aborted seeds was recorded in cv Šarenika (52:2) which was also characteristic by the maximum length of the stalk. Preliminary studies indicate the higher yield and higher values of these parameters for fruit varieties from the Čajniče collection in relation to fruits from collection in the Botanical Garden, which is associated with different pedoclimatic growing conditions. These results represent the basis for the selection of varieties for further biochemical and molecular characterization in order to eliminate possible duplicated accessions which are planned for multiplication and for the introduction of the breeding program.

Key Words: Ex situ Conservation, Pomological Analisys, Fruits Characterization

SMNRO11

SELECTED NUTRIENT EVALUATION OF SLOVENIAN LEAFY VEGETABLE GENETIC RESOURCES

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Leafy vegetables have become widely used in the past decade in Slovenia for various kinds of fresh, mixed or garnish salads. Fresh leafy vegetables contain important functional food components, such as vitamins, minerals and biologically active compounds, which are associated with dietary activities. Those vegetables also contain several types of photosynthetic pigments, namely chlorophylls and carotenoids, whose composition produces specific colouration of the foods. Chlorophyll and carotenoid concentration correlate to the photosynthetic status of the plant and play role due to their acknowledged roles in human health, since they have an important role in the prevention of various diseases associated with stress such as cancer or chronic diseases. For example, carotenes are the sources of vitamin A; and lutein and zeaxanthin are important factors for human eyesight. Leafy vegetables included in this study were chicory (Cichorium intybus L. cv. 'Anivip' and cv. 'Monivip'), dandelion (Taraxacum officinale Waggner), garden rocket (Eruca sativa Mill.) and wild rocket (Diplotaxis tenuifolia DC.). The pot experiment was carried out in 2013 in the greenhouse experimental field of the Biotechnical Faculty in Ljubljana, Slovenia. Seeds acquired from Slovene plant gene bank were sown at the end of March in plastic pots filled with a commercial peat-based potting medium. The harvesting was carried out after 40 days. Leaves were lyophilized and ground to a fine powder using laboratory ball mill and stored at -20°C. Chloroplast pigments have been separated by Spectra-Physics HPLC system with Spectra Focus UV-VIS detector. Three classes of pigments (xanthophylls, carotenes and chlorophylls) were identified and quantified. Xanthophylls were represented as lutein > violaxanthin > neoxsanthin > antheraxsanthin > zeaxsanthin, whereby their contents differed among species/cultivars ($p<0.05$). The highest lutein content was found in garden rocket (7.4 mg/100 g fwt). The content of neoxsanthin was lower than violaxanthin in all of the vegetables analysed. Total carotene (α- and β-carotene) content among species varied from 3.9 to 8.0 mg/100 g fwt. β-carotene was found in small quantities only in garden and wild rocket. Chlorophyll a and b were the most abundant pigments observed among species/cultivars with contents from 200.4 to 359.6 mg/100 g fwt, wherein the chlorophyll a/b ratio was found to be similar.

Key Words: α-Carotene; Chlorophyll a; HPLC; Leafy Vegetables; Xanthophylls

Notice: This research was a part of the programme financially supported by grant from the Slovenian Research Agency, Ljubljana, Slovenia, entitled »Agrobiodiversity« (P4-0072). This work was also in part financially supported through national programme Slovene Plant Gene Bank.

POSTER PRESENTATIONS

Section: PLANT SCIENCE

Subsection: Horticulture

HP1

BIOLOGICAL CHARACTERSTICS AND PRODUCTIVITY OF CAPE GOOSEBERRY (*PHYSALIS PERUVIANA* L.) PLANTS ACCORDING TO DIFFERENT TERM OF SEEDLING SOWING

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The main aim of this study was to investigate the effect of different time of sowing of seedlings on the morphological development and productivity of cape gooseberry (*Physalis peruviana* L.) plants, cultivars Plovdiv and Obrazetc 1. The experiments were carried from 2008 to 20011 with three different intervals of sowing 1st, 15th and 30th of March - 15 days interval. Phenological observations were done. Morphological characteristics such as total vegetative weight, high and weight of stem, number of branches, number, weight and area of leaves were investigated. Parameters were determined in the following stage of plant development – flower buds, flowering and fruiting. The generative behaviors such as number of flowers buds, number of flowers and number of fruits were estimated. Contents of total sugar, acid, vitamin C and pectin were also analyzed. The best rezults were observed in sowing on 15th of March. The increase of productivity in this term, in comparison with the variant with the lowest yield, was with 5.0% and 35% for Plovdiv and for Obrazecl 1, respectively.

Key Words: Morphology, Yield, Phenology, Sugar, Pectin

HP2

SOME CHARACTERISTICS OF KNJAŽEVAC TERROIR – FIRST SERBIAN MODERN WINE PDO

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The Knjaževac wine-growing region is a typical B (WIN) viticulture zone with warm (HI) and humid (DI) climate classes. With higher elevation terrains, characteristics of the relief between the Timok River valley and surrounding mountains, vertisol as type of soil, as well as CI + 2 Cold nights index etc., the quality and characteristics of wine in this region are greatly influenced by some parameters of Terroir. Wine producers from this wine-growing region recognized these specificities, founded a representative association and registered the protected designation of origin (PDO) in the new Serbian PDO wine system, established and harmonized to the EU legislation through the results of the Twinning Project SR08IBAG02 „Capacity building and technical support for the renewal of viticulture zoning and for the system of designation for wine with geographical indications in Serbia" (2011/2013). This paper presents the analysis of some of the main ecological and anthropogenic factors of the Knjaževac wine-growing region which greatly effect wines with a medium to high alcohol content which have, at the same time, a pronounced lightness and freshness due to a medium-high acid content. In particular, the focus was on some factors analyzed in several representative locations/vineyards such as altitude, exposition, slope, varieties, rootstocks, vineyard surface, training system, etc. which certainly represent the Terroir of the Knjaževac wine-growing region and have a big impact on the quality and characteristics of the PDO wines.

Key Words: Knjaževac Terroir, Ecological and Anthropogenic Factors, PDO

HP3

INCREASED SALINITY IMPACT ON PHOTOSYNTHETIC EFFICIENCY PARAMETERS IN TOMATO (*LYCOPERSICON ESCULENTUM* MILL.)

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The objective of this study was to examine the photosynthetic efficiency at growing of grafted and non-grafted tomato plants of two hybrids (Buran F1 and Berberana F1). The plants were growing in the presence of different sodium-chloride concentrations in the substrate (0.5 M, 1 M and 1.5 M). Intensity of photosynthesis and transpiration, gas flow through stomata and photosynthetic pigments concentration were analyzed in the leaves of control and treated plants. The results have shown that the change trend in no analyzed parameter within the same hybrid was proportional to the increase of salt concentration in the substrate. Significant difference in the reaction of grafted and non-grafted plants was noticed in Buran F1 hybrid on different salt concentrations in the substrate, so that in non-grafted plants the highest increase of photosynthesis intensity, gas flow and chlorophyll concentration was noticed at 0.5 M treatment, while at grafted plants the mentioned parameters grew the most at 1.5 M treatment. It was noticed, in Berberana F1 treatment, that with increase of salinity in non-grafted plants there was an increase of transpiration level, photosynthesis and gas flow, while the same parameters in grafted plants of this hybrid decreased. Apart from that, chlorophyll concentration in the leaves of Berberana F1 hybrid proportionally decreased with salinity increase, although slight decline was noticed in grafted plants. Chlorophyll content in grafted plants of Buran F1 hybrid had smaller oscillations in changes at increased salinity in relation to non-grafted ones. The obtained results indicate that grafting of tomato hybrids and selection of hybrid contributes to different metabolic adjustments in photosynthetic processes under the stress conditions caused by increased salinity.

Key Words: Salinity, Tomato, Photosynthesis, Grafting, Hybrid

HP4

MORPHOLOGICAL CHARACTERISTICS OF ROSES CUT FLOWER AFTER VASE LIFE

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Investigation was conducted under uncontrolled conditions in the laboratory for Plant production at the Faculty of Agriculture in Osijek. The cut roses used in the study were Red Naomi from Netherlands, manufacturer Schreurs. Favourable conditions of storage are necessary for a successful development of roses flower after cutting. Insufficient water supply causes neck bending and poor bud opening. The insurance of a good flow of water from the stems cut to the roses head is necessary during storage of cut flowers. Three different mediums of 300 ml volume were used in the study: ordinary tap water, Chrysal clear, Crystal soil gel. The length of the roses stalk was 50 cm and cut of the stalk was straight at an angle of 90°. After symptoms of decay such as weariness of neck and yellowing and drying of petals were observed, each rose was taken out of medium and the volume of the residual liquid was measured. Leaves, neck and head of decayed rose were separately weighed, placed in paper bags and dried at 70ºC for 24h and 48h respectfully. The smallest loss of medium volume (5.45 %) was recorded in cut roses that were stored in the gel, while the greatest loss of medium volume (47.71 %) was recorded in cut roses stored in Chrysal clear. Medium volume loss in cut roses stored in tap water was 35.78%. The lowest head mass (14.64 g) was recorded in roses stored in gel, which was 38.25% less than in plants stored in tap water and 17.78% less than in roses stored in Chrysal medium. The greatest neck fresh mass (1.52 g) of roses was observed in plants stored in water, while the lowest fresh mass was observed in plants stored in gel (0.81 g). Fresh leaf weight of rose (4.18 g) was significantly higher in plants stored in water compared to plants stored in Chrysal (3.39 g). Chrysal clear solution proved to be best medium for cut flowers vase life.

Key Words: Water, Chrysal, Crystal, Cut Flower

HP5

THE CHANGES IN NITROGEN METABOLISM IN RESPONSE TO MELATONIN APPLICATION ON PLANTS

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Melatonin, a hormone and a strong antioxidant is one of the growth-promoting substances for plants. There are a number of researches exhibiting effects of melatonin on main metabolic processes in plants; however, the relationship between melatonin and nitrogen metabolism is still unclear. The present study was carried out to assess the effects of melatonin on nitrogen metabolism in wheat seedlings. The 11-day seedlings were sprayed with melatonin solution (1 mM) and three days later after the treatment, they were harvested to determine the change in biochemical parameters included nitrogen metabolism. Melatonin-treated seedlings exhibited high nitrate reductase activity in comparison to the control seedlings. Similarly, activities of glutamine synthase and glutamate synthase, responsible for assimilation of ammonium in cell, were also stimulated by melatonin. To support the melatonin-induced activation of nitrogen metabolism, it was defined the changes in protein content and profile. The data demonstrated that melatonin application resulted in a notable rise in soluble protein content and marked changes in protein profile. The alterations in protein profile manifested as increase in intensities of protein bands compared to control. Based on these data, it can be said that melatonin-induced stimulating effect on growth of wheat seedlings is linked to modulation of nitrogen metabolism.

Key Words: Melatonin, Nitrogen Metabolism, Wheat

HP6

SOIL MICROBIAL ACTIVITY AS INFLUENCED BY FERTILIZATION AND SUBSTRATE UNDER THE INTEGRATED STRAWBERRY PRODUCTION PROGRAM

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Over the past years, fruit production has been focused on satisfying basic criteria of the integrated production concept which primarily presupposes the establishment of ecobalance in fruit plantings. In that line, besides toxicologically and eco-toxicologically favorable pesticides, a well-balanced plant nutrition plays an essential role. Therefore, fertilization program needs to be based on results of soil and foliar analyses as well as on specific requirements of a species or a cultivar, and should include characteristics of soil maintenance system, training system and projected yield. The investigations were conducted under controlled conditions, i.e. glasshouse under the integrated strawberry production system. Over the two-year period, strawberry plants were treated with two different type of fertilizers (biofertilizer – inoculum of mixed liquid cultures of Azotobacter, Derxia and Bacillus genera of bacteria, and chemical fertilizer) and grown on two different substrates (Klasman TS1 standard and Klasman TS1 standard + zeolite). The influence of the examined factors was determined by microorganisms count (the total number of bacteria, azotobacters and fungi) and generative potential of the strawberry. Fertilizers applied had a significant influence on number of ammonifiers and fungi. On the other hand, fertilizers did not exert a marked impact on the total number of bacteria. The microorganisms studied were the most abundant on Klasman TS1 standard substrate, in the second year of study. Regarding a generative potential, the applied treatments had a marked influence only on yield per cluster.

Key Words: Biofertilizer, Chemical Fertilizer, Soil Substrate, Strawberry.

HP7

PSYLLID SPECIES (CACOPSYLLA SPP.) IN PEAR ORCHARDS OF EAST SARAJEVO

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Psyllid species (Cacopsylla spp.) are the most important pests on pear in all regions where this fruit species is grown. This is result of pear growing on large areas with intensive application of agrotechnical, pomotehnical and chemical crop protection measures. Psyllid species are causing direct and indirect damages because they suck the sap and make large amounts of honeydew which disturbs the normal physiological processes of the plant. In addition, some psyllid species vectors of phytoplasma were found. The survey was done in 2011 and 2012 in orchards, in locations Vojkovici, Kula, Tilava, Petrovici and Kasindo. Pear orchards were differ in age and growing module as well as in the other environmental characteristics such as altitudes and climate. In Kula location, survey done on the following cultivars: cv. „Viljamovka“ (Bartlett/Wiliams), General Le Clerc, „Passa Crasana“, Abe Fetel and Poire de Curé. Psyllid species were collected at different stages of development and eximined in the laboratory - Faculty of Agricultural in East Sarajevo. Collected species were fixed in 70% alcohol, and preparations of adults and larvae were made in order to determination species. In pear orchards of East Sarajevo area, three three psyllid species were determined: Cacopsylla pyri Linne, Cacopsylla pyrisuga Foerster and Cacopsylla pyricola Foerster. In intensive growing system, Vojkovići and Kula, C. pyri was more present compared to C. pyrisuga, while in extensive orchards, the location Kasindo, C. pyrisuga was more present. In semi-intensive growing system, Tilava and Petrovići, the most present was C. pyrisuga, then C. pyri and at least present was C. pyricola. In the locality Kula, the highest percentage of shoots infested with C. pyri was the Poire de Curé, and the smallest was of cultivar Abe Fetel.

Key Words: Pests, Pear, East Sarajevo

HP8

TESTING THE EFFICIENCY OF EKSTRASOL® (BACILLUS SUBTILIS F 13) AGAINST SOME ISOLATES OF PHYTOPATHOGENIC FUNGI *IN VITRO*

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Botrytis cinerea and *Rhizoctonia solani* are polyphagous, widespread phytopathogenic fungi witch cause severe damage to a wide range of hosts. *Fusarium* species appear to be as significant pathogens of many cultivated plants, reducing the yield and quality. Considering the importance of these pathogens, it is necessary to find an efficient solution for they control which would be also ecologically acceptable. In these study the following variants were applied: 2% Ekstrasol® (*Bacillus subtilis* 13 titer of live cells min BioGenesis); Extrasol combination of 2% and 0.2% Organiko® (fulvic and humic acids); 0.07% Funomil (700 g/kg thiophanate-methyl; Ningbo). In the testing isolates of *Botrytis cinerea* (grapes), *F. proliferatum* (garlic), and *Fusarium* spp. and *Rhizoctonia solani* (root of apple) were used. Tests were performed in Petri dishes on PDA medium (Potato-Dextrose-Agar) and after cooling, mentioned variants were added and plated with mycelia (5 mm diameter). The control variant consisted Petri dishes only with fungi. Evaluation of fungicides efficiency was performed 7th day measuring the diameters of mycelia growth. The best and equal efficiency in all variants have been detected in isolates of *B. cinerea* (100%), while the lowest was found in *R. solani* in the variant with Extrasol (86%). A statistically significant difference, in efficiency were greatest between the thiophanate-methyl (98%) and Extrasol (92%) (*Fusarium* spp.), and thiophanate-methyl (95%) and a combination of Organic and Extrasol (92%) (*F. proliferatum*).

Key words: Efficiency, Ekstrasol®, Phytopathogenic Fungi

HP9

PRODUCTION OF STONE FRUIT PLANTING MATERIAL IN THE REPUBLIC OF SRPSKA

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Based on documentation from official inspection of nursery production in the Republic of Srpska (RS), analysis of stone fruit planting material production size was conducted by species, varieties and category for the period 1997 – 2013. Stone fruit planting material produced in the RS belongs to the category of standard material (the lowest category in domestic legislation), and also during previous years significant problems with virus infections on this material were noted. Stone fruits' share in fruit planting material production is 38,76 %. In the period 1997 – 2013 around 3.000.000 plum plants were produced, while the largest production was recorded in 2013 when 371.789 plants of this fruit species were produced. The largest increase in production was recorded in sour cherry production in 2013, when almost 5 times more plants of this species were produced than in 2012. Average sweet cherry, peach, nectarine and apricot plants production in considered period was not higher than 28.000 plants and no significant oscillation in production was recorded. Varieties present in production are mostly older and intended for processing, while varieties intended for consumption are less present. Production of sweet cherry plants is mostly consisted of autochthonous varieties which are not listed in the Plant Variety Catalogue of Bosnia and Herzegovina (BA). Lack of domestic capacities for production of healthy plant reproductive material represents a great restriction in updating stone fruit varieties, because of which most of fruit plants are produced with imported reproductive material, and this import is restricted by the Plant Variety Catalogue of BA. Production of healthy and quality stone fruit planting material in the RS is only possible through strengthening of scientific research, infrastructure and strict compliance with the certification system, i.e. official inspection and confirmation.

Key Words: Production Structure, Varieties, Fruit Plants

HP10

NURSERY CHARACTERISTICS OF SOME BITTER ALMOND ECOTYPES USED AS A PEACH ROOTSTOCK

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Today's selection program of the rootstocks is also as dynamic as the peach assortment. It is based on the new genotypes suitable for different pedoclimatic conditions and different training systems. The spectrum of rootstocks suitable for the peach is big and it consists of different fruit species and their interspecies hybrids such as the peach, the almond, the plum, the apricot and the peach x almond hybrids. In this paper results of pre-breeding work on bitter almond ecotypes suitable for peach rootstocks are presented. The following characteristics were investigated: phenological characteristics of the trees, pomological characteristics of the fruits, laboratory and field germination of the seed and some nursery characteristics of the seedlings (vegetative growth, uniformity and grafting compatibility) . Seeds from vineyard peach were used as a control. Mass selection from the reach population of bitter almond ecotypes in Macedonia was conducted. Significant variation between selected trees was registered concerning phenological characteristics of the trees and pomological characteristics of the fruits. Time of flowering variate from 15.03 to 02.04, while ripening time was between 12 of August up to 1 of September. The largest nuts were registered at ecotype CI-3 (5.11 g), whereas the smallest ones at ecotype CI-10 (2.18 g). All ecotypes had satisfactory germination of the seeds but ecotypes such as BA-3, CI-2, VE-1, VE-2, SO-1 and US-1 can be distinguished with a field germination up to 80%. All evaluated ecotypes have larger diameter of the seedling compared to the control (vineyard peach seedlings), but only types BA-1 and CI-4 have larger diameter of the nursery trees compared to the control. These two types can be recommended as promising for the production as generative rootstock.

Key Words: Seedlings, Germination, Rootstock, Vineyard peach

HP11

THE INFLUENCE OF PLANTING DISTANCE ON DISTRIBUTION AND GROWTH OF THE ROOT SYSTEM AT APPLE CV. JONAGOLD GRAFTED ON M9 ROOTSTOCK

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The influence of planting distance on distribution of the root system at apple rootstock M9 grafted with cv. Jonagold is presented in this paper. The study was performed in 7 years old apple orchard, established in Skopje region (North part of Macedonia). Experimental orchard has been established in 2002, with two variants of planting distance 4 x 1.5 m and 4 x 1 m. Trees were trained as slender spindle system. Following characteristics were evaluated: length and weight of the fine (fibrous) and coarse roots, depth distribution of the root system and horizontal spreading of the roots. Among evaluated variants and based on all evaluated parameters, the trees planted on smaller distance have smaller root system. The largest distribution of root system is recorded in the depth zone between 20-40 cm and zone of horizontal spreading between 0-50 cm. In total, depending of planting density length of fine roots was 13868 cm at trees planted 4 x 1 m, and 21948 cm at trees planted 4 x 1.5 m, and length of coarse roots was 3233 cm at trees planted 4 x 1 m, and 5107 cm at trees planted 4 x 1.5 m.

Key Words: *Malus domestica* Borkh., Coarse root, Fibrous root.

HP12

BRANCHING OF APPLE YOUNG TREES IN THE NURSERY BY USING 6-BENZYLADENINE (6-BA6) AND PROGERBALIN (6-BA AND GA4+7)

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Branched young trees are a critical component of most high-density apple planting systems including the Spindle. Nursery trees for Spindle orchards should ideally bear 10-15 branches per tree. Trees with branches provide bearing surface for production in the second and third years. Early bearing is essential to assist the financial pay off for increased tree numbers per unit of surface and costs of orchard establishment. The purpose of this study was to determine the effect of applications of 6-benzyladenine - 6- BA6 (500 mg L-1 and 1000 mg L-1) and Progerbalin - 6-BA and GA4+7 (200 mg L-1 and 500 mg L-1) on young trees branching of Golden Delicious, Granny Smith, Fuji (standard) and Idared cultivars. Experiment was conducted in 2015 at private nursery on one-year „knip-baum“nursery tree. All cultivars were grafted on M9 T337 rootstock. The trial used a randomized complete-block design with 4 replications and control block. Each replication was a section of row consisting of 8-10 trees (5 per each replication were used for final analysis with other trees acting as buffer). Spraying was done with a hand sprayer. Three spray treatments were performed at 7-day intervals. The first treatment was applied in mid-May (18th of May – in phenophase with 4-6 developed on young shoot). Control trees were unsprayed. At the end of vegetation, the following characteristics were measured: the total height of young tree, diameter of rootstock (10 cm below grafting place), diameter of scion (10 cm upper grafting place), total number of branches, total length and mean length of branches. Branches angle for branches longer than 30 cm was also measured. The research results show cultivar specificity in the number of lateral branches and their morphometric characteristics (especially length). Better morphometric characteristics of young trees (more suitable for intensive apple orchard) were observed in the treatment with 6-benzyladenine.

Key Words: Cultivar, Nursery Tree, Morphometric Characteristics

HP13

THE EFFECT OF CHEMICAL FRUIT THINNING OF 'GOLDEN DELICIOUS' APPLE

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Fruit production is one of the most important contributors in the total agricultural production of the Republic of Srpska. The importance of fruit production in this region is indicated by the fact that it is one of the most profitable branches of agricultural production and that it provides significant funding for rural development. In order to make good use of our agro ecological conditions and to achieve quantity and quality of yields that can compete with those countries that have developed fruit production, we need to follow and implement new technologies. In addition to pruning, regulation of growth and development it is possible to use synthetic growth regulators - chemical fruit thinning. Too many farmed fruits reflect on yield quality as well as fewer formation of generative buds that flower next year, which is called alternative cropping. Most of the fruit thinners impair plants endogenous hormone system and reduce auxin transport to lateral fruits. The effect of bioregulators in early stages of fruit development is to slow or to stop the growth of lateral fruits and to cause their early drop. The field trial was set up in eight years old apple orchards in the form of solax. The trees grafted on M106 rootstock were planted at 1,2 m within a row and 4 m between rows and trees grafted on M9 rootstock were planted 4 between row and 1 m within row. Two commercial plant growth regulator formulations naphthaleneacetamide (NAD) and naphthaleneaceticacid (NAA) were used. Fruit counting was done before harvest. First application was performed in the phase of petal fall and the second after the fruit set (when the central fruit in the cluster had diameter of 9-12 mm). It was found that minimum number of fruits per branch was on M9 rootstock. Also, most pronounced effect of fruit thinning regarding fruit weight and size was on trees grafted on M9. Results showed that fruits had decreased firmness and increased dry matter content. However, it did not show significant differences in values of iodine - starch test and acid content.

HP14

'ANĐELIJA' - NEW PEAR CULTIVAR DEVELOPED AT FRUIT RESEARCH INSTITUTE IN ČAČAK

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The paper presents results of a two years' study (2012−2013) of the phenophase of flowering and ripening, as well as the pomological characteristics (morphometric, biochemical and organoleptic) and the productivity of the newly-recognised pear cultivar 'Anđelija' ('Starkrimson'×'Coloree de Juillet') and the standard 'Starkrimson' cultivar. The ripening time of 'Anđelija' is mid-August, i.e. on the average of four days before the ripening time of the 'Starkrimson'. The fruit is of a regular pear shape, of a large size (average mass – 182 g; length and width – 86 mm and 64 mm, respectively). The fruit skin is dark red in colour, turning and crimson red in full maturity. The flesh is creamy white, juicy and of exceptional harmonious flavour (similar to cv. Williams). Examination of the biochemical composition of the fruit (soluble solids content – 13.70%; total sugars and acids content – 8.83% and 0.13%, respectively) indicates a significantly higher fruit quality in comparison with the standard cultivar. Considering the attractive appearance and the fruit quality, the 'Anđelija' cultivar is recommended for commercial farming and production of fruits for fresh consumption.

Key Words: Pear, New Cultivar, Pomological Characteristics

HP15

INFLUENCE OF IRRIGATION ON PRODUCTIVITY AND QUALITY OF SWEET CHERRIES CV. REGINA PRELIMINARY RESULTS

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Cherry production in Slovenia occupies only 170 ha of intensive orchards. Nevertheless, due to good experience with some dwarf and clonal rootstocks in the last two decades, the interest for planting new cherry orchards is growing up. As we know, dwarf rootstocks for good growth need, beside fertile soil, also enough water in the growing season, especially in drought years as it often happens nowadays. For this reason, in the Fruit growing centre of Bilje, we carried out an experiment with two types of irrigation: drip and micro sprinkler on sweet cherry cv. Regina on dwarf rootstock Weiroot 72. The experiment represents only one part of many other experiments included in the project (CRP – V4-1409) with the title Production Technology of Cherry and Pear which started in 2014. The first results of this experiment were obtained in 2015, in the year very suitable for irrigation experiment. The effect of micro sprinkler and drip irrigation in comparison to control (non irrigated trees) on sweet cherry productivity and fruit quality was evaluated. The preliminary results show that the type of irrigation didn't affect either productivity or fruit quality, but significantly positively influenced fruit weight without decreasing fruit quality (in content of soluble solids and total acids) in comparison to non-irrigated treatment.

Key Words: Sweet Cherry, Irrigation, Yield, Fruit Quality

HP16

FRUIT POMOLOGICAL CHARACTERISTICS OF SEA BUCKTHORN (*HIPPOPHAE RHAMNOIDES* L.) FROM TURKEY

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The Sea Buckthorn (Hippophae rhamnoides L.), one of the most important wild edible fruits widely grown in Northeastern part of Turkey, is characterized by resistance to hard environmental conditions and looks spectacular, especially in autumn and winter, when it is decorated with orange berries. It is a unique fruit species that can fix atmospheric nitrogen. Climatic conditions in Northern Anatolia are suitable for the growing of the Sea Buckthorn, which can be encountered in various dry areas as well as by riversides. Local people traditionally processed or preserved Sea Buckthorn fruits (berries). The decorative Sea Buckthorn shrubs/trees and berries are an important element of natural landscape in Northeastern Anatolia. The aim of the study was to define the biodiversity among trees/shrubs, berries and leaves of the Sea Buckthorn accessions based on morphological and biochemical data. In the present study we examined around 100 seed propagated native Sea Buckthorn genotypes and results showed a high diversity among accessions in terms of plant, leaf and berry characteristics. Berry diameter, length and 100 berry weight ranged from 5.48 to 7.18 mm; 6.64 to 9.14 mm and 15 to 26 g, respectively. A wide variability of berry skin colour was observed to be yellow, light yellow, dark yellow, yellow orange, orange and dark orange. The anthocyanin content varied from 7 to 38 mg/l berry juice. The total phenolic content and antioxidant activity of genotypes we also found to be quite variable.

Key Words: Antioxidants, Sea Buckthorn, Total Phenolics, Minerals

HP17

SOME PHYSICO-CHEMICAL CHARACTERISTICS IN FRUITS OF ROSE HIP (*ROSA* SPP.) GENOTYPES FROM BOLU PROVINCE IN WESTERN PART OF TURKEY

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More recently, functional foods or food supplements which can protect humans from oxidative stress and several diseases have attracted worldwide interest. Among the functional foods, fruits in particular wild edible fruits (neglected or underutilized fruits) have special attention. There are various neglected and underutilized fruit tree species grown in Turkey solely. These could be exploited directly as foods, or used to obtain valuable natural compounds and derivatives. One of these is rose hip (Rosa spp.).The aim of the study is to determine some fruit characteristics of promising rose hip selections from Bolu province in western part of Turkey. In the selection study, around 100 wild growing rose hip plants were investigated and among them 9 promising genotypes were selected based on rose hip selection criteria. The fruit mass, fruit flesh ratio, soluble solid content, titratable acidity, total dry matter and vitamin C content of these selected nine genotypes ranged from 1.40-2.77 g, 64.92-82.83%, 24.10-30.50%, 0.04-1.55%, 32.44-56.94% and 332.42-1603.52 mg/100 g. Among the 100 investigated genotypes, two genotypes had high, two genotypes had medium and five genotypes had low level of thorn.

Key Words: Rosa spp., Fruit weight, Chemical content

HP18

HAZELNUT YIELD AND SOIL NUTRIENT CONTENTS INFLUENCED BY HAZELNUT HUSK COMPOST USING MICROBIAL BIOTECHNOLOGICAL TECHNIQUES

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Plant residue, a by-product of plant production systems, is an important biological resource, comprising approximately 50% of the total biomass of crops. It is estimated that a total of approximately 2 billion tons of residue are produced annually worldwide. The return of residue to the field is a useful cultural practice to improve both soil fertility and soil organic carbohydrate storage. Composting, as one method of residue return, is a widely acceptable alternative for converting waste into a more useful eco-friendly fertilizer and is known to improve soil fertility. With the increasing demand for organic fruits and vegetables, the return of composted residue to fields as organic manure has recently attracted attention of farmers and scientists due to the positive effects of soil amendment while reducing the use of synthetic fertilizer. The purpose of this work was to examine the influence of different doses of (0, 1.25, 2.5, 5.0, 7.5 and 10 t.da-1) composted hazelnut husk (CHH) using microbial biotechnological techniques to the two hazelnut orchard with different textures such as sandy loam and clay loam on the nutrient contents of soil and hazelnut yield. The results showed that hazelnut yield and nutrient contents were significantly affected by soil texture and CHH application doses. In general, CHH markedly increased the hazelnut yield and increased the contents of mineral nitrogen (NH4-N, NO3-N), available P, exchangeable cations (Ca, Mg, K and Na) and available micronutrient (Fe, Cu, Zn, Mn). CHH significantly increased the aggregate stability of soil, and the hydraulic conductivity in the soil were notably heightened. Yield and yield characteristics, including the shelled hazelnut weight were significantly increased by CHH. According the results of field experiments, conducted with different texture types, focusing on the organic substance management and sustainability of the available nutrient contents in soil, it was clear from the evidence obtained by the research that the ideal CHH application was 5 ton per decare to increase the organic matter content by 2%.

Key words: Hazelnut, Hazelnut husk Compost, Soil, Nutrient, Yield

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HP19

CAN WE EXPECT MORE ACETIC ACID IN WINE IN THE FUTURE?

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Recent trends in food production, such as returning to nature, is gaining attention also on the wine market. Many producers decline the use of artificial means, including sulphur dioxide, for wine protection. On the other hand, climate change causes earlier grape maturation and consequently higher pH of wine. Higher pH means higher susceptibility of wine to faults and diseases, therefore more sulphur dioxide should be in wine, to achieve the same protection. Is it possible that due to general trend of increasing pH and decreasing use of sulphur dioxide, wines have higher values of volatile acids? To check this phenomenon, we have evaluated the data of 5580 Slovenian quality wines, analyzed in years 2013 and 2014. It is important to state that only 1 % of quality wines are not suitable for selling and are excluded, mostly due to chemically or organoleptically detected acetic acid. Pearson correlation coefficient between pH and volatile acidity is low for all wines (-0,41; -0,44 for red wines) except for excluded wines, where volatile acidity correlates well with the pH (-0,59). Acetic acid is also reported to be the main reason for wines exclusion. Closer look at excluded wines reveals that they have lower sulphur dioxide content and higher pH. Wines that were chemically excluded due to high volatile acids show 45 % lower sulphur dioxide values, 10 % higher pH and 75 % lower molecular sulphur dioxide content. So, what can we do? We can instruct producers to protect their wines according to molecular sulphur dioxide, which is calculated from free sulphur dioxide and pH and not only free sulphur dioxide. And this contribution is the first step.

Key Words: Wine, pH, Sulphur Dioxide, Volatile Acids

HP20

NEW GRAPE VARIETIES FOR ORGANIC GROWING

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At the experimental field of University of Novi Sad, Faculty of Agriculture in Sremski Karlovci, during last four decades several cycles of interspecies crossings were made placing emphases on quality improvement and resistance maintenance. The research results of last generation of new varieties Frajla, Panonia and genotype SK 01-1/12, are presented. Using molecular markers it was found that variety Panonia carries Rpv3, Rpv 12 and Ren 3 genes. Frajla carries Rpv3 and Ren3 ,while in the genotype SK 01-1/12 the genes Rpv3 and Rpv 12 are present. The presence of the genes Rpv3 and Rpv 12, (downy mildew resistance) and Ren3 (powdery mildew resistance), were confirmed in the field conditions. Biological and production characteristics of new varieties were observed during the period 2012-2015. Panonia (SK86 2/293 x Riesling 239-20 Gm) is an early ripening variety (30th August), with a potential to accumulate high content of sugar in the must (23,4 %) with high content of acid (9,2 g/l) and high quality white wine, similar to Riesling. Frajla (Vertes csillaga x Petra) is also an early ripening variety, solid yield, with high sugar content in the must (24,1%), and enough acids (8,3 g/l) to produce high quality white wine, with discreet muscat aroma.The candidate for a new red wine variety, genotype SK 01-1/12 (Cabernet franc E11x Panonia), is a late ripening (02.October), with solid productivity, accumulates high content of sugar in the must (24 %). New varieties are recommended for organic viticulture and winemaking.

Key Words: New Grape Varieties, Quality, Resistance

HP21

ABIOTIC STRESS RESISTANCE OF GRAPEVINE CULTIVARS DEPENDING ON THEIR PROVENANCE & GENETIC ORIGIN

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For introduction of new grapevine cultivars (cvs) it is necessary to know their agrobiological parameters and to carry out preliminary assessment of their reactions to basic climatic factors (intensity of light exposure, air and soil temperature in dynamics, etc.) at the target region. For the majority of grapevines it is shown rather high warm- and light- demanding. However specially designed and created modern grapevine cvs (especially Vitis hybrid forms) in practice convincingly showed enough adaptability to some inclement Boreal area. In such a way some American hybrids (AH) possess the accelerated rate of development (e.g. Marquette), and managed to finish year life cycle before autumn frosts. Grapevines annual cycle consists of several phenological stages: 1) intensive sap movement ('bleeding' of vine); 2) budburst (budbreak), bunch initiation and shoots forming; 3) flowering; 4) fruit set and berry development; 5) véraison and berries maturing; 6) ripening of sprouts and fall of the leaves 8) dormancy. In northern risky zones of grapevines growing the stage 6 by V. vinifera cvs often are not reached because their period of vegetation is shortened (by 'cold-cut') to 145…180 days. Also in Belarus sometimes spring T-falls are happened from +15°C to +5°C – the main 'deadly' stress factor just in the beginning of intensive plant vegetation (often fatal for grape harvest). That is why we undertook the current investigation on biochemical criteria of different grapevine cvs, which allows to choose in advance the suitable that one's (i.e. resistant to unpleasant abiotic factors). We verified again that at unfavorable abiotic conditions the retardation in phenological development of the grapevine are caused by mediated biochemical effects of generated harmful reactive oxygen species and subsequent accumulation of lipids peroxidation products (among them – malondialdehyde). It was shown, that the evident genetically inherited lower biological 'zero point' of many contemporary AH-cvs (+5ºC…+8ºC vs. +10ºC of V. vinifera) often allows them to resist short-term spring frost without the expressed stress. Thus, we conclude once more, that rate of phenological growth and development after abiotic stress impacts (e.g., the temperature pulldown during active vegetation) depend on the individual redox system characteristics of grape vine cvs. Our biochemical and gel-electrophoretic analyses revealed that the temperature pulldown initiates in Vitis plants additional activity of redox system (with expressions of appropriate ferments), in particular – isoenzymes of peroxidase (PO [EC 1.11.1.11] and superoxide dismutase (SOD [EC 1.15.1.1]) to level consequences of the abiotic stress (by mediated physiological mechanisms). The patterns of redox enzymes induction proved to be extremely sort-specific –depending on concrete Vitis variety. Besides, various grapevines revealed to have not only inducible (non-constitutive) PO & SOD isoforms, but also constitutive (general for all) and by means of its spectrum Vitis cvs can be identified and their resistance to abiotic stress factors can be predicted. In comparison with European cvs (Bianka, Krasen, Pinot Noir… – originated from V. vinifera) the grape vine cvs of North-American group (AH [Americans hybrids Marechal Foch, Marquette…) demonstrate the most stress resistance at action of adverse abiotic factors on all stages of their ontogenesis.

Key words: Grapevine, Redox System, Stress Resistance

HP22

CLONAL SELECTION OF GRAPEVINE (*VITIS VINIFERA* L.) VARIETIES IN SLOVENIA

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Slovenia is a traditional winegrowing country with a vineyards surface of 17.000 ha; 40 % of the Slovenian farms cultivate grapevines, representing an approximate 10% of the country's total agricultural income. Tradition in viticulture brought along also the tradition in vine grafting and nowadays, Slovenian nurseries produce about 4 million grapevine grafts annually, more than 50% of which, are exported to different European countries. Consequently, we take care of own production of scions and rootstocks and the genetic and sanitary selection is carried out continuously. Moreover, despite limited grape and wine production, Slovenia can boast about a large number of local and indigenous grapevine varieties which have been preserved. In the beginning of the 90`s of the previous century, the country realized the importance of clone selection as well as of preserving and maintaining local grapevine varieties. Therefore, two centers for grapevine selection and nursery production (STS Vrhpolje and STS Ivanjkovci) have been established which, after more than 20 years of work, offer 39 clones of 16 grapevine varieties. Nowadays, the winegrowers realize that home-selected clones, tested on nine economically problematic viruses, meet their expectations regarding growth and fertility at least as good as or even better than clones from abroad. However, the maintenance and the selection of local and international grapevine varieties are carried out continuously, taking into account the local demand and global trends. The task of clonal selection in the future is the selection of superior clones with a large genetic range and the preservation of the genetic variability within and between varieties with the main objective for Slovenian nurseries to offer sanitary and genetically sound and fair quality of grapevine grafts.

Key Words: Grapevine, Clonal Selection, Clone, Variety

HP23

CHARACTERISTICS OF PROMISING GRAPEVINE GENOTYPE '9345' OBTAINED FROM CROSSING COMBINATION CRVENI DRENAK × SMEDEREVKA

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Work on the creation of new grapevine cultivars at the Faculty of Agriculture, University of Belgrade is very intense. So far 23 new cultivars of different purposes and ripening time, and 12 new clones of 'Prokupac' cultivar were recognized. From numerous crossing combinations, constantly were selected new genotypes with improved characteristics. This paper presents the characteristics of promising genotype '9345' obtained from crossing combination Crveni Drenak × Smederevka. All characteristics of the researched genotype were compared with its parents. During the five-year research (2010-2014) the major morphological, agro-biological and technological characteristics were determined. Genotype '9345' showed similarities or significant differences relative to their parents, depending on the studied traits. This genotype is intended for fresh consumption and has a hermaphrodite flower, cylindrical-conical bunch shape, oval berry shape, red skin color, medium-firm flesh and a neutral taste. In the research period, the genotype '9345' matured in average as 'Smederevka' cultivar (6th October), and earlier from 'Crveni Drenak' cultivar (12th October). Bunch and berry weight in the studied genotype (304.0 g; 5.1 g) and sugar content of must (17.5%) were higher than the parental partners. 'Crveni Drenak' had a bunch weight of 293.5 g and berry weight of 4.6 g, and 'Smederevka' had a bunch weight of 276.8 g and berry weight of 3.5 g. The sugar content of must in the cultivar 'Crveni Drenak' amounted to 16.0% and the cultivar 'Smederevka' 15.8%. The average yield in the parents ranged from 3.38 kg/vine ('Crveni Drenak') to 4.64 kg/vine ('Smederevka') and the genotype '9345' amounted 3.56 kg/vine. Similarly, yield and total acid content of must in the genotype '9345' (7.4 g/l) was between his parents ('Crveni Drenak' - 7.0 g/l; 'Smederevka' - 8.9 g/l). Genotype '9345' has been reported to the Commission for the recognition of new cultivars of grapevine as a promising genotype for fresh consumption.

Key Words: Grapevine Breeding, Fresh Consumption, Traits

HP24

IMPACT OF FOLIAR FERTILIZERS ON GRAPE YIELD AND QUALITY OF WINE GRAPE VARIETIES VRANEC AND SMEDEREVKA

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This examination was carried out in order to be determined the impact of applying foliar fertilizers on the production and technological characteristic of grapes varieties Vranec and Smederevka. The examination was carried out in Gevgelija- Valandovo vine growing region in 2014 and 2015. The following foliar fertilizers which are found in the product's line of AD Alkaloid were applied: Agrosal NPKB 8-6-8-1 + ME; Agrosal NPK 12-5-7+ ME; Agrosal NPK 3-20-28+3 % EDTA; At the same time, the impact of applying foliar fertilizers on the weight of bunch, total yield, and content of sugars, acids and anthocyanins was examined. The total amounts of sugar in the must (unfermented wine) are established with Exslov mustmeter. Total acids (expressed in g/dm3 as the wine acid) are established with potentiometric titration by using bromothymol blue indicator. Anthocyanins' content is established by using spectrometric methods. On basis of the obtained results, it was proven that the application of foliar fertilizers has an important impact on the yield and quality of grapes in both years . Therefrom, the yield marked an increase of 6 % at the variety Vranec and 9 % at the variety Smederevka in 2014 and an increase of 7 % at the variety Smederevka and 8% at the variety Vranec in 2015. The content of sugars, with application of foliar fertilizers, has also marked an increase of 5 % at the variety Smederevka and 8 % at the variety Vranec in 2015. An increase of the content of anthocyanin at the variety Vranec by 4% was also established. The application of foliar fertilizers has also increased the degree of seed maturity, by 9 % at the variety Vranec and 12 % at the variety Smederevka in 2014 and from 12 % to 16 % in 2015. The application of foliar fertilizers improves production results and the technical characteristics of the grapes.

Key words: Wine Grape, Foliar Fertilizers, Yield, Sugar, Seed, Anthocyanin

HP25

INFLUENCE OF WEATHER CONDITIONS ON PHYSIOLOGICAL STATUS OF WINTER BUDS IN VINE CULTIVARS

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The hardiness of grape buds and wood ranges widely among cultivars and different weather and physiological conditions. Any estimate of cold hardiness needs to be considered as cultivar specificity to either the buds or the wood under the previous fall's conditions. The aim of the research within the study was to determine the degree of damage to buds (primary, secondary and tertiary buds) of 15 different varieties (*Vitis vinifiera L.*) and interspecies hybrids in Kozara region. The research was performed in the beginning of February 2015, before the pruning. In Kozara region, during the 2014, prevailing weather conditions (heavy rainfall and the emergence of the hail) had negatively affected the physiological preparation and ripening of vines for overwintering. For each of the tested cultivars and hybrids, randomly sampled were 10 canes (5 plants with 2 canes) on which cross-sections were made at the first eight nodes from the base of the shoots. On the cross sections visually defined was physiological status of the central (primary) and two side buds (secondary and tertiary). Buds were categorized as "live" and "dead" as defined by their physiological status. The highest percentage of live buds, regardless of the variety and level of development was determined on the first node (78.33%) and lowest at the eighth node (36.67%). The highest percentage of buds, regardless of the position of nodes and degree of development, was found in the cultivars Chanslor (89.59%), Concord (87.09%) and Gift (82.50%). The lowest percentage of live buds was determined in varieties Carmen (9.16%), Lasta (14.60%) and Chardonnay (19.18%). Tests have shown genotypic differences in terms of physiological readiness for successful overwintering. This fact must be taken into account when defining pruning approach, particularly after a season with environmentally unfavorable vegetation period.

Key Words: Cultivar, Interspecies Hybrid, Bud

HP26

THE MOST IMPORTANT INDICATORS OF FRUITFULNESS AND GRAPE QUALITY OF GRAPEVINE CULTIVAR RIESLING AND CLONES 239GM AND B21

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Riesling is very old and well-known cultivar, which originated from Germany, from the valley of the river Rhine. It is grown in almost all countries of the world. When talking about the importance for the highest quality of white wines, Riesling is one of the three major world cultivars, along with Chardonnay and Sauvignon Blanc. This paper presents the results of comparative investigation of basic parameters of fruitfulness and grape quality of grapevine cultivar Riesling and clones 239Gm and B21. Studies were carried out in the collection vineyard of the Center for Viticulture and Enology in Niš, which belongs to the Niš region and Kutina locality. In the period from 2012 to 2014 the cultivar and clones were determined for: the total number of buds, number of buds burst, the total number of shoots, number of fruitful shoots, the total number of inflorescences, coefficients of fruitfulness (potential, relative and absolute), yield (kg/ha), bunch weight (g), number of berries on the bunch, berry weight (g), sugar (%) and total acids (g/l) content in must. Data analysis determined the variation of the investigated traits depending on the meteorological factors of the year in standard cultivar and clones. The coefficients of fruitfulness were highest in clone 239Gm (1.86; 2.18; 2.25). The highest yield, bunch and berry weight were found in clone 239Gm (5080 kg/ha; 185.76 g; 1.95 g). On average, depending on the test year, in clone 239Gm, the lowest sugar content (17.07%) was determined and the highest total acid content (8.0 g/l) in must. Clone B21 had the highest sugar content in must (20.41%). In all three production years, based on the largest number of investigated traits, the clone 239Gm can be singled out and recommended for production in the same or in similar agro-ecological conditions in Kutina locality.

Key Words: Vitis vinifera, Clone, Fruitfulness, Grape Quality

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HP27

EFFECT OF DEFOLIATION ON YIELD, GRAPE STRUCTURE AND QUALITY OF CV. SAUVIGNON BLANC

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Defoliation is a measure which directly regulates the vine microclimate condition, and therefore the grape quality. The aim of this two-year trial was to investigate the effects of timing of basal leaf removal on yield components, grape structure and berry composition in cv. Sauvignon blanc. The experimental vineyard belongs to Experimental Station "Radmilovac" of Faculty of Agriculture in Belgrade. The vineyard location is in a Belgrade wine region, characterized as a Cfb climate. Leaf removal treatments were manually applied at full bloom, at fruit set (3-5 mm berry diameter) and ten days before veraison. The treatments consisted of defoliation of the first six nodes of all the shoots. Berry development of all treatments followed a typical double sigmoid curve. This means that berries develop in two phases, separated by a phase of slow growth – lag phase. Defoliation performed during flowering and fruit set period reduced the number of berries per cluster and berry size, resulting in a reduction of yield per vine from 2.80 kg in control, to 1.64 and 1.78 kg in flowering and fruit set treatment, respectively. The influence of defoliation time on change in the skin to pulp ratio was determined in flowering and fruit set treatments. Defoliation treatments increased the content of soluble solids in must (24.5, 24.2 and 23.8%) in comparison with control (22.8%), while the content of total acids was not significantly changed. The early defoliation can significantly affect the structure of the cluster, yields and chemical composition of grapes, and from a practical perspective, can replace the costly and time-consuming cluster thinning as a tool of yield control.

Key Words: Defoliation, Yield, Grape Structure, Skin to Pulp Ratio, Grape Quality

HP28

RESPONSE OF CV MERLOT (*VITIS VINIFERA* L) TO FOLIAR APPLICATION OF PLANT GROWTH REGULATORS – VEGETATIVE GROWTH, SHOOT MATURITY, BUD WINTER HARDINESS

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The effects of foliar application of plant growth regulators (PGR) - paclobutrazol (PC), chlorcholinechloride (CC) and gibberellic acid (GA3) on vegetative growth, shoot maturity and cold hardiness of cultivar Merlot were studied. The growth regulating substances of different effects on plant growth and development were used– growth inhibitors and growth promotant in following concentration: PK 500 mg/l, PK 1000 mg/l; CC 1000 mg/l, CC 2000 mg/l; GA3 100 mg/l, GA3 150 mg/l. Control plants (C) were not treated. Vines were treated foliarly twice during vegetative period: 10 – 15 days prior to flowering and 10 – 15 days after full bloom. Results indicated that application of plant growth regulators, carried out during the period of intensive vegetative growth (prior to flowering), considerably influences the shoot growth, pruning weight and quality of shoot maturity. The strongest effects PGR on shoot growth was manifested in June when in variants with growth inhibitors, monthly growth was decreased by 12% (PK1000, CC1000), 22% (CC2000) and 17% (CC1000) compared with the control. In variants with gibberellic acid treatments, the monthly shoot growth, compared with the control, was increased by 11% (GA100) and 33% (GA150) respectively. PC and CC strongly inhibited shoot growth by reducing the shoot length. The significant differences were obtained in length of internodes while the number of internodes was not affected. In the same treatments, both the content of dry matter in canes and thickness of phloem layers were increased. In treatment with GA150, the content of dry matter in shoots was decreased while pruning weight was increased compared with the control and the treatments with growth inhibitors. Applied PGA strong affected on both vegetative growth and maturity of shoots. The results showed significant correlation of maturity of shoots with cold hardiness of winter buds of cv. Merlot. The effect of growth regulators is directly dependent on the applied concentration.

Key Words: Grapevine, Plant Growth Regulators, Vegetative Growth, Shoot Maturity, Bud Winter Hardness

HP29

THE EFFECT OF STORAGE CONDITIONS ON CONCENTRATION OF PHOTOSYNTHETIC PIGMENTS IN LETTUCE (*LACTUCA SATIVA*, L.)

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Lettuce (*Lactuca sativa*) is omnipresent in the diet of people around the world. It has short vegetation period, so several production cycles can be achieved during the year. It has beneficial effect on the functioning of the cardiovascular and digestive systems. Among the other valuable compounds, lettuce contains carotenoids which have antioxidant activity. It is very important to store lettuce after harvest in the environment in which nutritional value of lettuce does not deteriorate. Therefore, the aim of this study was to assess the effect of different forms of cold storage conditions on concentration of photosynthetic pigments in lettuce. Lettuce (cultivar Murai) was grown under controlled conditions, to technological maturity, in growing cubes. After harvest, lettuce heads were stored in the refrigerator in two ways: 1) together with growing cube or 2) without growing cube. Every three days after beginning of the storage period, concentration of chl. a and b and carotenoids was determined. These results were also compared to those obtained on lettuce which was not harvested and continued growth in a greenhouse, in growing cubes. The results showed that there was a decrease in the concentration of chl. a in lettuce stored with growing cube over time. The overall reduction of concentration of chl. a was 35%, chl. b 44%, carotenoids 29% and chl. a+b 37.5% with the respect to concentration of pigments at harvest. The concentration of pigments in samples stored without growing cube was more variable and it was not decreasing linearly. The largest change in concentration of pigments was found for carotenoids (25%), then for chl. b (24%), chl. a (20%), and chl a+b (19%). At the last time-point, the concentration of pigments in lettuce stored without growing cube was higher than in the lettuce stored with growing cube. However, in the lettuce that was continuously in the greenhouse concentration of all pigments declined already after 6 days, suggesting the beginning of senescence. The results indicate that plants stored with growing cube, although visually better-looking because they better keep turgor pressure, don't have higher concentration of photosynthetic pigments under conditions in which this lettuce was stored.

Key Words: Lettuce, Chlorophyll, Carotenoids, Cold Storage, Growing Cube

HP30

REDUCING SUGAR AND TOTAL SUGAR CONTENT IN ONION `BUCHINSKA ARSHLAMA` DURING STORAGE IN R. MACEDONIA

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In Macedonia sweet onion landrace 'buchinska arshlama' is traditionally stored during winter period. Through this period there are losses of physiological and chemical nature. The objective of this research was to determine reducing sugar and total sugar content in onion bulbs during storage period in traditional way and in a cold room. The research was done three years (2010/2011, 2011/2012 and 2012/2013) and the storage period was from October to April. Every month samples were taken for chemical analysis. The results were statistically processed with data base in the statistical program SPSS for Windows 13,0 and tested with Student`s t-test. According to the results, the average values of reducing sugar and total sugar content showed no statistically differences concerning traditional way of storage and cold room storage during the three years research. The average reducing sugar content in onion stored in traditional way was 4,8%, while the average reducing sugar content in onion stored in cold room was 4,6%. The average total sugar content in onion stored in traditional way was 6,0%, while the average total sugar content in onion stored in cold room was 5,6%. These results showed that onion `buchinska arshlama` can be successfully stored either in the traditional way of storage or in a cold room.

Key Words: Onion, Reducing Sugar, Total Sugar, Traditional Storage, Cold Room

HP31

THE REACTION OF DIFFERENT COMMON BEAN GENOTYPES, AS STUBBLE CROP, TO THE PRESENCE OF CAUSAL AGENT OF RUST, *UROMYCES APPENDICULATUS* (PERS.) UNGER DURING 2015

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The causal agent of rust, Uromyces appendiculatus (Pers.) Unger, is present in all countries of the world where common bean is grown. In the countries with suitable climates for pathogen development, yield losses caused by this disease may be severe. In Republic of Serbia, it appears in higher intensity on dry and snap bean plants during summer, when they are grown as stubble crops. Growing more tolerant and resistant genotypes is the most important way of protection, and constant screening of breeding material enables selection of less susceptible genotypes. The aim of this work was to investigate the reaction of different genotypes to the presence of causal agent of rust. The stubble bean planting was done on July 1, 2015, in the distance of 50x5cm in the rows. Length of one row was 2m and contained 40 plants. For the trial, 17 domestic and 4 foreign genotypes were chosen from the collection of the Institute of Field and Vegetable Crops, Novi Sad. The evaluation was done on September 22, 2015, in the condition of natural infection, with visual method using score scale from 0-5 (0: without visible symptoms of infection, 1: 1-5% of the leaf coverage with uredopustules, 2: 6-25%, 3: 26-50 %, 4: 51-75 %, 5: 76-100 %). The first symptoms of rust on the back of the leaf were observed in the first decade of September, as small, single uredopustules, dark orange in color. The average scores of infection intensity among tested genotypes on September 22 ranged from 0.29-0.95. Lowest leaf infection level was noted in cultivars Belko (Serbia) and Sataja 425 (USA), whereas the highest was in local population originating from Stejanovci (Serbia). Among tested genotypes there are statistically significant differences concerning the intensity of infection in bean leaves.

Key Words: Reaction, Tolerant Genotypes, Uromyces appendiculatus

HP32

APPLICATION OF DIFFERENT SUBSTRATE ON BASIL (*OCIMUM BASILICUM* L.) SEEDLINGS PRODUCTION

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Container production of seedlings, with the use of different substrates, has a number of advantages in comparison to classical production and it found its application in the vegetable and fruit production a long time ago. In Serbia, seedlings of herbs and spices are still produced in a classical way; - the so-called bare root plantlets (unprotected root system) use to be produced in cold and warm seedbeds, and garden soil is most frequently used as a substrate. In such a production, plantlets udergo stress during transplantation, and cosequently, need longer time for rooting which further disturbs their growth and development.Basil production in a protected area, with additional warming, is possible during the entire year, buth special attention should be paid in order to produce healthy and good quality seedlings, which prove to be very significant part of the overall cultivation technology for basil. In this research, the influence of ten different substrates in the production of basil variety Genovese has been investigated. The predominant component of the studied substrates was the dark peat originating from Gaj, which was improved by adding the white peat, zeolite and the two water soluble mineral fertilizers, FitoFert Humistart (4:12:5) and FitoFert Kristal (10:40:10). The control variants were two commercial substrates, FloraGard and Humate substrate. The obtained results shows that basil seedlings produced on such an enriched substrates achieved better results (better quality seedlings) in relation to production on a commercial substrate FloraGard and Humate substrate. In addition, the best quality basil seedlings produced in containers are obtained with the use of substrates with the following mixture ratio: dark and white peat (75%) + zeolite (25%) + Kristal water soluble mineral fertilizer.

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Key Words: Basil, Seedlings Production, Substrates

HP33

THE USE OF HERBAL PREPARATIONS AND FOLIAR NUTRITION IN PRODUCTION OF WHITE MUSTARD

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In food production in the past few years, there has been a high percentage of replacement of synthetic chemical agents with biological ones. Application of different types of herbal preparations and foliar fertilizers has been present in the plots of our organic producers. Therefore, we wanted to examine some types of different biological agents, which could be of help to our producers in the production of organic cultivation of white mustard. We tested the effects of three medicinal herbs preparations (LAB1, LAB5 and LAB-VAL) and two commercial foliar fertilizers (Slavol and Biofor) to ensure better production practices of white mustard. During 2014 and 2015 foliar treatment was performed a month after sowing (early May). The used amount of the herbal preparations were: LAB1 = 2.00 l/ha, LAB5 = 2.00 l/ha and LAB-VAL = 3.00 l/ha, Slavol = 5.00 l/ha and Biofor active = 2.00 l/ha. The best effect (earliness and yield) was achieved using herbal preparation LAB1. The crop which was treated with the herbal preparation LAB1 came to the technological phase of mature seeds six days earlier than the crop which was treated with the herbal preparation LAB5. The worst effect of the maturity of seeds was in the treatment with Biofor and the ripening of seeds took 12 days longer than in the treatment with the herbal preparation LAB1. The highest yield of white mustard seeds was achieved in the variant with the herbal preparation LAB5 (2.115 kg/ha), and the lowest with foliar Biofor active (1.890 kg/ha).

Key Words: Herbal Preparations, Foliar Nutrition, Organic Production, White Mustard Yield, White Mustard Seeds.

HP34

USE OF AZADIRACHTIN AND THIAMETOXAM IN PEPPER PROTECTION AGAINST *MYZUS PERSICAE* SULZER

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In pepper crops, polyphagous pest *Myzus persicae* Sulzer occurs regularly and causes great damages, both direct ones by plant juice feeding, as well as indirect as a vector of plant viruses. The aim of the this paper was to study insecticides azadirachtin and thiametoxam in protection of pepper crops from the grin peach aphid. During 2013 and 2014 the trials were carried out on production localities in Vojvodina (Pećinci, Veliko Selo and Bavanište) in pepper crop, variety Danica, by standard OEPP methods. The applied products were on the basis of azadirachtin (10 g a.i./l product) of EC formulation, in concentration of 0.3% and thiametoxam (250 g a.i./l product) of WG formulation, in the quantity of 180 g/ha. Before the product application, content of the active ingredient azadirachtin (CIPAC MT 627, 2009) and tiametoxam (HPLC-DAD) were checked and study of physical and chemical properties was carried out in accordance with recommendations of FAO and WHO (2010). The treatments were conducted foliar, twice with the product based on azadirachtin, with seven days interval between treatments, and once with the product based on thiametoxam. Three assessments were made on 25 marked top plant parts per replication by counting of aphids. The first one was before applications and the second one seven days after the first or immediately before the second treatment. The third assessment was performed seven days after the second treatment or 14 days after the first one. Results are presented as means, efficacy (E%) according to Abbott and significance of differences by LSD test (5%). In 2013, the average number of 335.2-367.7 leaf aphids was found before the treatment at localities Pećinci and Veliko Selo. Seven days after use of insecticide, number of aphids (11.5-57.0) was at a significantly lower level in relation to the control (362-390.2), and efficacy of the studied insecticides was 85.4-96.0%. Seven days after the second treatment, aphid number (9.5-27.5) was at a significantly lower level in relation to the control (380.5-418.5), and efficacy of the studied insecticides was 93.4-97.5%. In 2014, in Bavanište and Veliko Selo, just prior to the treatment, the average number of aphids ranged from 352.2-385.5. Seven days after insecticide application aphid number (14.5-62.0) was at a significantly lower level in relation to the control (379.7-408.5), and efficiency of the studied insecticides. Applied insecticides showed high efficiency for control of *Myzus persicae* in pepper.

Key Words: Pepper Crop, *Myzus persicae*, Insecticide, Azadirachtin, Thiametoxam

HP35

EXAMINATION OF SEEDLINGS QUALITY OF PELARGONIUM X HORTORUM L. H. BAIL. TREATED WITH FERTILIZERS WITH DIFFERENT CONCENTRATION OF Ca $(NO_3)_2$

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The aim of this examination was to determine the quality of the seedlings of Pelargonium x Hortorum L. H. Bail. hybrid "Ringo 2000 deep scarlet" by using fertilizers with different Ca $(NO_3)_2$ concentration. Easily soluble fertilizers were used in the following composition: NPK 9-10-34+M.E. + Ca $(NO_3)_2$. In all treatments the dosage of NPK 9-10-34+M.E. was the same (1,6 g/l), but the dosage of Ca $(NO_3)_2$ was different as following: 1,6 g/l, 3 g/l and 4,6 g/l. The plants of the control variant were irrigated with plain water. The following biometric parameters like mass of stem, mass of root, number of brunches, number of leaves and number of inflorescence were examined. The research period was three years (2010-2012). The obtained results were statistically processed with the method of analysis of variance and test with LSD test. According to results of all examined biometrical parameters, it was determined that the nutrition with the crystal fertilizer NPK 9-10-34+M.E.+ Ca $(NO_3)_2$ in dosage of 1,6 g/l have shown the best results in comparison to control variant for about 52% more mass of stem, 76% more mass of root, 83% higher number of brunches, 30% higher number of leaves and 15% higher number of inflorescence.

Key Words: Pelargonium x Hortorum L., Seedling, Fertilizer, Ca $(NO_3)_2$, Biometric Parameters

HP36

CURRENT SITUATION OF MEDICINAL AND AROMATIC PLANTS IN ALBANIA

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Albania is among the European countries with the richest natural genetic diversity in terms of medicinal and aromatic plants (MAP). Albanian flora comprises about 3250 species, which is about 30 % of the entire European flora. Out of those, 30 species are endemic and about 180 sub-endemic in Albania. Such a huge diversity is attributable to favorable climatic conditions, ranging from coastal subtropical climate towards inland continental climate. The geographical position of Albania in the Mediterranean region and in the Balkan Peninsula results in many different types of landscapes. In Albania about 400 different medicinal and aromatic plant species are harvested in the wild, many of which are widely known in the folk medicine. There is a long tradition in collecting them either for domestic use or for sale. Currently, collection from the wild is the main source of MAP in Albania. Many of the medicinal plants, including the endemic species, are harvested unsustainably from their natural habitat. Consequently, some species are becoming rare or are even threatened with extinction. Habitat changes across most parts of Albania have also eroded species' population levels. In the last two decades several plants are affected by the phenomenon of genetic erosion. Sixty-eight medicinal species are considered of the endangered status and 40 MAPs are included in the National Red Data Book.

Key Words: Albania, MAPs, Red List

HP37

GROWTH AND DEVELOPMENT OF SAGE (*SALVIA OFFICINALIS* L.) IN DIFFERENT SOIL SUBSTRATES

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Medicinal, aromatic and spice plants are increasingly used as raw materials in the pharmaceutical, cosmetic and food industries, and their use is increasingly on the rise. Therefore, there is a danger that due to uncontrolled collection of individual plant species from the natural environment their survival is threatened. Bearing all this in mind, it is necessary to cultivate larger areas as medicinal, aromatic and spice plants, in order to preserve as much as possible natural plant resources and their biodiversity, while also growing cultivated plants by standard quality of raw materials and their products. The aim of this study was to demostrate the influence of different substrates on the growth and development of sage (*Salvia officinalis* L.). As an initial planting material already rooted cuttings of sage (*Salvia officinalis* L.) taken from mother plants (locality - University City, Banja Luka) were used. The experiment was conducted in the greenhouses "Šušak" in Prnjavor. The plants were divided into two groups with 3 replicates and 10 plants at each replicates, making a total of 30 plants in each group. The plants are transplanted into the pots φ 9 cm. The first group was transplanted into the soil from the location of University City - Banja Luka and served as a control. The second group was transplanted into the soil taken at the location of Trebinje - Donja Kočela and represented the treatment. Chemical analysis of the soil substrate will be shown in the work. Plants control showed better results in terms of morphological characteristics (plant height, number of leaves), because the average values of all investigated parameters were statistically significantly higher in comparison to the treatment. From this study it can be concluded that the choice of substrate is very important in growing sage, because local, continental species of sage from Banja Luka had not yielded satisfactory results in the cultivation of the substrate from the Mediterranean region.

Key Words: Sage, Soil Substrate, Seedlings

HP38

ENTOMOFAUNA ON SWEET BASIL, POT MARIGOLD AND PHACELIA IN FLOWERING PHENOPHASE

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On the cultivated plants in agricultural production, both the beneficial and harmful insect can be found on plants simultaneously, though differing in kind of relationship; the harmful insects cause significant damages to the crop plants, while the beneficial ones are either pollinators or they feed on present pests. The aim of the research is to determinate the presence and abundance of different insects in flowering phenophase on medicinal plants, sweet basil (*Ocimum basilicum* L.) and pot marigold (*Calendula officinalis* L.), as well as on phacelia (*Phacelia tanacefolia* Benth) which is primarily a honey plant, but also a forage and green manure plant. Experiment was conducted on experimental plots of Agriculture Faculty Banja Luka. Experimental plots of sweet basil, pot marigold and phacelia were each $1m^2$ of size, in 3 repetitions. Monitoring of insect number and diversity was carried out during flowering phenophase by visual observation and by the use of a sweep net. Flowering of sweet basil and pot marigold started on 10^{th} of June 2015 and first survey was conducted 5 days after. While the flowering of phacelia started on 20^{th} of June and the first survey was performed 15 days later. For each plant there were 3 survey totals, at intervals of 4 to 6 days, with 5 surveys per day. Further examinations were perform in entomological laboratory of the Agriculture Faculty Banja Luka in order to determinate the family level of the collected insects. The greatest number of insects were found on phacelia. Out of pollinators, in all three plant species, the honey bee (*Apis mellifera* L.) was the most present. Besides that, there were also insects from Syrphidae family, which larvae are significant aphid predators, while from predatory species species from Coccinelidae family were recorded, and from harmful insects there were species from Agromyzidae and Cicadellidae families.

Key Words: Insects, Flowering Phase, Sweet Basil, Pot Marigold, Phacelia

HP39

ATTRACTIVENESS OF POT MARIGOLD, LACY PHACELIA AND SWEET BASIL AS PLANTS FOR HONEY BEE PASTURE

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The aim of the research is to determine the attractiveness of pot marigold (*Calendula officinalis* L.), lacy phacelia (*Phacelia tanacetifolia* Benth.) and sweet basil (*Ocimum basilicum* L.) as pasture crops for honeybees. The research was conducted at the experimental field of the Faculty of Agriculture, University of Banja Luka, in the period April-August 2015. The experimental plots had surface of 1 m2 with three replications. The presence of bees was followed in three periods with intervals of 7 days, and 5 times a day, every 2 hours starting from 9:00 a.m., recording the number of flying from all four corners of the trial plot. The most attractive plant for honey bees was lacy phacelia, with an average visit of 32 bees/day. Basil and pot marigold were less attractive to bees, with an average visit of their flowers 6 and 8 bees/day respectively. During the day, the bees visited flowers more frequently in the morning hours (7 to 38 bees) than in the afternoon (5 to 25 bees).

Key Words: Attraction, Honey Bee Pasture

HP40

POPULATION DYNAMICS OF POTATO TUBER MOTH PHTHORIMEA OPERCULELLA IN THE TERRITORY OF ČAČAK, WEST SERBIA

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The Potato Tuber Moth (PTM), Phthorimea operculella Zeller (Lepidoptera, Gelechiidae) is a cosmopolitan polyphagous pest native in South America. Beside potato, this pest also affects some other plants of the family Solanaceae (tomato, tobacco, eggplant, bell paper) and tobacco (Nicotiana tabacum). PTM also attacks several wild plant of following genera: Solanum, Datura, Fabina. For this pest, present worldwide, potato represents the main host plant in many regions. During vegetation period PTM laid eggs on leaf or potato tubers, depending on the phase of vegetation. After natural leaf extinction PTM lay eggs in or near the eye buds of tuber. PTM damaging of potato in the field causes yield losses up to 50% but in storage conditions up to 100%. Different climatic conditions during vegetation period (temperature, precipitation, humidity) of three years (2013, 2014, and 2015), in territory of Čačak, West Serbia, indicate on different development and the population dynamics of PTM. Population dynamics of PTM was monitored by phero-traps. Growing season 2013 shows that the number of PTM flight was progressive. The first and the lowest catch were in the beginning of vegetation with one caught specimen. The last and the highest number were at the end of vegetation period when 32 specimens were registered. Vegetation period in 2014 with completely different climatic conditions and longer growing season shows that the number of PTM flight was fluctuating. The smallest catch was in the beginning of vegetation period, one month earlier then in 2013 with 1 specimen caught. The highest number of caught specimens (70) was at the end of vegetation (11th of October), one month later then in 2013. Higher fluctuations in the number of moths caught were recorded in the middle of vegetation in 2014, July and September. Climatic conditions in 2015 show similarity with vegetation period in 2014. The flight of PTM in 2015 was fluctuating. The first economical threshold was registered on 16th of July and until the end of vegetation the number was under that limit. The highest number (85) of caught specimens was registered on 17th of October.

Key Words: PTM, Population Dynamics, Potato, Čačak

HP41

GROWTH RATE AND FROST HARDINESS OF THIOPHANATE-METHYL RESISTANT STRAINS OF *BOTRYTIS CINEREA* PERS. ORIGINATING FROM ORNAMENTAL PROTECTED CULTIVATION

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Ornamental plants are defined as plants that are grown for display purposes or the plants that have no value beyond being attractive. Their production in the world is constantly increasing. According to the data from 2010, the production value, realized on the total area of 740.600 ha, exceeded €26.5 billion. The production of seedlings of seasonal flowers is the most profitable; it represents more than 50% of the total ornamental production in almost all countries. Seasonal flowers require large amounts of heat during winter, and, therefore, in temperate regions, they may be grown only under protected conditions −greenhouses, tunnels, etc. The production in Serbia is currently characterized by a large variety of production facilities, which are in most cases shelters or improvised tunnels. Unlike in high-tech greenhouses, maintenance of the optimum temperature and humidity for plant development during extremely cold winter months in these structures is quite challenging. Cold and wet conditions are particularly suitable for the development of gray mold disease caused by polyphagous fungus Botrytis cinerea Pers. Even though the disease control is mainly based on regular sanitation along with temperature and humidity regulation, fungicide application remains indispensable way of protection. However, in recent years, thiophanate-methyl resistant B. cinerea strains were often isolated from ornamental plants originating from protected cultivation. The aim of this study was to determine if there is any fitness cost in thiophanate-methyl resistant strains compared to sensitive once, in order to assess their survival ability in a population in the absence of thiophanate-methyl application. Growth rate at different temperatures and frost hardiness of thiophanate-methyl resistant and thiophanate-methyl sensitive strains were tested in vitro. The growth rate of resistant strains at 20oC was 39.17-64.83 mm/3days, compared to 43.83-65.83 mm/3days of sensitive once. Similar overlapping of the growth ranges was observed at 5oC and 29oC. In addition, mycelium of both groups of isolates was able to survive freezing at -20oC for 34-44 days. Therefore, it is unlikely that temporary suspension of thiophanate-methyl application will result in disappearance of resistant strains from B. cinerea population.

Key Words: Grey Mould, Growth Rate, Survival Ability, Fungicide Resistance

HP42

RESPONSE OF GREEN FORAGE YIELD AND YIELD COMPONENTS ON SOME RAPESEED GENOTYPES (*BRASSICA NAPUS* L.) TO SOWING DATE AND HARVEST STAGE

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The one-year field experiment was set up in the village Stajkovci (location near Skopje, 42°2'1" north, 21°30'42" east, 264 m.a.s.l.), during 2013/14 growing season. Five rapeseed genotypes (AbaKus, Rohan, Banacanka, Majdan and Perko) were tested under the three sowing dates (September 20, October 4 and October 17) and harvest at two phases of development (codes 51 and 65 according BBCH scale) to determine their effects on green forage yield and yield components. The obtained results showed that most dense canopy was observed in the third period of sowing (an average from 86 - 157 plants/m2). On genotype level, the hybrid AbaKus formed most plants per m2 (109, 106 or 157 depending on the period of sowing) and the lowest is calculated on cultivar Majdan - 37, 56 and 87 respectively. The highest plant height is reached in the first period of sowing (from 94,7 until 104 cm respectively), with determined statistically significant differences at the level of 0,05% between the first with the second and third, and between the second with third sowing period. The examined genotypes in the first period of sowing, on average level from 8,1 to 9,9 formed most leaves/plant which is more compared with the second (6,7 to 8,9) and the third (6,3 - 6,4) sowing period, within established statistical justification of the level of 0,05%. Statistical justification of the same level was determined between cultivar Perko (formed the most leaves/plant – 9,9) with others investigated. The yield of the green forage in the first period of sowing ranked from 53,2 to 84,6 t/ha and was higher compared to the second and third period. The hybrid AbaKus obtained the highest yield, on average level of 61,2 t/ha with certified significant difference at 0,01%. The green forage yield from the second phase of development (code 65 according BBCH), is higher in all genotypes with exception from hybrid Rohan, which gave higher average yield in the first phase of development.

Key Words: Oilseed Rape, Genotype, Forage, Yield

HP43

INNOVATIONS IN GHERKIN PRODUCTION IN THE REPUBLIC OF SERBIA AND ITS IMPACT ON ECONOMIC RESULTS

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The foreign trade of agricultural and food products in the Republic of Serbia has been significantly liberalized in recent years. The consequences of liberalization can be seen in an increased competition by the companies from developed countries. Vegetable production in the Republic of Serbia is increasing its importance. The attractiveness of vegetable production is reflected primarily in the fact that these products could be sold easily, and as such it has a relative advantage in relation to other classical plants, e.g. wheat. Innovations in the vegetable production are aiming to improve the economic performance. The aim of this paper is to present the main innovations being implemented in the production of gherkin and to evaluate the effects on yields, the selling prices as well as the total revenues and costs. Data for this research were collected from the producers during the 2014/15 production year. The study is focused on two farmers, one that produces gherkins on the land of a total area of 10 hectares and another one which produces cucumbers in vertical farming system on a total area of 2 ha. In order to make comparison between those producers, the results of all data have been calculated per one hectare. In this paper, we used methods of analytical calculations and descriptive statistics. The results of research show that innovations are mostly connected with the farming system, which results in changes of production output. Based on the analysis, several conclusions can be made. First, the change of the farming system and an introduction of the vertical farming system lead to decrease of total yields, which is a negative effect. Then, due to the equalized products quality in the vertical farming system, a higher selling price can be obtained, which is a positive effect. Finally, total revenues of € 27,067 and the total costs of € 18,313 in the vertical farming system are almost halved which can have both positive and negative effects.

Key Words: Gherkins, Innovations, Republic of Serbia, Economic Results

HP44

THE IMPACT OF APPLIED DEFOLIATION ON QUALITY OF GRAPES AND WINE OF *VITIS VINIFERA* L. CV. MERLOT

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The effect of partial defoliation from different developmental stages of Vitis vinifera L. cv. Merlot on grape skin color and sugar content as well as on wine quality was studied. Anthocyanin concentrations tended to be higher following partial defoliation and tended to increase the later defoliation was applied, resulting in the highest concentration with defoliation from veraison. The anthocyanin content per berry was significantly higher for vines defoliated from veraison. Sugar levels in berry skins seemed to be associated with anthocyanin concentration. The phenolic content per berry was unaffected by partial defoliation. Berry volume generally decreased with defoliation. Berry volume of partially defoliated vines increased the later defoliation was commenced. In general, wine quality was significantly improved by partial defoliation, regardless the severity of defoliation or developmental stage defoliation was commenced. The effect of defoliation on wine quality should be judged in conjunction with results on sugar and acid content of berries and must pH. Defoliation had no marked effect on berry composition and volume; however, it generally improved wine quality.

Key Words: Defoliation, Merlot, Quality, Grape, Wine

Section: PLANT SCIENCE

Subsection: Crop Sciences

CSP1

EFFICIENCY OF THE AQUEOUS EXTRACTS *AILANTHUS ALTISSIMA* IN SUPPRESSION OF *RHYZOPERTHA DOMINICA* ON WHEAT

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Stored grain (wheat, corn, rye, millet) and traditional products preserved (barns, farms, warehouses floor) or inadequate in silos are often infested with a variety of harmful organisms. One of the most common primary pests in storage grain is Rhyzopertha dominica F. (Coleoptera, Bostrichidae). Besides a number of limitations in the use of synthetic insecticides (pre harvest period, residues), and due to growing losses (quantitative and qualitative) there is a need for using natural easily degradable, efficient and environmentally friendly compounds. The aim of this study was to determine potential insecticide activity of aqueous extracts of Ailanthus altissima. This alien invasive species is now recognized as a threat to biodiversity globally. Little is known about the possibilities of using A. altissima (tree of heaven) as a potential biocide. Extracts of leaves and roots were obtained by grinding, drying and extraction of plant material. The extracts were applied as 0.1%, 1% and 5% aqueous solutions. Biocidal effects were studied in a randomized block design with three replications for each concentration including control (untreated). In each repetition (Petri dishes) 30 vital beetles were introduced. Filter paper was impregnated with the applied concentration, placed in Petri dishes to dry and imago's entered. Estimates of the effects of determining the moving and dead insects were carried out 1, 3, and 5 DAT (days after treatment). Efficiency of aqueous extracts was calculated by Abott's formula. Recalculation shows the highest (76%) efficiency of 0.1% leaf extract of 5 DAT, a 1% solution of root 3 DAT (65.33%). Applied 5% concentration of root extract, in all replications had the lowest biocide activity.

Key Words: Lesser Grain Borer, Three of Heaven, Water Extract, Efficiency

CSP2

EFFECTS OF ESSENTIAL OILS AND PLANT EXTRACT ON *SITOPHILUS ORYZAE* L.

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Sitophilus oryzae L. is one of the major economic pests of stored products in facilities used for storage and processing of plant products. Synthetic insecticides are mainly used as grain protectants against storage pests. Many conventional pesticides can leave residues in food and affect human health, so it is necessary to develop safer means of pest control. Recently, plant extracts and essential oils are used against stored pests as alternative to chemical insecticides. The aim of this study was to investigate the contact (wet filter paper method), the contact-digestive (wheat grain treatment) and repellent effect (Y tube olfactometer) of essential oils of *Lavandula angustifolia* and *Ocimum basilicum* and ethanol extract of *Erigeron canadensis* on *S. oryzae*, applied at concentrations 0.5, 1 and 2%. Control treatments were alcohol and distilled water. The experiment was performed in four replicates with 10 insects in each, at a temperature of 25 ±1 °C and 65% RH. Repellent activity was assessed only for 2% concentrations of plant oils and extract, and expressed in Preference Index (PI= %At-%Ac/%At+%Ac; At- adults in treatment; Ac- adults in control; PI /-1.0 to -0.1 repellent; -0.1 to +0.1 neutral; +0.1 to +1.0 attractant/). Effects were determined after 24, 48 and 72 h. *O. basilicum* essential oil (1 and 2%) caused mortality of 65-100% after 24, 48 and 72 h in contact test, while in the contact-digestive test, the mortality ranged from 32.5 to 82.5%. Extract of *E. canadensis* (0.5-2%), in contact test, caused mortality of 2.5-37% after 24 h, .5-74.4% after 48 h and 42.5 to 100% after 72 h of exposure, while in contact-digestive it was very low. Essential oil of *L. angustifolia* did not cause significant mortality in contact test regardless on concentration (0-18%), however in the contact-digestive test it ranged from 0 to 25%. PI values indicate that 2% essential oil of *L. angustifolia* (-0.74) and *O. basilicum* (-0.80) had the repellent activity on *S. oryzae* while *E. canadensis* did not express repellent activity.

Key Words: *Sitophilus oryzae*, Essential Oils, Plant Extract

CSP3

HETEROSIS FOR YIELD AND YIELD COMPONENTS IN DIALEL CROSSES OF MAIZE

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A study was undertaken to estimate the heterotic effect for yield and component of yield in maize. Thirty F1 crosses were made adopting diallel fashion, involving six maize inbred lines, three related with BSSS (ZPL 142, ZPL 680, and ZPL 357/3) and three with non-BSSS genetic background (ZPL 275/3, ZPL 17/5, and ZPL 173/3). F1 crosses along with the parents were planted in the field in randomized complete block design with four replication. Data were recorded for yield, ear length, number of kernel per raw, number of raw per plant, kernel depth, and 1000 grain weight. In the present study, mean values related to hybrids were larger than those related to inbred lines for all traits. For grain yield relatively high, positive and statistically significant heterosis were found. Heterosis was in the range of 46.68% to 150.32%. For yield components heterotic effects were lower compared to yield. Negative heterosis for number of kernel per row in seven hybrid combinations were found. For this trait heterosis had the lowest value compared to other traits. The extent of heterotic response of the F1 hybrids largely depends on the breeding value and genetic diversity of the parents included in crosses. Higher heterosis for all the trait were found in hybrid combinations created by crossing genetically divergent parents (L142 x L275) while the lowest were in crosses of related lines (L175 x L173 and L142 x L357).

Key Words: Maize, Heterosis,Yield, Yield Components

CSP4

INFLUENCE OF AMELIORATIVE FERTILIZATION ON YIELD AND SOME QUALITATIVE CHARACTERSTICS OF SMALL GRAINS

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Ameliorative fertilization is carried out in order to do land reclamation of bad physical, chemical and biological characteristics of soil. If it is about acid soils, then we improve their bad characteristics by applying of lime and organic fertilizers, as well as mineral fertilizers in order to maintain soil fertility. The goal of this paper was to investigate the effects of applying ameliorative fertilization on pseudogley (pH<4.5) and how it affects on yield and some qualitative characteristics of small grains. Investigations were carried out on the outskirts of Kraljevo during the 2011/2013. The experiment included wheat, winter barley and triticale as well as 3 variants of fertilizers (K – check; I. N80 P80 K80; II. N80 P80 K80+ 5 t ha-1 CaC03 and III. N80 P80 K80+ 5 t ha-1 CaC03 + 20 t ha-1 manure). Beside yield of grains, 1000-kernel weight and hectoliter mass were also observed. Results of the investigations shows that fertilization caused multiple increase of yield in regard to check variant. Also, the differences in yield between fertilizing variants, in all small grains, were statistically very significant. Combinations of lime and mineral fertilizers, respectively lime, mineral and organic fertilizers caused significant increase of yield. In that way the biggest average yields were achieved with combination of lime, mineral and organic fertilizers (wheat - 4.405 kg ha-1, winter barley – 4.150 kg ha-1 and triticale – 4.210 kg ha-1). 1000-kernel weight and hectoliter mass of grains showed less variations, in such a way that differences between II and III variants were not statistically significant. The biggest values of 1000-kernel weight and hectoliter mass of grains were in III variant, and that differenece was very significant in regard to variant I and check. Taking into account that we are talking about acid soils, the effect of applying fertilization was quite considerable, especially the combination of lime, mineral and organic fertilizers. Accordingly, it is highly recommended to use ameliorative fertilization for these type of soils, in order to gain satisfactory yields.

Key Words: Small Grains, Pseudogley, Ameliorative Fertilization,Yield.

CSP5

PRODUCTION CHARACTERISTICS OF SOME GENOTYPES OF FLAX (*LINUM USITATISSIMUM L.*) IN STRUMICA REGION

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Flax is a cultural plant and is grown for getting fiber and seed. During 2014 and 2015, a research was done with five genotypes of flax: Velusina, Duferin, Belan, Viking and Belinka related to seed production in Strumica region. The genotype Viking gave the highest yield (728,05 kg/ha). The genotype Belinka gave the lowest average yield (479,25 kg/ha), which was 248,8 kg/ha or 65,83% less than the genotype Viking. The general average yield of flax seed in Strumica region, regardless of the year of examination or genotype was 672,78 kg/ha.

Key Words: Yield, Seed, Flax, Genotypes, Region

CSP6

THE EFFECT OF 24-EPIBRASSINOLIDE ON SEED VIGOUR OF TWO MAIZE HYBRIDS

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The influence of 24-epibrassinolide in wide range of concentrations from 5.2 × 10-7 to 5.2 × 10-15 M was studied on two maize hybrids, ZP 434 and ZP 704, purchased from the Maize research institute" Zemun Polje", Serbia. Seed was germinated in phytothrone and measurements of germination percentage and weights of seedlings were conducted after 7 days. Seeds (4 × 50, which weight was previously measured) were germinated in plastic boxes (each box contains 50 seeds), on filter paper sheets, topped at the beginning of experiment with 60 ml of different concentrations of 24-EBL solution and under phytothrone (Loške tovarne hladilnikov Škofja Loka, d.d., Slovenia) conditions at 27°C (day) and 21°C (night), with an 12 h light (110-160 μmol photons m^{-2} s^{-1})/ 12 h dark regime. Brassinosteroids (BRs) are common plant-produced compounds and they perform an integrative role in plants development and they ensure an optimal phenotype in a certain stage of development, which can be of great importance in choosing the right genotypes with improved seedlings vigour, competition with different weeds and answer to stress factors. Vigour index II was calculated from dry mass of parts of plumule and radicle, together with germination percentage of maize seedlings. Results are showing that concentration of 5.2 × 10-7 and 5.2 × 10-8 have high inhibitory effect on maize seedlings vigour, while concentration of 5.2 × 10-11 and 5.2 × 10-12 had stimulatory effect on vigour of plant seedlings. Germination of ZP 704 varied under the influence of different concentrations of 24-epibrassinolide, with the highest drop induced by concentration of 5.2 × 10-7 M, compared to control. In case of ZP 434, highest influence has been noted at concentration of 5.2 × 10-7 with decrease of germination percentage over 27%. These approaches relating to high initial growth of plants, originated from high vigor seedlings, could be identified as a direct result where population of corn plants that originated from high vigor seedlings had higher growth.

Key Words: Maize Hybrids, Germination, Brassinosteroid, Vigour

CSP7

INFLUENCE OF 24-EPIBRASSINOLIDE ON SEEDLINGS OF TWO MAIZE HYBRIDS

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Exogenous application of brassinosteroids (BRs) affects a broad spectrum of physiological responses like cell expansion, vascular differentiation, reproductive development, seed germination, flowering, and fruit set in plants. They promote cell growth, even if at low concentrations, by regulating cell division and elongation. Plant height is an important agronomic trait that affects grain and biomass yield, and is one of the focus of agricultural sciences. The aim of this study was to reveal the influence of 24-epibrassinolide on growth potential of seedlings of two different maize hybrids. Hybrids which were tested are ZP 434 and ZP 704, both products of Maize research institute "Zemun Polje". The influence of 24-epibrassinolide in concentrations of 5.2×10^{-7} – 5.2×10^{-15} M on germination percentage, plumule and radicle length was examined. Seeds were germinated in phytothrone and measurements were conducted after 7 days. Difference between examined hybrids was present on germination level, with lowest values at 86% for ZP 434, and 72% for ZP 704, gained at highest concentration of 24-epibrassinolide. According to results, ZP 704 showed values of seedling plumule length similar to control only at concentration at 5.2×10^{-15} M while all other concentrations had statistically significant inhibitory influence on plumule length. Hybrid ZP 434 had significant differences at concentration of 5.2×10^{-7}, 5.2×10^{-9} and 5.2×10^{-15}, while ZP 704 had higher sensitivity for 24-epibrassinolide range, with more statistically significant differences, relative to 24-epibrassinolide concentrations. For both hybrids, highest values were obtained at lower concentrations, while 5.2×10^{-7}, 5.2×10^{-8} and 5.2×10^{-9} M had an inhibitory effect on maize plumule and radicle length. Seed germination and seedling elongation (and in the later stages of plant development) are directly dependent on gibberellins inducing activity of the enzyme α-amylase, one of the key hormones in the process of degradation of the starch reserves during germination of seed and other grasses with which BRs act synergistically. According to fact that height of the whole plant, length of root and germination percentage affect yield, phytohormone 24-epibrassinolide could be used for improving maize characteristics.

Key Words: 24-epibrassinolide, Maize, Germination, Seedlings Lenght

CSP8

LIPID PEROXIDATION INTENSITY IN SOYBEAN AND MAIZE PLANTS INOCULATED WITH PGPR

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The purpose of this work was to define the reaction of soybean and maize plants to inoculation with plant growth-promoting rhizobacteria (PGPR) [isolates of Azotobacter (AB), Streptomyces (S) and mixture of these (MIX)], by investigating lipid peroxidation intensity. Lipid peroxidation (LP) represents a valuable biomarker of cell degradation and oxidative stress secondary effects. It is analyzed as a response of plants exposed to various (a)biotic factors and in this work it is expressed as nmol malondialdehyde (MDA) equivalents in fresh leaves and roots of investigated plants. Seeds of soybean (cultivar Bečejka) and maize (hybrid NS 640) were inoculated with aqueous inoculums of tested PGPRs and grown under field conditions, without fertilization. Plants were harvested for biochemical analyses at three specific stages of development: 21-day-old seedlings, full bloom, seed beginning stage and, at the end of the experiments, yield was recorded. Inoculated plants had similar values of LP intensity as plants from control (35.1-98.9 nmol MDA g-1 fresh weight). There were no significant differences in LP intensity between control and treatments within the sampling stage, however the amount of MDA accumulated during the vegetation period (up to 60%), possibly because of the developmental processes in soybean and maize. As for seed yield (t ha-1), both investigated species had 5-7% higher yield when inoculated with MIX inoculum, which highlighted the coupled inoculation as possible potent biofertilizer in soybean and maize organic production.

Key Words: Soybean, Maize, Lipid Peroxidation, Oxidative

CSP9

GENETIC VARIATION OF MACRO AND MICROELEMENTS IN RICE GRAINS (*ORYZA SATIVA* L.)

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The present study was undertaken to investigate the quality of the rice produced under the climate and soil conditions in the region of Kochani which is well known as a rice producing region. The assessment of the genetic diversity of trace element distribution in the rice whole grain and in the polished rice grains is very important from different points of view. The most important is the quality of the grains as a source of nutrients for human nutrition, but also it is very important to investigate the ability of different varieties for adsorption micro and macro nutrients in order to establish the most suitable production techniques. The effects of variety and production location on trace elements distribution were investigated using four rice cultivars recently introduced to R. of Macedonia from Turkey. The four newly introduced Turkish varieties (Paşali, Efe, Hamzodere and Cakmak) were compared to a domestic variety Prima Riska and to the long time ago adopted and registered variety from Italy, San Andrea. The obtained results showed that among the introduced varieties, Pasali has best ability for microelement absorption (Al 11.58 mg/kg, Ba 0.83 mg/kg, Cr 2.60 mg/kg, Fe 50.83 mg/kg, Mn 49.58 mg/kg, Mo 0.83 mg/kg, Na 32.8 mg/kg, Sr 0.36 mg/kg, Zn 4.10 mg/kg). Similar behavior of the same rice variety was found for macro elements (Ca 243.2 mg/kg, Mg 1037.2 mg/kg, K 1797.8 mg/kg and P 2763 mg/kg). The information achieved with this investigation is important in relation to plant breeding, biofortification, and postharvest techniques aiming at delivering new genotypes enriched in essential mineral elements.

Key Words: Rice, Macroelements, Microelements

CSP10

CAN THE YIELD AND QUALITY OF SUGAR BEET BE AFFECTED BY SULFUR?

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Sugar beet has relatively high sulfur requirements. Sulfur deposition after desulfurization of sources of sulfur dioxide does not fully cover the nutritional demand of agricultural crops. The vegetation pot experiment was established in order to determine the effect of application of various forms of sulfur on the yield and quality of sugar beet. The experiment included the following variants: 1. unfertilized, 2. elemental sulfur, 3. ammonium sulfate, 4. gypsum, 5. foliar application of elemental sulfur. Nitrogen fertilization was uniform for all variants. Root yield, sugar content, polarized sugar yield, content of ash and the content of α-amino nitrogen were evaluated by one-way analysis of variance followed by the Tukey´s test. The highest root yield in the experiment was achieved after foliar application of elemental sulfur. Foliar application of sulfur proved to be statistically different from variants with application of elemental sulfur and ammonium sulfate to the soil. The desired value of 16 % sugar content was achieved in all variants of the experiment. The highest sugar content was observed after foliar application of sulfur. However, sulfur fertilization had no significant effect on the sugar content. Polarized sugar yield was also highest after foliar application of sulfur. Tukey´s test proved statistical difference between the foliar application of sulfur and variant with ammonium sulfate. The soluble content of ash in roots was fairly equal with no statistically significant differences. The α-amino nitrogen was reduced in every variant with sulfur application. The highest (statistically significant) decrease compared to the unfertilized variant was observed after foliar application of sulfur. The results show that the variant with foliar application of elemental sulfur achieved the best quantitative and qualitative parameters in most cases. A possible explanation can be improved health of sugar beet in this variant. Sugar beet after foliar application of sulfur resisted the invasion of Erysiphe betae. The least favourable results in the experiment were observed after ammonium sulfate application. The lowest yield of roots and sugar content was obtained after fertilization with ammonium sulfate. Compared to other sulfur variants in the experiment, ammonium sulfate appears to be the least suitable fertilizer for sugar beet.

Key Words: Fertilization, Sugar Beet, Sulfur, Yield

CSP11

FORAGE YIELD OF RED CLOVER CULTIVARS ON ACID SOILS

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The main aim of red clover breeding, the second most important perennial forage legume in Serbia, is to create varieties that produce higher yields of forage. Besides that, in recent time it is important to create of high specialized varieties of high adaptability to specific areas of cultivation. Most European and Japanese manufacturers point out the advantage of tetraploid red clover varieties for forage production, which are characterized by higher and more stable yield, as compared to the diploid, while the American experiences are somewhat different. The aim of this work was to follow the forage and hay yield of one diploid (K-39) and one tetraploid (Amos) of red clover variety, on acid soil and in the conditions of dense sowing, during their production cycle of three years. The experiment was established in spring 2012 in Cacak (43°54'39.06" N, 20°19'10.21" E, 246m above sea level), on alluvium soil type, with acid reaction (pHH2O 4,8). The experiment was based on a randomized block design with three replications, with plot size of 5m2 (5x1m). Sowing was performed on 20 cm row spacing and seed rate of 18 kg ha-1. The crop was grown without irrigation. The varieties were cut at budding stage. In 2012 a very small amount of rainfall was recorded (463 mm), especially during the growing season, in 2013 the rainfall was 583 mm, slightly below the long-term average, while in 2014 there was a considerably larger amount of rainfall (over 1100 mm). During all years of the research, the cultivars did not differ significantly among themselves in terms of green forage yield and hay yield. Due to the pronounced dry period in 2012, forage yield of both varieties was very low (3.11 to 3.52 t ha-1). As the crop was badly prepared in 2012, low forage yield was also achieved in the first harvest in 2013 (5.0-6.3 t ha-1). But in the third year (2014), there were three harvests at both of the cultivars, with total forage yield of 46.4-46.5 t ha-1.

Key Words: Red Clover, Forage, Yield, Varieties

CSP12

THE EFFECT OF FOLIAR APPLICATION OF LIQUID ORGANIC FERTILIZER ON RED CLOVER FORAGE YIELD

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Proper mineral nutrition of red clover, especially on acid soils is one of the preconditions for the realization of the maximum yield potential. The aim was to analyze the impact of foliar application of liquid organic fertilizer on forage and hay yield of red clover, in terms of dense planting. The field experiment with varieties of red clover (K-39 - diploid and Amos - tetraploid) and fertilizing treatments (control and Bioplant flora) was set up in Cacak on the alluvium soil type, with acid reaction (pHH2O 4.8). The trial was set up a randomized block design with three replications, with plot size of 5m2 (5x1m). Sowing was performed on 20 cm row spacing and seed rate of 18 kg ha-1. Foliar application of fertilizer (Bioplant flora, Plant DOO, Russia, at a concentration of 0.4%, with the water and a water rate of 250 l ha-1) was performed in the first and second growth during the second year of cultivation, once at the beginning of intensive growth and the second time two weeks after. The second growth in the second year of cultivation has been used for the production of seeds. In the third year, foliar fertilization has not been performed, but only possible effect of fertilizers from the previous year was accompanied. The crop was grown without irrigation. The varieties were harvested at the budding stage. Foliar application of liquid fertilizer has affected significantly the increase of green forage yield at the tetraploid variety Amos, but only in the first growth of the second year of cultivation, when the application of fertilizers was conducted. It can be connected with the positive effect of biostimulants and nutrients that the fertilizer contains, on growth and stem elongation of this variety, which normally has higher potential for yield of forage. However, in the third year of production, there was no significant differences in the green forage and hay yield between the control and the variant which was fertilized in the previous year. This indicates that foliar fertilization did not have a prolonged effect in the next year's growth.

Key Words: Red Clover, Bioplant Flora, Forage

CSP13

WEEDINESS OF ALTERNATIVE SMALL GRAINS IN ORGANIC GROWING TECHNOLOGY

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This paper presents results on effects of organic cropping systems on a weed community of a six varieties of different alternative small grains of winter wheat (genotype Nirvana-*Triticum aestivum* L. ssp. *spelta*, genotype Durumko-*Triticum durum* L.), one variety of spring barley (Golijat), one variety of triticale (Odisej) and a conventional variety of common soft wheat (NS 40S-*Triticum aestivum* L. ssp. *vulgare*) during two years of investigations (2012/13 and 2013/14). Fertilization involves three types: independent foliar application of microbial fertilizers, combined application of organic and microbial fertilizers and control without fertilization. Plots were fertilized with biohumus "Royal ofert" (30 t ha^{-1}) applied in autumn with basic tillage and microbial fertilizer "Slavol" ad as in spring foliar treatment in full tillering (5 l ha^{-1}). The effects of various cropping systems on weed infestation were observed by the one square meter area method. The floristic composition, number of weed plants per species and fresh biomass were determined in the field and then air-dry biomass of weeds was measured. The investigations were carried out on Experimental field of Faculty of Agriculture "Radmilovac". Crops are grown in non-irrigation regime, on leached chernozem. Weed community of alternative cereal makes a relatively large number of species (21), which is usually specific to organic production. The annual species *Stellaria media* (L.) Vill., *Veronica persica* Poir. and *Sonchus oleraceus* L., and the perennial species *Agropyrum repens* (L.) Beauv., *Cirsium arvense* (L.) Scop., *Convolvulus arvensis* L. and *Sorghum halepense* (L.) Pers. prevailed in the weed community. Weed community has therophytic character, with a notable reduction in the proportion of the total number of perennial weed plants per m-2 to 40,6 % in the first year, and to 37,3 % in the second year of investigation. The total number of individuals per m-2 was the highest in the control. The minimum of fresh (43,80 g) and air-dry weight of weeds (17,42 g) was recorded in the variety Nirvana. Organic farming of alternative small grains with only organic fertilizers was more efficient in suppression of weed plants per species and weed biomass than growing with combination of organic and microbiological fertilizers.

Key Words: Organic Farming, Alternative Small Grains

CSP14

CORRELATION ANALYSIS - MONITORING PERFORMANCE OF SPRING MALTING BARLEY AT DIFFERENT LEVELS OF NITROGEN NUTRITION

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This paper examined the elements of productivity of spring malting barley and their interrelations at different levels of nitrogen nutrition. Tests were carried out in a two-year period, on a farm in the village of Globoder near Krusevac. In the experiment variants with increasing doses of nitrogen fertilizers were applied as follows: N_0, N_{60}, N_{80} and N_{100} kg ha^{-1}. On variants with nitrogen rate was used more by 90 kg ha^{-1} P_2O_5 and K_2O. Examined variety was Slavko. The results show that the values of correlation coefficients between all the traits studied were mainly positive and significant at all doses of nitrogen fertilizers. The correlation ranged from weak to highly significant. Positive and highly significant correlations were found between the length, number of grains per spike and grain weight in class at all doses of nitrogen. However, 1000 grain weight showed negative correlative connection with the length of class to control, as well as the number of grains per spike in the dose N_{100} kg ha^{-1}.

Key Words: Barley, Elements of Productivity, Correlation Analysis

CSP15

COMPARATIVE EVALUATION OF EINKORN ACCESSIONS (*TRITICUM MONOCOCCUM* L.) BY SOME MAIN AGRONOMIC CHARACTERS

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The evaluation, identification and description of the genetic variation of einkorn accessions stored in ex situ collection of the Bulgarian National gene bank is of utmost importance for the prevention of genetic erosion and to promote its use in breeding programs. A set of 15 landraces was estimated by seven agronomic characters. The analysis of variance showed that the most relative variable character during the period of study was the grain yield, following the spike length and thousand kernel weight. Relatively the least variable was the length of vegetative growth phase. The accessions with the shortest stem were B3000126 (90 cm) and B3000128 (95 cm), while B4E0040 and B3000130 had dense and long spikes. The highest thousand kernel weight was observed in B3E0024 (37.66 g), followed by B3000126 (36.60 g). B3000024 and B3000082 possessed high production potential. PC-analysis was applied to arrange accessions by their similarity. The first two factors explained 68.533 % of total variation. First factor had an important role to justify alteration of length of vegetative growth phase, number of spikelets per spike, plant height and thousand kernel weight. Second factor had justified 27.603% of total variance. The factorial coefficient of spike length was high and negative, while the factorial coefficients of grain yield was also high but positive. Cluster analysis based on the two factors grouped the landraces into six groups.

Key Words: Einkorn, Agronomic Characters, PCA, Cluster Analysis

CSP16

THE VARIABILITY AND QUANTITATIVE CHARACTERISTICS OF JERUSALEM ARTICHOKE SELECTED POPULATIONS (*HELIANTHUS TUBEROSUS* L.)

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The testing of quantitative characteristics of Jerusalem artichoke selected populations was conducted at the experimental field of the PI Agricultural Institute of Republic of Srpska in Banja Luka, in 2013 and 2014. The testing materials were the population of Jerusalem artichoke collected in the wider area of Republic of Srpska. For these tests following populations were used: Srbac, Modriča, Pivara, Lazarevo, Bosna, Vrbas, Gradiška and Aleksići. Populations of the Jerusalem artichoke were vegetatively transferred and multiplied. The tubers were planted in the spacing of 70 cm x 50 cm. From each population 20 plants were planted. Before planting the tubers were weighed, and then planted one by one in the space provided. For both years, the planting was carried out in the late autumn of the previous year. During this research, the following parameters were used: mass of tubers (g), plant height (cm), number of stems per plant, the average stem thickness (cm), green biomass yield per plant (kg) and dry matter yield per plant (kg). An average mass of tubers that were used for planting was from 36.6 to 61.0 g. During planting, the population of Lazarevo had the largest mass of tubers . The number of stems per plant was 2-5. The average of 5 stems per plant, in both years of testing, had the population of Srbac and Modriča. The plant height, which is an important component of green biomass, dry matter and its quality, in the tested populations, ranged from 154.9 m (population Lazarevo) to 219.8 m (population Aleksići). The stem thickness, which has a significant impact on the biomass yield, was 1.24 cm (population Bosna) to 2.10 cm (population Aleksići). Population Bosna had the lowest average yield of green and dry matter per plant, while the population Aleksići. had the highest yield The results of these studies will enable the allocation of certain Jerusalem artichoke populations with better quantitative properties and their inclusion in the program of creation of the new varieties.

Key Words: Jerusalem Artichoke, Plant Height, Mass of Tubers, Stem Thickness, Number of Stems, Green Biomass Yield per Plant.

CSP17

NUTRITIONAL QUALITY OF ORGANICALLY PRODUCED SOYBEAN AND SPELT

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Soybean is species that enriches soil with nitrogen, while spelt is tolerant to the majority of pests and various stressful conditions. This means that soybean and spelt are species with negligible requirements, and could be grown in organic production with minimal or without fertilizer application. The aim of experiment was to examine variation in main antioxidants and potential bioavailability of Mg, Fe and Zn in organically produced soybean and spelt without fertilizer application, during period 2012-2014. The experiment was conducted in Zemun Polje, on a slightly calcareous chernozem type of soil. After harvesting, chemical composition of grain was performed. Grain yield of soybean increased from 0.8 t ha^{-1} (2012) to 2 t ha^{-1} (2014), while spelt yield decreased from 4.2 to 2 t ha^{-1} in mentioned period, according to increase in precipitation amount. The content of phenolics, glutathione and yellow pigment (β-carotene) had the highest values in relatively moderate season of 2013 for both crops (2135.75 μg g^{-1}, 887.43 nmol g^{-1} and 23.09 μg g^{-1}, respectively for soybean; 1268.72 μg g^{-1}, 342.20 nmol g^{-1} and 5.53 μg g^{-1}, respectively for spelt). The content of phytic acid varied dependently on species, having the highest value in 2012 for soybean (17.17 mg g^{-1}) and in 2013 for spelt (4.61 mg g^{-1}). The stressful conditions present during 2012 were favorable for accumulation of mineral elements, such Mg, Fe and Zn (1729.38 μg g^{-1}, 68.12 μg g^{-1} and 36.88 μg g^{-1}, respectively for soybean and 994.37 μg g^{-1}, 36.22 μg g^{-1} and 35.87 μg g^{-1}, respectively, for spelt), in comparison to 2013 and 2014, when about 44-72% lower values were observed. The ratio between phytic acid and mineral elements that defines potential bioavailability had in soybean grain the lowest values for phytic acid and Mg and Fe in 2014 (1.10 and 47.36, respectively), and phytic acid and Zn in 2012 (164.71). Nevertheless, in spelt grain, the lowest values between phytic acid and Mg, Fe and Zn were in 2012 (0.24, 14.95 and 17.66, respectively). Obtained results indicate that moderate to dry meteorological conditions were favorable for increase of nutritional quality of organically produced soybean and spelt grain, owing to higher contents of antioxidants, as well as increased potential bioavailability of Mg, Fe and Zn. This was particularly emphasized for spelt.

Key Words: Soybean, Spelt, Bioavailability, Mineral Elements

CSP18

INFLUENCE OF THE OPERATION SPEED SELF-PROPELLED FORAGE HARVESTER ON HIGH CUTTING OF WHOLE PLANT CORN SILAGE

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The research was conducted on commercijal family farms in the region southern Serbia. Harvesting of the whole plant corn at the best cutting height is important for making high-quality corn silage .Prioritize your needs for maximum yield versus high quality to determine the best cutting height for your solution.This may vary from year to year depending upon the inventory and quality of your corn silage.The self-propelled forage harvester Cllas Jaguar 690SL was tested with three different operation speeds from 0,66m/s to 1,583m/s and the corn silage was chopped on three hights i.e. 6cm, 15cm and 30cm.Maintaining the high cuts at lower speed ranged from 9 ,53%to 12%, and at the higher work speed the relation ranged from 19,3% to29,3%.The results show a high correlation between work speed and cutting height. The applied methods are standard, and related to the fild-lab and exploiting self-propeled forage harvester.The aim of this research was to determine parameters, prove advantages and disadvantages of different operating speed and of the influence of the operation speed on high cutting of the whole plant corn silage.

Key Words: Silage, Combine, Cutting height, Losses.

CSP19

ASSESSMENT OF THE WEED VEGETATION INFLUENCE ON GROWING CONDITIONS AND YIELD OF BIOENERGY CROP *MISCANTHUS X GIGANTEUS* GREEF ET DEU

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The bioenergy crop Miscanthus x giganteus Greef et Deu. is a relatively new crop in the territory of the Republic of Serbia. The problem of its cultivation is particularly pronounced in the first year after planting due to underdevelopment of rhizomes, slow growth and a prolonged period of crop establishment. During this period, its high yields, in addition to the winter losses, can seriously restrict the competitive weed species. Therefore, in this study, an evaluation of an influence of weed vegetation on growing conditions and yield of this bioenergy crop in the first year of cultivation was performed. The trial was set up on three types of soil: Eutric Cambisol and Stagnosol within the experimental field of the Institute of Soil Science, Belgrade, as well as on Calcic Gleysol, during 2012 and 2014 year. By taxonomic analysis, in the phase of intensive miscanthus growth, 22 weed species were identified, classified into 10 families. Of these, 6 were recorded on all three soil types, but their percentage share was specific for each type. The research results show that not all the species are equally problematic for growth and yield of miscanthus. The predominant weed species in the plantation of miscanthus grown on Stagnosol was Ambrosia artemisiifolia L., while for miscanthus grown on Eutric cambisol the potentially most aggressive species was Polygonum aviculare L. On Calcic Gleysol, Ambrosia artemisiifolia L. and the species from the grass family, Setaria glauca (L.) P. B., were serious competitors to young plants of miscanthus. Based on the results obtained, it can be concluded that the diversity of weed flora is of locally specific character and depends primarily on agro-ecological conditions, soil type, agricultural practices prior to plantation, and partly from the time of weed vegetation sampling, respectively, the growth phase of miscanthus.

Key Words: Miscanthus x giganteus, Weed Vegetation, Growth Phase of Miscanthus, Soil

CSP20

PROTEIN CONTENT VARIATION IN MAIZE GRAIN DEPENDING ON PRODUCTION SYSTEM

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Studies of crop production system used to be focused on the calculation of yield loses as a result of weed competition, but contemporary approaches are related to management of competition processes among plant species, by the application of broad information within ecology and biology. In order to successfully control weeds and produce maize with higher biomass and protein content in grains, production system can be organized with application of more efficient forms of nitrogen and appropriate herbicide treatment. The investigations were conducted in the MRI Zemun Polje, Belgrade. Experiment was conducted as split-split plot block design with four replications. The following factors were included: row distance of maize (50 cm and 70 cm), nitrogen fertilizer form (standard urea and urea with ureaze inhibitor - triamid UTEC (n-butil) tiofosfat, Eurochem Agro, Germany) and application of herbicide. Fertilizers and herbicide mix for grasses and broadleaf weeds were applied at recommended amounts and time. The untreated control was also included. Maize hybrid ZPSC 388 was sown in the second decade of April, 2014. Three weeks after herbicide application, the biomass of uprooted weeds (WB) from 1 m2 and biomass of crop plants (MB) were evaluated, while protein content in maize grain was measured after harvest with NIRT analyser Infraneo (Chopin, France). Weed biomass (WB) was significantly lower after herbicide application and with maize sowing at narrow distance. In both treatments, herbicide and control, weed biomass was higher after urea application, than with urea with ureaze inhibitor. Chemical control of weeds significantly increased biomass of maize plants (242.84 g/plant) compared to untreated control (100.33 g/plant). Maize biomass was also higher with application of urea and 70 cm row distance. Protein content was higher when maize was grown with 70 cm row distance (8.10%) than with 50 cm (7.60%). Differences in protein content between herbicide treatments and fertilizers forms, were not significant according to first year results.

Key Words: Maize, Nitrogen Fertilizer, Biomass, Grain

CSP21

EFFECTS OF VARIOUS FERTILE TO STERILE PLANTS RATIO ON YIELD OF HYBRID ZPSC 341

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The aim of the study was to determine the changes in grain yields in relation to the sterile to fertile plants ratio.Total of 21 mixtures of 0, 5, 10, … up to 100% of fertile plants mixed with the sterile variant of the hybrid ZPSC 341 was made. Because of reliability of the experiment the original fertile hybrid ZPSC 341 was used as a check three times. Effects of fertile, i.e. sterile cytoplasm of the observed hybrid on yield and yield variations were studied. The extent of dependence of the percentage of fertile plants on yield was determined. Furthermore, the sterile to fertile hybrid variant ratio resulting in the highest yield was established. The analysis of results indicate that the highest average yield (17,341 t ha-1) was obtained with 80% fertility, while the lowest average yield (16,004 t ha-1) was gained with 25% fertility.

Key words: cytoplasmic male sterility, maize, yield.

CSP22

ANTIOXIDANT ACTIVITY AND PHENOLIC CONTENT OF SOYBEAN SEEDS EXTRACTS

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Plants are a good source of natural antioxidants and could provide protection agains harmfull free radicals. Phenolic compounds were found to be an important part of human diet and are considered as active principles in many medicinal and agricultural plants. Increasing recent interest in functional foods and nutraceuticals has led plant breeders to initiate selection of crops with higher phenolic contents. Soybean is one of the most important crops for animal and human consumption due of its high content of proteins and oil. Therefore, detailed information about health-promoting components of different soybean cultivars could lead to a better understanding and an increased consumption of this crop, including its use in functional foods. The objective of this study was to determine total phenolics, total tannins, total flavonoids and antioxidant capacity with different assays (DPPH, ABTS, FRAP, total reduction capacity etc.) of a five serbian soybean cultivars (Merkur, Sava, Valjevka, Venera and Victoria) extracted with three different solvents (70% acetone, 70% ethanol and 70% methanol). Total phenolic varied among cultivars and amond applied solvents. The highest toal phenolics was observed in acetone extract of Valjevka genotype (5.25 mg gallic acid equivalents/g), while the lowest total phenolics were recorded in methanol extract of Merkur genotype (2.26 mg gallic acid equivalents/g). Antioxidant properties highly depended on the solvent used for extraction. ABTS radical scavenging capacity varied within the range of 14.70 mg trolox equivalents/g (Merkur, methanol extract) and 31.17 mg trolox equivalnets/g (Venera, acethone extract). There are linear relationship between the antioxidant capacity and phenolic compounds in soybean seeds. Such results highlight an existing variability in soybean seeds and stress the need to evaluate the diversity and to support conventional breeding programs to improve soybean nutritional value.

Key Words: Antioxidant Capacity, Phenolics, Soybean Seed

Section: ANIMAL SCIENCE

ASP1

REPRODUCTIVE PERFORMANCES OF HOLSTEIN COWS WITH DIFFERENT MILK FAT TO PROTEIN RATIO DURING SUCCESSIVE STAGES OF LACTATION

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Aim of study was to determine relationship between the energy status of cows, expressed through different milk fat to protein ratio values (FPR1.3), and their reproductive performances (interval from calving to first artificial insemination; calving to conception interval; insemination index; pregnancy duration; intercalving interval) during succesive stages of lactation (day 15th to 45th; day 46th-75th; day 76th-105th; day 106th to 135th of lactation). The study included a total of 350 fresh calved Holstein cows (121 primiparous, 115 secundiparous and 114 cows which calved three or more times), kept and fed in usual farm conditions. Milk samples were taken during morning milking, and FPR value was calculated from concentrations of milk fat and protein for all milk samples. Reproductive parameters were calculated from farm data. Values of all reproductive parameters, except pregnancy duration, had generally an increasing trend in all groups during successive stages of lactation. During successive stages of lactation, cows with optimal FPR values had generally better reproductive performances, compared to cows with increased or decreased FPR values, which indicates importance of FPR monitoring during early lactation for timely detection of cows predisposed for poor reproductive results.

Key Words: Cow, FPR, Reproductive Performances

ASP2

EFFECT OF AGE ON SOME QUALITY PROPERTIES OF EGGS IN ISA BROWN PROVENANCE

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The main objective of this paper is to point out the effect of age of hens on egg quality of light layer hybrid ISA Brown. This paper describes the production traits of egg quality (egg weight, egg length, breadth egg shape index, purity shell, color shell and yolk color) of three periods of the production cycle (CH20, CH28 and CH48), and changes depending on the age of laying hens. The relationship between the aforementioned qualities and egg mass was presented by correlation coefficients. By following the above indicators and determining the correlation relationship between the listed characteristics give the possibility to evaluate the manifestation of the genetic potential of the respective hybrids, as well as time-exploitation hens in egg production at the said poultry farms. In this study, randomly chosen from three periods (CH_{20}, CH_{28} and CH_{48}), were individually measured. Thus, during the entire production cycle there were three control measurements off eggs (a total of 90 eggs), statistically speaking. Primary treatment of the data was carried out using conventional statistical methods variational principle. Significance of differences between the different age groups in terms of hens monitored qualities was performed using an appropriate model analysis of variance with equal number of replicates per treatment. In the end, viewed as a whole, one can conclude that the analyzed commercial flock light line hybrid Isa Brown, grown on a poultry farm private households, in most studied traits of quality has provided satisfactory results.

Key Words: Age, Isa Brown, Egg Quality Traits, Correlation

ASP3

BASIC MORPHOMETRIC PARAMETERS OF ANTLERS IN ROE DEER (*CAPREOLUS CAPREOLUS L.*) FROM HOMOLJE AREAS

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During 2013 and 2014 in the hunting grounds managed by LU "Jovan Šerbanović" from Žagubica hunted was 28 and 33 roe deer were hunted. Trophy value was determined by CIC formula. The aim of this research was to find out the lengths of the left and right horn, as well as the distance between them, viewed by years of hunting. It was found that the average length of the left horn, during 2013, was 19.55 cm, and right 19.36 cm with a distance of 7.75 cm. The average age of roe deer was 3.39 years. In 2014, the average length of the left horn was 15,54 cm and right was 15.67 cm. The distance between them was 8.94 cm. The average age of roe deer was 3.0 years. Overall it can be concluded that the individuals that were hunted had no suficient development of antlers. Therefore, the number of CIC points was unsatisfactory and sporadical in a small number of individuals "in the medal."

Key Words: Roe Deer, Antlers, Parameters, Points

ASP4

MORPHOMETRIC PARAMETERS OF DONKEYS BODY

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The domesticated donkey (*Equus asinus*) originates from Africa. Its prowess as a working animal is widely known, and there are virtually no geographic areas where donkeys are not used for some type of work, typically transport. The donkey's ability to maintain balance and successfully traverse over even most difficult terrains is almost astounding. The secret of the donkey's stability lies in the biostatistics model of its body. The position of the pelvis and the neck (and thus, the head) determine the location of the barycenter. The research included a morphometric examination of 6 exterior parameters (height in withers, body length, height in beck, croup height, chest depth and chest width) in 17 females and 14 males. The research encompassed donkeys from three countries (Romania (Sibiu, Turda), Macedonia (Ohrid, Prilep) and Turkey (Eskisehir). Mean values, as well as maximum and minimum of the observed parameters are presented. Statistical significance of differences between the observed parameters, distributed by gander, were determined by means of the t-test. This study determined the average height of 104.5 cm, in males and in females 102.00 cm. Body length is average 112.8 cm in males and 110, 5 cm in females. The average depth of chest of males was 49.6 cm and 48.7 cm in females. Based on the results obtained a valuation code can be concluded that the measured donkeys have rectangular format of the body.

Key Words: Donkeys, Body, Morphometric Parameters

ASP5

ASSESMENT OF THE REPRODUCTIVE TRAITS PHENOTYPIC CORRELATION IN THE COW FIRST THREE LACTATIONS

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Reproductive ability is the main factor that significantly affects the level of milk production and calves in herds of high productive dairy cows. One of the main parameters of reproductive efficiency of dairy cattle is the interval between successive calving (ie. intercalving interval). During the last 20 years, steady decline in reproductive efficiency is recorded in the modern dairy high milk cow breeding, both in developed European countries and the USA, as well as in our country. The main reason for reduced reproductive efficiency on farms with high dairy cows was extended interval from birth to the first and the fertile estrus, or extended service period, as well as heightened index of insemination. Reproductive performance of Simmental breed cows were analyzed on a farm „Planinsko dobro“ Nevesinje, Republic of Srpska, Bosnia and Herzegovina. Testing the reproductive traits of cows was conducted on the 74 individual dairy cows. This paper analyses the phenotypic correlations between individual reproductive traits of cows. Results of study of phenotypic correlations were obtained by using mixed model LSMLMW, while the degree or intensity correlation of phenotypic correlation is determined based on Roemer-Orphalove classification. The results showed that the age of the heifers at first insemination to some extent conditioned service period and calving interval in the analyzed period, which was confirmed by phenotypic correlation coefficients. With the increasing age at first insemination heifers, duration of the first, second and third service period is increased (r=-0.130; r = -0.291; r=-0.691), respectively, while the duration of the first intercalving interval (r= -0.046) slightly decreased, and the second one (r= 0.140) increased. Between the ages of heifers at first insemination and service period negative correlation coefficients were established that were statistically significant ($P<0.05$) in the second service period, or a very significant ($P<0.01$) in the third service period. Contrary to that between the age at first insemination of heifers and other reproductive traits (duration of the first service period, first calving interval, second calving interval) there was a very slight correlation or insignificant relationship. However, between the age of heifers at first insemination and weight of calves in the first and second calving there was a strong or medium correlation explained with the correlation coefficient at the significance level of $P<0.001$ and $P<0.01$.

Key Words: Phenotype Correlations, Reproductive Traits, Simmental Breed

ASP6

PHENOTYPIC CORRELATION BETWEEN IMPORTANT PRODUCTIVE TRAITS OF COWS IN THE FIRST THREE LACTATIONS

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Phenotypic correlation of the dairy cow productive traits refers to the existence of a common positive or negative covariance, which occurs as a result of genetic and environmental factors. Studying the production capacity of cattle to increase milk production, milk fat content, lactation length, number of calves, etc., to a significant degree depends on phenotypic and genetic variability, heritability and connection between desired traits. This paper analyzes the phenotypic correlations between the following characteristics: duration of the lactation, milk production, milk fat content, milk fat yield, milk protein yield and protein content. The results of phenotypic correlations study were obtained by using mixed model LSMLMW, while the degree or correlation intensity or phenotypic correlation is determined based on Roemer-Orphalove classification. The results showed that there was a strong positive correlation between the milk yield from the productive and standard lactation. The established correlation coefficient (r=0.634) is statistically confirmed at the level of P<0.001. Very strong positive correlation was found between milk yield and duration of whole lactation (r=0.840). The high significance correlation was found between the milk yield (lactation production), milk fat yield (p=0.948***), and protein yield (r=0.955***), while between the milk yield (lactation), the milk fat yield (r=0.598**), and the protein yield (r=0.633**) a strong correlation was observed. Between the milk yield (whole lactation), milk fat content and protein content, as well as between the milk yield (lactation), the milk fat content and protein content, insignificant correlation (P>0.05) was observed. Between duration of lactation production, milk fat yield and protein yield statistically significant correlation coefficients were determined (P<0.001), (r=0.803***, r=0.841***), respectively. The duration of lactation did not affect the content of fat and protein while the values of the correlation coefficients r= -0.046 (fat content) and r= 0,072 (protein content) was not statistically significant (P>0.05). Among the milk fat yield and protein yield positive correlation was determined (r=0.950***), contrary to those between milk fat yield and fat content in milk (r= -0,062ns) and protein content (r=0,093ns) insignificant correlation was found (P>0.05). Calculation of the coefficients of phenotypic correlation between selected productive characteristics will contribute to determining the strategy for further improvement of cattle production in the highland areas of the Republic of Srpska.

Key Words: Phenotypic Correlation, Productive Characteristics, Milk Production

ASP7

PARATYPHOID INFECTION IN DOMESTICATED PIGEONS

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Pigeons that had paratyphoid infection were collected in the loft located in Trn, a village 10 kilometers north of Banja Luka, in 2012. Paratyphoid infections in domesticated pigeons were caused by bacteria of the genus Salmonella. Through research methods on the analysis of samples taken from 369 individual pigeons this study showed that 20% (n = 74) of the total sample of pigeons were infected with bacteria of the genus Salmonella. The diagnostic procedures for determining bacteria of the genus Salmonella is based on the sampling of fecal matter from potentially infected individuals. This involves cloacal swabs (taken several times at regular time intervals), which are then smeared on Rambach agar. The most frequently isolated serotypes of Salmonella were Salmonella typhimurium (16%, n=12) and Salmonella enteritidis (84%, n=62). The infection may be present without observable symptoms, but some serotypes can cause systemic disease. In adult females pigeons some serotypes are localized in the reproductive organs (ovaries and fallopian tubes). The localization in the tissue were caused by mentioned serotypes, particularly Salmonella enteritidis. Salmonella infects granulosa cells surrounding prevailing follicles in females and easily accompanied by vertical transmission. Special importance is contamination of shell eggs during passage through the cloaca of parent-virus carriers. The level of contamination of the shell were around 6%, and certain internal parts of the egg werebelow 0.4%. The emergence of explosive outbreaks have manifested with high morbidity and mortality figures (20%, n=74). Paratyphoid serotypes are not specific for the host and spread out in a large number of the alimentary tract without signs of illness. In order to prevent infection it is necessary to intensively implement the measures of prevention and combating salmonella and, also, cooperation of all entities that are at the service of veterinary public health.

Key Words: Pigeons, Salmonellosis, Paratyphoid Infection, Vertical Transmission

ASP8

BANAT NAKED NECK HEN - AUTOCHTHONOUS BREED OF POULTRY

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Preservation of autochthonous breeds of domestic poultry is integral part of preservation of domestic animal genetic resources. Important characteristics of these breeds are high resistance to diseases and adaptability to poor housing conditions, diet and care. However, intensive poultry production is exclusively based on commercial exploitation of meat and egg-type hybrids with high production performances compared to autochthonous breeds of hens. The loss of economic importance of autochthonous breeds has led to drastic reduction of number and extent of their populations, therefore the tradition of growing of these breeds is at risk. Four autochthonous breeds of hens exist in Serbia: Banat Naked Neck, Sombor Crested, Svrljig and Dečani hens with varying degrees of endangerment. Banat Naked Neck is the most represented autochthonous breed of hens with combined production capacity, originated and developed in Vojvodina, especially in Banat, as the most important areas of growing. The endangerment degree of this breed is medium high, and according to current status of flocks in Serbia, the most important growers are fanciers of racial and ornamental poultry. Banat Naked Neck is breed of medium format body; average body weight is 3.2-3.6 kg for roosters and 2.3-2.6 kg for hens. The main exterior characteristic is naked neck. The original color of feathers is grayish, and there are also black, red, white and partridge. The average egg production is 120-150 eggs of weight 55-60 g. Roosters and hens after fattening period of three or four months achieved 1.5 to 1.7 kg. The preservation of existing populations of Banat Naked Neck hens and increase of their numbers in the future can be achieved by implementation of suitable programs of protection and selection, and by economically sustainable growing. The inclusion of this breed in unconventional production systems (e.g. free range and organic production) can be an opportunity for expressing of its most important characteristics, which is prerequisite for production of products with special quality and origin. In this paper, presented are the most important exterior and production characteristics of Banat Naked Neck, current number and distribution of populations and measures proposed for conservation and sustainable use.

Key Words: Banat Naked Neck, Autochthonous Breed

ASP9

MORPHOMETRIC AND PHYSIOLOGICAL CHARACTERISTICS OF BROWN TROUT (*SALMO TRUTTA*) FROM RIVER PONOR

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This paper presents the data related to morphometric and physiological (haematological) characteristics of brown trout (*Salmo trutta*) from the River Ponor. This river rises near the village Podrašnica (municipality of Mrkonjić Grad), sinks into the ground and after a while, near the settlement Krupa na Vrbasu, appears as a spring of Krupa River (tributary of Vrbas River). Fish sampling was done during the summer of 2015 and in this period the total of 22 pcs of brown trout were caught (11 females and 11 males). On that occasion, several morphometric (total and standard body length) and haematological traits (HCT-hematocrit, HB-hemoglobin and MCHC- mean corpuscular haemoglobin concentration), body mass and Fulton's coefficient were analyzed. The average value for total body length was 18,85 cm and for standard body length it was 16,85 cm; the mean value for body mass was 80,38 g, and for Fulton's coefficient 1,41. As for hematological parameters, the average value for HCT was 0,39 l/l, HB 70,62 g/l and MCHC 180,64 g/l erythrocytes. The estimated parameters can serve as indicators for the condition of these aquatic organisms and indirectly, the state of their environment.

Key Words: Brown Trout, Morphometric, Haematological Characteristics

ASP10

OFFER AND DEMAND OF GOAT'S MILK PRODUCTS

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Goat breeding in the Republic of Macedonia is a sector of husbandry industry that has a good basis for improving the genetic capacity of livestock breeding, increasing the volume of production and creating opportunity for economic profit of the farmers. Considering the climatic conditions and the experiences of other countries, the Republic of Macedonia has capacity for adequate development of goat breeding by establishing smal to medium goat farms and application of intensive or semi-intensive goat farming systems. There are various breeds of goats in the Republic of Macedonia such as the Domestic Balcan Goat, Saanen and Alpina and cross-breeds between these breeds. The basic product that is obtained from goats is goat milk which is mostly processed into cheese, butter and yogurt. Subject of research in this paper is the supply and demand of products from goat's milk in the Pelagonia region. The research includes data on supply of products from goat's milk taken from the Ministry of Agriculture, Forestry and Water Management of the Republic Macedonia and data on demand of the products obtained using a questionnaire on a representative sample of 200 respondents chosen at random. The largest percentage (70%) of the respondents said that the market offers small quantities of products from goat milk. Therefore it is nessery to take more measurements aiming the development of this industry in the future.

Key Words: Goat Breeding, Supply, Demand, Products

ASP11

REPRODUCTIVE CENTER FOR SALMONID FISH KLAŠNIK - BANJA LUKA

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The reproductive center for fish is a basis for production of fry and fingerlings that are used to revitalize - fish stocking and breeding fish to market size. The reproductive Center Klašnik is owned by the Sport-Fishing Association of Banja Luka which, in cooperation with the Faculty of Agriculture in Banja Luka, conducts annual reproduction of brown trout in the winter period. Fish stocking of salmonid regions, rivers Vrbas, Pliva and Vrbanja with their tributaries, was done with juvenile categories (6 - 9 months of age), brown trout (Salmo trutta m. fario). The importance of this center is that, previously buying juvenile brown trout from other farms (Ljuta - Konjic, Krupić - Prozor, Bugojno, Buna - Mostar, etc.), now performs a reproduction of sexually mature individuals in Klašnik (controlled spawning) and performs a regular annual fish stocking of juvenile brown trout categories. The reproductive centre in Klašnik has broodstock of 300 sexually mature individuals (150 females and 150 males) of brown trout. Age of females ranges from 3+ to 6+ and sexually mature males that are used during spawning are slightly younger, aged 2+ to 5+. Individual fertility of females ranges from 2.000 to 3.000 pcs of roes. Juvenile brown trout, of 6-9 months age, is kept in round pools for fish stocking. The controlled spawning provides 400.000 to 450.000 oocytes (roes), which together with the expected mortality (about 10%) give juveniles to be carried out for fish stocking.

Key Words: Reproductive Center, Brown Trout, Klašnik

ASP12

HEAT STRESS AND ITS EFFECT ON THE BEHAVIOUR AND PERFORMANCE OF DAIRY COWS - A REVIEW

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It is generally known that a cattle has very good thermoregulation abilities. This ability is due mainly to the production of high amounts of heat (the rumen microbial activity). Period with low temperatures, is therefore far better tolerated by cattle than high temperatures. The critical limit for dairy cows with average yield is temperature of 25°C and for high-producing cows temperature of 21°C. Exceeding these temperatures in the barn can lead to heat stress, which can have a negative effect on dairy cows. Therefore, it is obvious that addressing this problem in cattle breeding requires an increased attention.

Key Words: Dairy, Heat stress, Behaviour

ASP13

THE EFFECT OF COWSHED TEMPERATURES ON BEHAVIOUR AND MILK PERFORMANCE OF HOLSTEIN DAIRY COWS

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The aim of this study was to assess the effect of barn temperatures on behaviour of holstein dairy cows. The experiment was carried out at the University Training Farm in Žabčice (the Czech Republic; location 49°0'51.081"N, 16°36'14.848"E, 179 m.a.s.l) over the period of one year (1st July to 30th June). The assessment of temperature impact was based on data from 16 hottest days (H) and 16 coldest days (L). The experimental group consisted of 70 cows in various stage of lactation (30d – 210d) and parity (1 – 8). The cows were housed in a section (one quarter) of a free-stall barn with 77 stalls in three rows. The cows were observed weekly on the same day at 9.00 a.m. The microclimate characteristics (temperature, relative humidity, THI) were recorded daily. Behaviour was described by a number of cows standing or lying down, number of cows lying down on their left or right side. A total of 1587 observations were analyzed. A number of cows lying down (922) was significantly higher than that of standing cows (665). Milk production was significantly higher in hot (H) period (by 1.0 – 1.7kg). There was an interaction in milk production between period and standing. In H period the standing cows produced more milk, in L period vice versa. The cows with non-significant tendency towards left-side laterality produced more milk (by 1.2 kg). No interaction was found between period and laterality for milk production.

Key Words: Holstein, Temperature, Behaviour, Cows

ASP14

DIVERSITY COCCIDIA OF THE GENUS EIMERIA IN DOMESTICATED PIGEONS IN BANJA LUKA

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Coccidiosis is a disease that represents a permanent health problem in pigeons breeding. The causes of this disease are protozoa of the genus Eimeria, a form of infectious spore oocysts. Oocysts diversity of Eimeria coccidia was investigated on 150 faecal samples of pigeon. Samples were collected in the loft located in Trn, a village 10 kilometers north of Banja Luka, during 2015. A total of 150 faecal samples were investigated with McMaster's method. The species composition of coccidia was determined on the basis of morphological characteristics of oocysts and their sporulation time. For this purpose, the key according to Eckert was used. Eimeria oocysts were determined in 27.3% of the animals. Dominant species were E. labbeana, E. columbarum and E. columbae. Eimeria labbeana was found in 56.10%, Eimeria columbarum 29,27% and Eimeria columbae in 14,63% samples. The largest number of animals was infested with one, and the smallest number of animals with three species of Eimeria. It was found that 109 examined animals (73%) showed no coccidia oocysts. The presence of coccidiosis is confirmed in pigeons of all ages but is was most common in pigeons under the age of one year. It is also evident that the birds older than two months were more susceptible to coccidia oocysts than the birds younger than two months. With greater intensity of oocysts excretion was more frequent occurrence of clinical coccidiosis.

Key Words: Coccidiosis, Pigeons, E. labbeana, E. columbarum, E. columbae

ASP15

TRAINING HORSES IN SHOW JUMPING EQUESTRIAN SPORTS

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Equestrian show jumping horses requires many specifics in physical stores. To horse and rider were successful in the mentioned equestrian sport requires mutual coordination in the movements. Throughout the calendar year of the horse to require different forms of sport, preparatory period (December-March), a competitive period (from April to September) and end period (October to November). Sports form horse should follow the dynamics of competition in show jumping equestrian sports. In the competition between sports form should be at its peak. Negligible knowledge, skills and attributes to those riders who brings dynamics, cognitive abilities, conative dynamic personality, balance and coordination in rhythm, speed, time and space. Training horses is divided into general and specific for all equestrian sports. General training ranges from the earliest age, and specific hurdle equestrian sport since the age of three years. The dynamics and severity of specific training in equestrian show jumping tracks age, mental and physical qualifications horses. Adequate work with groin horse sports form will develop until 7 years when an stagnation to 13 years of age and its decline in the sports scores. The achievement and maintenance of the sports form is achieved by alternating dynamics of free and guided movement of horses. The free movement of the horse achieved in the outlet where the smooth moves and also develops coordination. Guided by the movements of horses are walking on hand and / or walkers, free jumps, Lungeing on the fly, trot and gallop, with and without the borders, work on the track for horses, swimming horses, work under saddle, jumping a hurdle with a saddle. The development of techniques and technologies are being developed and new opportunities in training horses. Pace, intensity and gravity of the acts in the horse to achieve a desired sporting form. Through the work with the horses, it is important not to create monotony in training. Monotony in training the horse develops an aversion to work and cooperation with the rider. Where are we today technique provides many simple options for monitoring.

Key Words: Horses, Training, Show Jumping

ASP16

THE EFFECT OF HIGH TEMPERATURE ON SELECTED PARAMETERS OF SEMEN QUALITY OF DUROC BOARS

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The aim of the study was to investigate the effect of high temperature on selected parameters of semen quality of duroc boars at the insemination station in Velké Mezirici (N 49°23.46667', E 15°52.70135') in summer season from May to September. In the stable the temperature (°C) and relative humidity (%) were monitored at hourly intervals for whole period of this study. For purpose of the experiment were chosen 20 boars of the Duroc breed, divided into two groups. Group A – the control group (n=10) has average quality of semen (volume of ejaculate 198 mm3; concentration of sperm 499 000/mm3; motility of sperm 71.4 %; rate of pathologically abnormal sperm 6.2 %); group B – the experimantal group (n=10) showed below-average long-term quality of semen (volume of ejaculate 203 mm3; concentration of sperm 430 000/mm3; motility of sperm 67.3 %; rate of pathologically abnormal sperm 6.4 %). Analysed parametres were volume of ejaculate, concentration of sperm, motility and rate of abnormal sperm. The results of the experiment shows that the volume of ejaculate from both monitored groups increased at the same rate ($P > 0.05$) and in group A from 198 mm3 to 252 mm3; in group B from 203 mm3 to 241 mm3. Concentration of sperm of group A decreased (from 499 000/mm3 to 436 000/mm3), whereas concentration of sperm of group B was at the same level during the experiment. The motility of sperm of group A at the end of the experiment increased (from 71.4 % to 74.0 %) and motility of sperm of group B has intensively decreased (from 67.3 % to 62.2 %) ($P < 0.05$). In the both groups there was an increase of amount of the abnormal sperm in an ejaculate and in group A from 6.2 % to 7.5 % ($P > 0.05$); in group B from 6.4 % to 11.6 % ($P < 0.05$). In our experiment the effect of the season had no significant influence on boars with the average quality of ejaculate (group A), but there was found a tendency to deterioration of motility of sperm and amount of the abnormal sperm in group of boars (group B), whose quality of ejaculate has below-average values before the start of the experiment.

Key Words: Boar, Semen, Temperature, Microscopic Parameters

ASP17

ANALYSIS OF CORRELATION BETWEEN EXTERIOR PROPERTIES OF SIMMENTAL COWS

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The external appearance of domestic animals, or the development and mobility of individual parts of the body, and everything else that on the animals can be seen, represents a significant information on the total value of an animal. Since ancient times, the method applied to estimates of farm animals was based on their exterior appearance, where multiple ways of assessment were created. Parameters of type traits and body developments are an important attribute in livestock production because, among other things, they represent a basis for the adoption of economic and organizational decisions. Scoring exceeds many problems that occur with the visual assessments of body development with traits that cannot be measured and provides relevant information about genetic values. The aim of this study was to analyzed phenotypic correlations between type traits and body developments of Simmental cows (540) in the area of Rasina region. Analysis of phenotypic correlations between traits of type was carried out on the basis of documentation of organizations which have contractual obligations to organization "Agricultural advisory and professional service of Krusevac" from Krusevac. Testing, selection and evaluation of observed cows was done on selection festival in the period from 30th to 150th day after calving, but mostly between 80th and 100th days of lactation. Coefficient of phenotypic correlation was calculated according to Pearson's moment, while strength was discussed on the basis of Romer-Orphals classifications of strength between characteristics depending on the range of correlation. The obtained phenotypic correlations between type traits and body developments were ranging from negative, weak and statistically highly significant correlation between the purity and depth of the udder to positive, very strong and highly statistically significant correlation between the height of cross and height of the front udder. Genetic improvement of offsprings depends directly on the correct choice of parental pairs, where we tried to find out genotype on the basis of phenotype. In connection with the above mentioned, on the basis of the relationship between type traits and body developments we can determine which traits should be excluded from linear classification system and to which characteristics should we pay particular attention.

Key Words: Cattle, Correlation, Exterior, Linear Scoring.

ASP18

EXAMINATION OF OVULATION RATE IN GILTS TREATED WITH VARIOUS HORMONE PREPARATIONS

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The most common reason of elimination gilts from further reproduction is the lack of records of pubertal estrus signs in gilts older than 8 months, which is above for the technologically acceptable age for the first fertile insemination. According to some authors, certain hormonal treatments can be increased or decreased ovulation rate in sows and gilts. The ovulation value, ie. the number of ovulations in one estrus, is usually expressed on the basis of established cl (corpora lutea - CL). In this study we used different hormonal protocols, in order to determine their effectiveness in ovulation value rated postmortem inspection of the ovaries of treated gilts. Experimental treatment of gilts of the Swedish Landrace, treated by various hormonal preparations, was performed on a large farm for intensive pig production in Vojvodina. Overview of the reproductive organs of sacrificed gilts was carried out in the laboratory for domestic animals reproduction, Faculty of Agriculture in Novi Sad. It was found that the ovulation value of the treated gilts, depends primarily on the dose ECG and reproductive status of gilts at the moment of the start of hormone treatment.

Key Words: Gilts, Ovulation Value, Hormone Treatment, Postmortem Inspection

Section: AGRICULTURAL ECONOMICS AND RURAL DEVELOPMENT

AERDP1

ANALYSIS OF SOCIO-ECONOMIC DISPARITIES OF SERBIAN REGIONS

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Regional development is an important component of economic development of each country. In general, the problem of regional disparities is growing all around the world. Regional imbalances in Serbia are among the highest in Europe, as a result of the inadequate allocation of resources, as well as their concentration in the most developed areas. Key considerations of regional imbalances are: unfavorable demographic trends, high unemployment in some regions, inadequate infrastructure, etc. In view of development, in three categories of regions are identified in Serbia: developed regions - Belgrade and Vojvodina; medium developed regions - Šumadija and Western Serbia and region of Southern and Eastern Serbia and undeveloped region - Kosovo and Metohija. The main objective of this paper to analyze regional development in Serbia through indicators such as: demographic potential, economic activity, territorial diversity, level of employment, etc. Starting with the primary objective of regional policy which refers to the creation of economically strong, competitive regions, it is necessary to analyze the development potential of each of them. In the article were used secondary data from official sources, such as Statistical Office of the Republic of Serbia, EUROSTAT, FAOSTAT, etc. The applied method is a comparison between the regions of Serbia, which are the main subjects of the research. The highest percentage of the population is concentrated in the region of Šumadija and Western Serbia 28%, while the largest percent of employees are in the region of Belgrade (33%). Regarding the structure of sectors, the primary sector is the most represented in the Vojvodina, secondary in Šumadija and Western Serbia (39%), while the tertiary sector is well represented in Belgrade region (76%). The largest contribution to the formation of gross domestic product has Belgrade region with 40%. According to all analyzed determinants, we can conclude that the region Belgrade in the most favorable situation unlike the region of Southern and Eastern Serbia.

Key Words: Regions, Serbia, Economic Development, Regional Policy

AERDP2

TEHNICAL AND ECONOMIC EFFICIENCY OF BROILER FARMS IN VOJVODINA: DEA METHOD

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Measurement of the efficiency of agricultural production is very important issue especially in developing countries. The major problem of the poultry production in Vojvodina region is low level of productivity and inefficiency in resource allocation and utilization. The objective of this study is to measure technical and economic efficiency of broiler farms using a nonparametric approach, Data Envelopment Analysis (DEA). Efficiency study based on the framework which is developed by Farell (1957) defines efficiency from both input and output-oriented perspective. In this study, input-oriented model was used which focuses on the cost side, assessing whether the farm can reduce its use of inputs or assessing how much costs can be reduced, while the observed amount of outputs are still produced. Three major efficiency scores were defined: technical efficiency (TE), allocative efficiency (AE) and economic efficiency (EE).

Analyzed data were obtained from 30 broiler farms from which the input-output data were collected by using a structured questionnaire. The multiple-input, single-output production units (the broiler farms) were evaluated with the individual farms being referred to as individual Decision Making Unit (DMU). For the purpose of TE and EE analysis, outputs were aggregated into one category namely produced poultry meat and inputs were aggregated into four categories, namely, conversion, one day-old chicks, labor and used energy. The results have shown that under costant return to scale (CSR) and variable returns to scale (VRS) specification, TE were on average 92.96% and 99.10% respectively and EE were 84.83% and 88.93% respectively. Presented results of broiler farms in Vojvodina imply that the inputs of the farms could potentially be reduced by 7.04% if CRS is assumed or 0.9% if VRS is assumed. Furthermore, results have also shown that there is potential possibility to reduce costs of inputs for 15.17% (CRS) and 11.07% (VRS). In conclusion, obtained results imply that there is a real need to enhance the efficiency of broiler production in Vojvodina, especially economic efficiency by reducing the cost of production while attaining the same level of output.

Key Words: Broiler Production, Technical Efficiency, Economic Efficiency, DEA method, Vojvodina

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AERDP3

STAGES OF DEVELOPMENT OF AGRICULTURAL EXTENSION SERVICE IN BOSNIA AND HERZEGOVINA

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The subject of research is development of agricultural extension services in Bosnia and Herzegovina and objective is to show their transformation during transitional period. Review of the current state of agricultural extension service has been based on analysis of data from primary and secondary sources and author's personal observations. In order to make a review of agricultural extension service in characteristic periods, historical method of data analysis in combination with analysis and synthesis method were used. The research was conducted according to a standardized template to nine criteria. Until the 90-ties, agricultural extension service in Bosnia and Herzegovina was organized in cooperatives, by state owned combinates, as well as within scientific-research institutes. Revival of agricultural extension services after the war began thanks to EU financed projects and the establishment of a network of advisors across the country applying the German and British school of agriculture advising. Extension service in BaH is not equally developed in all regions. In the Republic of Srpska, the extension service established during the implementation of the mentioned EU projects is still in place. In the other entity - FBaH, the coordination of the development of a network of extension services by the Federal Ministry is completely absent. Services have largely survived thanks to cantonal offices. Conclusion of the research is that mapping of different models of organization of agricultural extension service on the case of B&H, without, at the same time, providing funds for capacity building, development of human and material resources, did not contribute to the professionalization of public extension service. Service, which is fully controlled by the state, has a priority in the implementation of the government support measures, rather than technology development and improving productivity of agricultural holdings. The third level of organization of extension service is at the municipalities and their departments of agriculture, whose work is mainly focused on administrative support to farmers in obtaining subsidies. Attempts for a new wave of modernization of agricultural extension service modeled on the Slovenian case, occur in 2010 when the World Bank funded project financed development of a strategies of development extension service in agriculture which envisage its modernization and specialization, strengthening of human resources and licensing of extension work. Four years after, the degree of development of agricultural extension service in both entities is not significantly altered. Taking into consideration the problems and weaknesses that were identified some recommendations were made to improve the agricultural advisory service performance.

Key Words: Bosnia and Herzegovina, Agriculture, Extension Service

AERDP4

THE IMPORTANCE OF OTHER INCOME GENERATION ACTIVITIES FOR AGRICULTURAL HOUSEHOLDS IN REPUBLIC OF SRPSKA

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Certain households in Republic of Srpska, are exploiting available resources, beside for agricultural production, also for organizing other on farm activities to gain certain sources of income. Point of this work is to show the importance of nonagricultural activities on agricultural households in Republic of Srpska. Nonagricultural activities are mainly contributing to distribution of additional values of agricultural products and services and are realized through rural tourism, specialized stores, direct sale on the household, and many other service activities. The results of the research show that 23,48% of households in Republik of Srpska have other income activities in their household. The most often other kind of income activity is processing of agricultural products (64,71%) and forestry (15,88%). Other activities, such as handcrafting and wood processing, are also present, but only at 5-10% of households. The research was carried out by forming a random sample of 800 households, of which 724 were successfully interviewed farms, as well as the referent literature. For the purpose of detailed analysis, methods of induction, deduction, synthesis and comparative analysis were used.

Key Words: Nonagricultural Activites, Agricultural Households, Republic of Srpska

AERDP5

TOURISM AS A GENERATOR OF RURAL DEVELOPMENT IN SERBIA

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Over 80% of Serbian territory is considered as a rural area where about 55% of the country's population live. Therefore, rural areas have significant resources which can be put into function of the rural development in Serbia. The main feature of rural areas is that they are small-scale, fragmented, and most often spatially dislocated. Rural tourism was identified as a key factor in the differentiation of rural economy and in the rural development through new business initiatives and linkages between agribusiness and tourism. According to projections published in the Master Plan for sustainable development of rural tourism in Serbia, about 250,000 new jobs can be expected in rural areas in the period of next ten years. Having these facts in mind, the main objective of this paper is to point out the importance of human resources in the context of achieving sustainable tourism development in Serbia. The paper analyzes the role and importance of tourism in preserving and promoting rural areas and fostering rural development at whole. Those analyses are based on modern, domestic and foreign theoretical knowledge and relevant data sources, with the application of appropriate qualitative and quantitative methodologies.

Key Words: Rural Areas, Human Resources, Rural Tourism, Rural Development

AERDP6

ANALYSIS AND FORECASTING OF TOMATO EXPORT FROM SERBIA

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Tomato production in the Republic of Serbia could have a far greater significance, but the opportunities are insufficiently used. In the world, on average, 122 million tons of tomatoes are produced annually and our country participates in this production, with only 0.01%. Tomato export from Serbia in the period from 2004 to 2014 was analyzed in the paper. The following were analyzed: exported quantities (t), export value (US $) and average export prices. The analysis was performed by descriptive statistics. Forecasting of tomato export parameters in the forthcoming period (2015-17) was carried out based on the established rate of change in the analyzed period. Fresh tomato export had a positive rate of change of 19.20%. The average exported quantity of tomatoes amounted to 4.093,71 tons, at an average price of 415,05 $/t, with total export value of US $1.699.118,18 on average, annually. Further increase in the quantity, price and export value is expected in the following three years, therefore Serbia should export 6.748 tons in 2017, at an average price of 765 $/t, with export value of tomatoes at about 5.160.814 million dollars.

Key Words: Tomato, Serbia, Export, Forecasting

AERDP7

CONSUMERS' ATTITUDES ABOUT BUYING FISH IN BANJA LUKA

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The subject of research is the production and consumption of fish both in the world and Bosnia and Herzegovina. Aquaculture has a continuous growth in the world, and the value of farmed fish for feeding the world's population in 2012 was estimated at 137.7 billion dollars. The average annual growth rate in aquaculture for the period from 2002 to 2012 was 6.1%. A major part of aquaculture products goes to the international marketing channels, and the estimate in 2012 was about 37%. Estimates for the year 2012 show an increase in fish consumption in the world at around 19.2 kg per capita. The objective of the paper is determination of the basic parameters influencing the purchase, supply and consumption of fish on Banja Luka market. The survey for the research was conducted by interviewing 100 respondents, selected randomly, out of which 44 were male and 56 female. The research results show that the decision on buying fish primarily depends on richness, which is expected having in mind the type and origin of the product, price and type of fish. Special attention was devoted to the identification of factors determining the decision to buy fish as well as the attitudes of the respondents on the fish market supply. Out of all respondents, 41% said that they were not informed about the fish as a food product while the remaining 59% said that they got information through different media. It has been found that consumers are usually informed about the importance of fish as a foodstuff by secondary type of promotion, i.e. "from mouth to mouth".

Key Words: Marketing, Fish Consumption, Consumers, Banja Luka

AERDP8

ASSESSMENT OF FISHERY PRODUCTS CONSUMPTION BEHAVIOR: THE CASE OF TURKEY

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Fish and other fishery products, has become the oldest food supply of human. From the early history of the people until today, it's always been involved in the diet. Because of the need to meet a significant portion of the protein, such as omega-3 fatty acids and essential amino acids in a protein rich source of high-quality, fish meat is the most important alternative food source. According to the studies, 150 grams of a fish, meet the needs of a 50-60% of adults person's daily protein. Thus, it's recommended to consume at least twice a week (300 g). WHO recommended consuming of 1 g of protein per day per kilogram of healthy person's body weight, which is 42% of animal origin. In our country, 72% of the proteins consumed daily are plant-based foods. On the other hand, according to data released by the FAO, total protein consumption per capita in Turkey is sufficient. A large part of fishery production in Turkey (86%), in contrast to action in the world, is consumed fresh. Processed products are mainly export oriented. As of 2013, 78.9% of aquaculture production in our country are considered domestic consumption as human food. It is specified that, 75% of this consumption is fresh, 4% frozen and 2% processed, while the rest (19%) fishmeal and fish oil is used for other purposes. Turkey, in the process of the accession negotiations with the EU, within the scope of Common Fisheries Policy is trying to harmonize fisheries with the EU. Within the scope of the Common Fisheries Policy, activities such as storage and protection help, price adjustment, compensation support are performed for ensuring the price stability for producer, processing industry and consumers. Failure of updating the 1380 coded Fisheries Law and rapid issuing of EU compatible regulations, safe food for consumers, high quality products throughout the year for processing industry and marketers and inability to ensure sustainable price development for the producers prevent the success of the sector.

Key Words: Fishery Products, Behavior, Consumption, Turkey, EU

AERDP9

EMPLOYMENT AND PROBLEMS IN TURKISH AQUACULTURE INDUSTRY

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Technical staff employment of Fish Farms is regulated by legislations and circulars in Turkey. However, it is frequently observed that those rules are not followed. This study deals with the resources of aquaculture production in Turkey and the actual employment situation in those areas. Besides, current and ideal employees' numbers were compared and current and ideal aquaculture engineer's numbers in aquaculture industry were quoted. In this context, actual production, costs, fixed capital investment and sales over the last decade were assessed in relation to employment. The conclusion is that the employment problems related to the qualified workers will continue to increase in the coming years.

Key Words: Aquaculture, Sector, Employment, Aquaculture Engineer, Qualified Worker

Section: SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES

SMNRP1

NUTRIENT EVALUATION OF DIFFERENT BUCKWHEAT GENETIC RESOURCES

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Common Buckwheat (Fagopyrum esculentum Möench) and Tartary Buckwheat (Fagopyrum tartaricum L. Gaerth) represent an important functional foods and pseudo-cereals in many countries around the world. Both types are a rich source of vitamins, minerals, dietary fibre, essential amino acids, retrograded starch, high quality lipids and phenolic compounds. Consumption, as part of an everyday diet, has increased over the past few years due to the number of health-beneficial properties. Common and Tartary Buckwheat are notable for being a short-season crop, requiring only moderate soil fertility and 10 to 12 weeks to mature. Eight Common and eleven Tartary Buckwheat genetic resources provided from Slovenian plant gene bank were grown in 2014 at the experimental fields of the Infrastructure Centre Jablje, Agricultural Institute of Slovenia, Slovenia (304m a.s.l.; 46.151°N 14.562°E). The dried grains, containing in average 12.8% of moisture for Common and 11.5% of moisture for Tartary Buckwheat grains, were milled with a laboratory mill. Proteins were analysed using method ISO 5983:2; dietary fibre by modified method ISO 6865 using Fiber Cap; ash method using ISO 5984; and fats with petroleum ether extraction (152/2009 App. III H). Fatty acid composition was determined using gas chromatography (GC) of fatty acid methyl esters (FAMEs). The multi-element analysis was performed non-destructively using EDXRF spectroscopy. The average protein content was 14.1% dwt for Common and 12.2% dwt for Tartary grains and the average dietary fibre content 16.6% dwt for Common and 18.1% dwt for Tartary Buckwheat grains. Common Buckwheat grains contained more proteins (+1.9%) and less dietary fibre (–1.5%) compared to Tartary Buckwheat grains. The total fatty acid content varied considerably, from 200 to 316mg/100 g fwt. The data show differences among the samples and the type of the Buckwheat. Using GC analysis we identified and quantified seven fatty acids. Prevailing fatty acid in both Buckwheat grains was linoleic acid (40.7%), followed by oleic (35.6%) and palmitic (16.1%). The multi-elemental analysis evaluated twelve mineral elements namely Si, K, P, S, Ca, Cl, Fe, Zn, Br, Rb, Sr and Ti. The highest levels among these elements were seen for K (4560 – 6570mg/kg dwt), P (3410 – 4850mg/kg dwt) and Si (675 – 10400mg/kg dwt).

Key Words: Fagopyrum; Fatty Acid; Fibre; Mineral Elements; Protein Content

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SMNRP2

'VILINA BUKVA' BEECH TREES FROM ČAJNIČE

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During the expedition performed in the area of Čajniče in 2011, the beech trees under name 'Vilina bukva'(Fairy Beech) with a 'pendula' growth were recorded. An old and dry beech tree called 'Majka vilina bukva'(Fairy Mother Beech) is accompanied with a few trees at ages 20-40, as well as a certain number of younger trees of the same appearance. The total number of live beech trees with a similar morphology in this very limited area is about 40. This morphological pecularity is described in botanical literaure as a result of mutation which in certain rare cases may be transferred to the progeny. The generative and vegetative reproduction of these four trees were made in the nursery of the Institute of Genetic Resources in order to determine the character of this specificity of habitus of trees "Vilina bukva". The seeds were collected in early autumn 2011th and 2012th, and after breaking dormancy, sown in containers with mixed substrate (soil, sand and peat). The Whip grafting was conducted in early spring 2012th and 2013th on seedlings originated from typical forest stand of beech trees near Čelinac. The growth of both young plants, seedlings and those vegetative propagated, was observed during the vegetation 2012th and 2013th. The morphology of both categories of young plants confirmed a hereditary character od growth type, ie, the growth with negative heliotropism. However, the expressed vigor of growth indicates a different degree of manifestation of the characteristics, which shall be the subject of further research.

Key Words: Seedlings, Grafting, Negative Heliotropism

SMNRP3

VEGETATIVE PROPAGATION OF TILIA USING SEMI - HARDWOOD CUTTINGS

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This study was conducted to investigate the effects of different doses of IBA, IAA and NAA on rooting power of semi - hardwood cuttings from *Tilia*, conducted in greenhouse conditions during the period 2013-2015. *Tilia* species are often used in ornamental horticulture. The determination of appropriate conditions for propagation by cuttings has an effect on the cost of production. The cuttings were treated with 30, 40, 50 и 60 mg/l indole-3-butyric acid (IBA), 100, 150, 200 и 250 mg/l indolyl-acetic acid (IAA), and 20, 30, 40, и 50 mg/l naphthyl acetic acid (NAA). The results were reported after three months and were statistically processed by (ANOVA) and Duncan test. They were traced following indicators : percentage of rooted cuttings (%), number of roots of cutting, the average length of root (cm). The results showed that the percentage of rooted cuttings and quality of root system are dependent on the concentration of IBA, IAA, NAA. The largest number of rooted cuttings were obtained when using 40 mg/l IBA for most of the variants. The treatment with 200 mg/l IAA resulted in the preparation of roots with the greatest length. The average length of the roots is increased by treatment with 30 mg/l and 40 mg/l NAA. High doses of IBA, IAA, NAA will provide a weak, brittle root system, which reduces the chances of successful adaptation in replanting.

Key Words: Tilia, Vegetative Propagation, Rooting, indole-3-butyric acid, Indolyl-acetic acid, Naphthyl acetic acid

SMNRP4

EFFECT OF PRESOWING TREATMENT WITH ULTRASOUND AND STRATIFICATION OF *LAUROCERASUS OFFICINALIS* L. SEEDS ON SOME GROWTH BEHAVIOUR OF SEEDLINGS

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This study was conducted to investigate the effects of different treatment with ultrasound and stratification of Laurocerasus officinalis L. seeds, conducted in greenhouse conditions during the period 2013-2015. The Laurocerasus officinalis L. is a species that have economic importance for the pharmaceutical industry, and it is also often used in ornamental horticulture. Determination of appropriate conditions for propagation by seeds has an effect on the cost of production. The seeds were treated with 0, 5, 10 и 15 min ultrasound and 2 months stratification. The results were reported after six months and were statistically processed by (ANOVA) and Duncan test. The results showed that the percentage of germinated seeds and quality root system are dependent on the exposition time. The largest numbers of germinated seeds were obtained with ultrasound treatment of 10 min The stratification resulted in the obtaining roots with the greatest length. High doses of ultrasound will provide a breaking of seeds and weak, brittle root system, which reduces the chances of successful adaptation in replanting.

Key Words: Laurocerasus officinalis L., Seeds, Ultrasound, Stratification

SMNRP5

CROP–YIELD IMPROVEMENT – STRATEGIES FOR ALLEVIATION TO COMBINED ALUMINIUM TOXICITY AND DROUGHT STRESS

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Aluminum (Al) toxicity and drought are two major factors limiting crop production in the world. Plant species have evolved to variable levels of tolerance to aluminum toxicity and drought stress enabling breeding of high tolerant genotypes. Present knowledge suggests that Al toxicity decreases drought resistance primarily by reducing the use of subsoil water and nutrients, and crops yield decreases under combined stresses. The common method of evaluating the interaction of Al toxicity and drought stresses is by measuring economic yield (grain or forage) under field conditions. Deleterious effects of subsoil soil-acidity on crop yield will thus be influenced by the extent to which plant depends on the subsoil for supply of water and nutrients, especially when the topsoil dries out. A possible breeding strategy for developing crops for superior adaptation to combined stress conditions of soil acidity and drought could involve screening germplasm under sufficient watered and drought stressed conditions on an acid soil and make selections based on superior performance (yield) under both conditions. Since field screening is highly inconsistent and complex secondary phenotypic traits for both Al toxicity and drought resistance can be performed using screening methods in laboratory, greenhouse and field level to link yield crops to the molecular genotypic traits. This review assesses the literature on aluminum toxicity, as well as crop-yield improvement–strategies for adaption to combined aluminum toxicity and drought stress.

Key Words: Aluminum Toxicity, Drought Stress, Crop Yield

SMNRP6

EFFECT OF ORGANIC WASTE APPLICATION ON OUTFLOW ELECTRICAL CONDUCTIVITY AND MICROBIAL ACTIVITY OF A COARSE TEXTURED SOIL

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Hazelnut husk (HH) as an organic waste was incorporated into a sandy clay loam soil with the rates of 0 (control), 2, 4 and 6% in order to investigate the effect of organic waste on hydraulic properties, outflow electrical conductivity and microbial activity during its mineralization period for 16 weeks. Experiment was conducted at five different incubation periods (1, 2, 4, 8 and 16 weeks) under the greenhouse conditions. HH application increased organic carbon (OC) content, basal soil respiration (BSR), soil electrical conductivity (ECs), aggregate stability (AS), total porosity (F) and decreased bulk density (BD), saturated hydraulic conductivity (Ks), pore water velocity (Vp), outflow electrical conductivity (ECo)in 5 pore volume effluent of the soil over the control. OC content gave the significant positive relations with ECs (0.635**), F (0.947**) and the significant negative relations with Vp (-0.529*), BD (-0.960**) values. Basal soil respiration had significant positive relations with ECs (0.887**), OC (0.864**), AS (0.522*) and F(0.856**). Outflow ECo showed significant negative correlations with Ks (-0.751**) and Vp (-0.777**). Increasing OC content in soil increased ECs, BSR, and F, but decreased Vp values. While the percentage of EC in bulk soil increased with HH application over the control, that in outflow decreased. According to path analyses of the data, BSR as an indicator of microbial activity in soil had the highest direct effect on Ks (44.16%) and ECo (51.84%). The highest indirect effects on soil hydraulic properties were also determined via OC or BSR. Increasing soil microbial activity due to mineralization of HH increased AS, F, ECs and generally decreased Eco, Ks and Vp during the incubation period. Electrical conductivity in 5 pore volume outflow decreased with increasing Ks and Vp values.

Key Words: Organic Waste, Outflow, Hydraulic Soil Properties, Microbial Activity

SMNRP7

MYCOREMEDIATION OF HIGHLY CONTAMINATED SOILS

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Mycoremediation is the form of bioremediation which is aided by fungi performing detoxification of contaminated soils and waters. Fungi play an important role in all environments and are able to regulate the transfer of nutritious materials and energy. One of the basic roles of fungi in an ecosystem is degradation which is performed by mycelia. Mycelia excrete extracellular enzymes and acids which destroy lignin and cellulose. Those are organic compounds from the chain of carbon and hydrogen similar by its structures to many organic pollutants. In this way they break down toxins into simpler and less toxic chemicals. Fungi enzymes can dissolve some of the most resistant materials made by nature and man like crude oil, oil, pesticides, medicines, textile colors, etc. Some of the well-known fungi which are used in mycoremediation are: Oysters (*Pleurotus ostreatus*), Turkey Tail (*Trametes versicolor*), Shiitake mushrooms (*Lentinus edodes*), White-rot fungi (*Phanerochaete chrysosporium*), Reishi mushrooms (*Ganoderma lucidum*), Morel (*Morchella Conica*), etc. The most common method is to inoculate wood chips or straw with mycoremediators and put that substrate on the top of the intoxicated soil or where the contaminated water has to flow through it. Depending on the level of contamination it is necessary to make several consecutive applications in order for toxins to be reduced to an acceptable level. Mycelia excrete the enzymes which absorb toxic material all the time until they develop into grown mushrooms. Therefore, it is important to keep mycelia to grow as long as possible before they mature into a form of fruit. Spring inoculations work better than fall inoculations as the mycelium has at more time to grow. Many factors affect the speed and capability of absorption and degradation of toxins using fungi, and some of them are the nature of hydrocarbons, temperature, pH value of the soil, oxygen, humidity of the air and the similar.

Key Words: Mycoremediation, Fungi, Detoxification, Soil

SMNRP8

PRESENCE OF FUNGICIDES AND INSECTICIDES IN AGRICULTURAL SOIL

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Pesticides are important part of agricultural production. With increasing public concerns for agrochemicals and their potential movement and persistence in the ecosystem, pesticide residues in our environment need to be more effectively documented. Information about persistence and mobility of pesticides in soil is required, considering that its presence in soil can affect phytotoxic symptoms in sensitive crops. Extreme weather conditions, such as waterless and reduced soil quality, can strongly influence presence of pesticide residue in soil. In order to evaluate the presence of insecticide and fungicides residues in soil under intensive agricultural production, this study was conducted. In total, 68 soil samples from fields with different history of farming practices were analyzed. Samples were collected from surface soil layer. Soil samples were mixed and the average samples of 500 g were formed and transferred to the laboratory. Extraction and clean-up procedure was carried out using modified QuEChERS (Quick, Easy, Cheap, Effective, Rugged, and Safe) method. The GC/MS analyses of 33 insecticide and fungicide residues were performed on Agilent Technologies GC-MS Model 7890 A Series gas chromatograph coupled to 5975 C mass selective detector. A HP 5 MS (30 m × 0.25 mm i.d.) fused silica capillary column with a 0.25 μm film thickness was used with helium as carrier gas at a constant pressure (chlorpyrifos-methyl RT relocked to 16.596 min). 2.0 μl of the sample was injected in the splitless mode at 280 ^{o}C. The GC oven was operated with the following temperature program: initial temperature 70 ^{o}C held for 2 min, ramped at 25 ^{o}C/min to 150 ^{o}C not held, followed by a ramp of 3 ^{o}C/min to 200 ^{o}C not hold, followed by another ramp of 8 ^{o}C/min to 280 ^{o}C held for 10 min. The total run time was 41.86 min. The interface was kept at 250 ^{o}C, the quadropole at 150 ^{o}C and the mass spectra were obtained at electron energy of 70 eV. In soil samples, residues of fungicides for different classes, such as triazoles, strobilurines, anilinopyrimidines and azoles were detected. Positive findings of insecticides in agricultural soil were obtained in less than 20% of total number of samples.

Key Words: Fungicides, Insecticides, Residues, Soil, GC/MS

SMNRP9

FIELD DISSIPATION STUDY OF HERBICIDE CLOPYRALID IN SOIL

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Clopyralid is a phenoxy acid herbicide registered for many annual and perennial broadleaf weeds control in different crops. Persistence in topsoil is one of the criteria for pesticide registration at the European Union level. The DT_{50}, under field conditions, should be less than 3 months, unless there are no unacceptable effects on terrestrial organisms and plants. The purpose of this study was to investigate the dissipation dynamics of clopyralid herbicide in soil. The experiment was conducted in the field conditions, according to OEPP standard methods. Clopyralid (Lontrel 72 SG) was applied for weeds control in rapeseed crop, at three different concentrations – 90 g a.m./ha, 151.2 g a.m./ha and 302.4 g a.m./ha. Soil samples were collected immediately after the pesticide application, and every two weeks till harvest, from surface soil layer, of 0-30 cm. Clopyralid residues from soil were extracted with acetonitrile and mixture of buffered salts, while herbicide concentrations were measured using HPLC equipped with a diode array detector. The analytical method was successfully validated fulfilling the criteria described in the SANCO/825/00 rev.8.1 16/11/2010 – method accuracy 91.25%, R^2=0.9981, RSD=6.34%, LOD=0.002 mg/kg, LOQ=0.006 mg/kg. The dissipation kinetics of clopyralid was adequately described by the first-order kinetic model which was used for the calculation of DT_{50} and DT_{90} values. Highly significant R^2 (0.881-0.980) values indicated that the dissipation of clopyralid conformed to the first-order kinetics. Clopyralid half-lives (DT_{50}) in soil, obtained in the experiment with different application rate, were 1.65, 2.04 and 2.10 days, respectively. The calculated DT_{90} ranged from 6.97 to 5.48 days after reaching the highest concentration. More significant influences of different application rate at DT_{50} and DT_{90} were not observed. In the soil of chernozem type, used in this study, clopyralid indicated low persistence. However, quite lower values of DT_{50}, in comparison with those obtained in other studies, could be a consequence of the soil properties, as well as climatic conditions during the season in which it was applied.

Key Words: Dissipation, Soil, Clopyralid, DT_{50}, DT_{90}

SMNRP10

BREAD WASTE IN MEDITERRANEAN ARAB COUNTRIES

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Food losses and food waste have become among the most pressing environmental and social problems with negative implications in terms of food security and environmental sustainability. Food wastage is considered a scandal at global level. The Arab region is no exception. Cereals are among the most important contributors to energy supply in Arab countries. However, Arab countries are net cereal and grain importers because they are unable to achieve self-sufficiency. Nevertheless, they waste considerable amounts of bread. The paper aims at shedding light on bread and bakery products wastage in some Mediterranean Arab countries. The paper is based on a review of literature as well as the results of an online exploratory survey on household food waste in Mediterranean countries carried out by the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM-Bari) in the period January-May 2015 with 1123 adult consumers in Algeria, Egypt, Lebanon, Morocco and Tunisia. Cereals consumption is high in all concerned countries. Wheat is the most consumed cereal in the region and often as bread. Survey results show that cereals and bakery products, mainly bread, are among the most wasted food groups in the targeted countries. Bakery products waste reach up to 20% in some surveyed households. Bread wastage is higher during the fasting month of Ramadan. In Arab countries, bread is used even to feed animals. This has to do, among other things, with subsidies as subsidized bread is much more convenient than other feedstuffs. Bread waste can be presented as a scandal in the Arab world as bread has a prominent place in Arab culture. Therefore, urgent actions are needed to raise the awareness of Arab consumers and citizens about this phenomenon that represents not only a waste of natural resources and money, but also a cultural issue. Cultural background should be exploited in awareness campaigns. Moreover, governments should speed up the process for reforming food support policies and better targeting food subsidies. In fact, bread waste is also a waste of precious public financial resources that can be better invested in other social services.

Key Words: Household Food Waste, Bread Waste, Culture, Subsidies, Arab World

SMNRP11

WEED VEGETATION OF ALLIANCE *POLYGONO-CHENOPODION* KOCH 1926 EM SISSING. 1946 IN THE VINEYARDS OF BOSNIA AND HERZEGOVINA

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The paper presents research of weed community: *Panico-Galinsogetum parviflorae* Tüxen et Becker 1942, *Panico-Portulacetum oleraceae* Lozanovski 1962, *Cynodono-Sorghetum halepensae* (Laban 1974) Kojić 1979 and *Amarantho-Fumarietum* Tüxen 1955 of alliance *Polygono-Chenopodion* Koch 1926 em Sissing. 1946 of the order *Chenopodietalia albi* Tüxen, Lohm. et Prsg. 1950 and vegetation class *Stellarietea mediae* Tüxen, Lohm. et Prsg. 1950. Floristic-phytocoenological research was carried out according to the principles and methods of the Swiss-French (Zürich-Monpellier) phytosociological school of Braun Blanquet (1965), and included: assessment of quantitative representation (determining frequency, coverage and conviviality) of weed species, ecological and phytogeographic analysis, development of ecological series using ordination method (correspondent analysis and UPGMA clustering method). The quantity of 91 relieves was taken at 40 sites which were precisely positioned. There was 97 weed species determined, of which 31 were characteristic for higher syntaxa (11 for alliance, 12 for the order, 8 for the class), and 66 species were beacons with little presence and cover values. The biological spectrum of association has terophytic-hemicryptophytic character that confirms anthropogenic influences and that is in accordance with macroclimatic conditions of the study area. Areal range consists of 9 floral groups that is dominated by a group of wide distribution, so it can be said that association had cosmopolitan character. For the first time in the territory of Bosnia and Herzegovina, the association of *Panico-Portulacetum oleraceae* Lozanovski 1962 and *Amarantho-Fumarietum* Tüxen 1955 was noted and thoroughly analyzed.

Key Words: Weed, Biological Spectrum, Areal Range

SMNRP12

UTILIZATION OF CHICKEN FEATHER HYDROLYSATE AS AN ORGANIC FERTILIZER FOR GROWTH AND DEVELOPMENT OF WHEAT SEEDLINGS

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Gradually advancing techniques in plant cultivation have led to the new searches such as more low-cost, sustainable and compatible approaches with natural environment to upgrade yield, quality and crop productivity. Today many researches have focused on the use of biostimulants including protein hydrolysates (PHs) in plant cultivation instead of inorganic fertilizers to improve growth and development performance. In the present study, to evaluate as a significant PH resource, we used chicken feathers (CF) rich in minerals and protein keratin taking into account that it is a waste product. We prepared different concentrations (between 0.01 and 0.1%) CFPH solutions and sprayed them to the leaves of 11-d wheat seedlings. Three days later, the seedlings were harvested to determine effects of CFPH on several morphological, physiological and biochemical parameters. CFPH significantly increased seedling growth (root and leaf lengths) compared to the control. In addition, it resulted in marked rises in the contents of soluble protein, total sugar and chlorophyll in the leaves. Similarly, it led to important changes in protein profile in comparison to untreated seedlings. On the other hand, marked elevations at glutathione, phenolic compounds and proline contents were recorded in wheat leaves. Considering all these data, it can be suggested that CFPH is an alternative organic fertilizer candidate for growth and development of plants.

Key Words: Chicken Feather, Protein Hydrolysate, Organic Fertilizer

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SMNRP13

ECONOMIC FEASIBILITY FOR THE CONSTRUCTION OF RESERVOIR FOR WATER SUPPLY OF LOCAL IRRIGATION SYSTEMS

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This paper examines the economic feasibility of the construction of dam and reservoir for water supply of local irrigation systems. The considered case is applicable to single-purpose water reservoir that can be an integral part of the regional irrigation system / subsystem. The parameters that were included in the economic analysis were: storage capacity (900,000.00 m^3), the consumption of water in dry, average and wet years (16,5; 10,5 and 4,2 mil. m^3), the potential area for irrigation in dry, average and wet years (6000 ha). The investment model is developed and tested for regional subsystem "Srbobran". Calculated indicators of economic efficiency were: investments needed for the construction (1.18 mil. €), positive net present value for a period of 30 years, internal rate of return is 5.68%, pay back period about 18 years, the cost of storage 1 m^3 of water is 0.55 cents / m^3, the economic price of water at the water intake - 1.7 cents / m^3, the minimum annual production of water is 9.5 millions m^3 and the break-even point of 90%. In the final evaluation of effects, the pricing of the water at the system / subsystem level was taken into account as well as on the consumer level (in this case, the local irrigation systems were owned by agricultural holdings). The price of water in the local system depends on the selected technologies for irrigation (sprinkler or drip irrigation). The cost of irrigation in agricultural holdings depends on the quantity of water intake which depends on the types of crops (annual irrigation rate), m^3 / ha. In this area, annual irrigation rate ranges from 800 to 2800 m^3 / ha. The price of water at the water intake for an average consumption of 2000 m^3/ha is 34 €/ha. Total cost of irrigation on agricultural holdings may vary in wide range (250-550 €/ha). In making the final decision on the construction of such facility, all considered parameters must be taken into account.

Key Words: Water Reservoir, Irrigation, Economic Efficiency, Price

AUTHOR INDEX

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