I INTERNATIONAL SYMPOSIUM AND
XVII SCIENTIFIC CONFERENCE OF AGRONOMISTS OF
REPUBLIC OF SRPSKA

BOOK OF ABSTRACTS

March 19-22, 2012
Trebinje, Bosnia and Herzegovina

Organizer

FACULTY OF AGRICULTURE
UNIVERSITY OF BANJALUKA

in cooperation with

BIOTECHNICAL FACULTY
UNIVERSITY OF LJUBLJANA

Supported by

Ministry of Agriculture, Forestry and Water Management of Republika Srpska
Ministry of Science and Technology of Republika Srpska

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dr Siniša Mitrić

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Verica Savić
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Section Moderators

	Name of Section.	Section moderator
1	Fruit growing and viticulture	dr Dragan Nikolić
2	Vegetable growing	dr Nada Parađiković
3	Animal Husbandry	dr Nebojša Savić
4	Agroecology and Organic Agriculture	dr Mile Dardić
5	Agricult. Economics and Rural development	dr Željko Vaško
6	Genetic resources	dr Gordana Đurić
7	Field crop production	dr Desimir Knežević

Programme per section

Section	Time		Hall
Fruit growing and viticulture	Wednesday, 21. 03.	09:00 – 13:30	Large Hall of Hotel Leotar
Vegetable growing	Wednesday, 21. 03.	09:00 – 13:00	Small Hall of Hotel Leotar
Animal Husbandry	Wednesday, 21. 03.	09:00 – 13:30	Small Hall of HET
Agroecology and Organic Agriculture	Wednesday, 21. 03.	09:00 – 13:30	Red salon of Hotel Leotar
Agricult. Economics and Rural development	Wednesday, 21. 03.	08:30 – 13:45	Large Hall of HET
Genetic resources	Wednesday, 21. 03.	15:00 – 18:30	Large Hall of Hotel Leotar
Field crop production	Wednesday, 21. 03.	15:00 – 18:15	Small Hall of Hotel Leotar

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1. SYMPOSIUM PROGRAMME

Monday, March 19, 2012.

	Arrival and registration of participants

Tuesday, March 20, 2012.

LARGE HALL OF HET

10^{00} – 11^{00}	**Opening ceremony**
	Welcome address by organizers. Welcome address by Ministry of Science and Technology of Republic of Srpska Welcome address by Minister of Agriculture, Forestry and Water Management of Republic of Srpska Welcome address by guests
11^{00} – 11^{30}	**Cocktail**
	Plenary Sessions
	Presiding Committee**:** Academician Vaskrsija Janjić, dr Aleksandar Ostojić, dr Borut Bohanec, dr Željko Vaško
11^{30} – 11^{50}	**Branka Javornik** Molecular markers in agriculture
11^{50} – 12^{10}	**B. Bohanec** Biotechnological approaches for breeding vegetable and crop species at Biotechnical faculty (Ljubljana, Slovenia): results achieved and a progress report
12^{10} – 12^{30}	**T. Jemrić** The use of heat treatment for maintanins postharvest quality of fruits
12^{30} – 12^{50}	**Liliya Krasteva, Katya Uzundzhalieva, Ruska Ruseva** Plant Genetic Resources as a part of the Biodiversity
12^{50} – 13^{10}	**Eva Thörn** Challenges of food security and sustainable use of PGR
13^{10} – 13^{40}	**Coffee Break**
13^{40} – 14^{00}	**K. Beleski, K. Boškov, Olivera Bicikliski** Features and prospects of organic viticulture
14^{00} – 14^{20}	**B. Mihailović, D. Cvijanović, Vesna Paraušić** Analysis of performances in primary agricultural production and food industries of Serbia
14^{20} – 15^{00}	**Discussion**
15^{00}	**Lunch**
16^{00} – 18^{00}	**Visit to the local wine distillery**
18^{00} – 19^{30}	**Dinner**
20^{00} – 21^{00}	**Concert of Hercegovačka Gračanica Choir**
21^{30}	**Presentation of local wine and traditional food products**

Wednesday, March 21, 2012.

Paralel Working Sessions

Section 1: Fruit growing and viticulture - Oral presentation

Large Hall of Hotel Leotar

Presiding Committee: dr Dragan Nikolić, dr Klime Beleski, dr Miljan Cvetković

09^{00} – 09^{10}	**N. Mićić, Gordana Đurić** Occurance of aposporous embryo sacs in apple in highly intensive orchard management systems
09^{10} – 09^{20}	**N. Mićić, B. Pašalić, M. Žujić, M. Divjak** Apple ovule setting ih function of sustainable fruit development
09^{20} – 09^{30}	**T. Milošević, N. Milošević, I. Glišić** Fruit growth and postharvest physical and chemical properties of nectarine [*Prunus persica var. nectarina* (Ait.) Maxim.]
09^{30} – 09^{40}	**I. Glišić, Ivana Glišić, T. Milošević, Gorica Paunović** Vigour, cropping and fruit size of plum (*Prunus domestica* L.) cultivars during the first years after planting
09^{40} – 09^{50}	**M. Cvetković, M. Berić, D. Bodilović, N. Mićić** Pomotechnical operation related to the initiation of the development of vegetative buds within plums
09^{50} – 10^{00}	**R. Vidrih, E. Zlatić, J. Hribar** Suscepitibility of apples to various disorders during storage
10^{00} – 10^{10}	**Violeta Dimovska, K. Beleski, K. Boškov, Violeta Ivanova, Fidanka Ilieva, Elenica Sofijanova, P. Kletnikovski** Comparison of three chardonnay clones (*Vitis vinifera* L.) growing in Skopje vineyard region, Republic of Macedonia
10^{10} – 10^{25}	**Presentation of the Agrimatko company** Presentation of new products Lepidoptericida and their use in fruit and vegetable growing
10^{25} – 11^{00}	**Coffee Break**
11^{00} – 11^{10}	**Vesna Maraš, Milena Tomić, Vesna Kodzulović, Sanja Sućur, Jovana Raičević, Danijela Raičević, M. Čizmović** Research of origin and work on clonal selection of Montenegrin grapevine varieties cv. Vranac and cv. Kratosija
11^{10} – 11^{20}	**Duška Delić, Biljana Lolić, Ana Karačić** Screening for phytoplasma presence in West Herzegovina vineyards
11^{20} – 11^{30}	**Sanja Radonjić, Snježana Hrnčić** San josė scale *Quadraspidiotus perniciosus* Comstock (Homoptera: Diaspididae) – a danger for fruit production in Montenegro
11^{30} – 11^{40}	**Ljiljana Došenović, Jelena Davidović** Place and function of horticultural objects in process of sustainable development of urban pattern of Trebinje
11^{40} – 11^{55}	**Presentation of the Eko Bel company** Presentation of the byostimulator program and their application in fruit, vine and crop production
11^{55} – 12^{10}	**Presentation of the Golić Trade company** Modern methods of fruit protections
12^{10} – 12^{20}	**Presentation Bobar Bank -** Financial credit support to agricultural sector

12^{20} – 12^{45}	**Discussion on oral presentations**
12^{45} – 13^{30}	**Questions and discussion on posters** Moderator: dr Dragan Nikolić
14^{00}	**Lunch**

Section 1: Fruit growing and viticulture - Poster Session.

Large Hall of Hotel Leotar.

Important notice.

All authors within Fruit growing and viticulture section are invited to exibit theire posters at the designated poster area on Tuesday 20th March 2012 (during the entire day) and on Wednesday 21st March 2012 (until 09:00 hours). Authors are kindely requested to remove their posters immediately after discussion (no later than 13:30 hours). Posters that are not removed timely will be removed by the organiser.

I - 1	**T. Arsov, M. Kiprijanovski , V. Gjamovski** Quantity of pruned apples trees trained on intensive growing system
I - 2	**N. Mićić, B. Pašalić, Mirjana Petrović** Lenticels as pomological characteristic of apple fruit
I - 3	**Gordana Đurić, N. Mićić, T. Predić, B. Karapetrović** Morpho – physiological characteristics of leaf as basis for genotype specific mineral nutrition of apple
I - 4	**M. Cvetković** Fouling growth structure of multiyear yielding porters in long cutting during reconstruction of apple training system
I - 5	**Gordana Đurić, N. Mićić** Productivity of apple grown on pseudogley
I - 6	**T. Spahiu, H. Domi, F. Thomaj, E. Kullaj** Behaviour of 'Starking', 'Golden Delicious', 'Red Chief' and 'Granny Smith' apple cultivars on M9, supporter 4 PI 80, MM 111, MM 106 and Pajam clonal rootstocks
I - 7	**V. Gjamovski, M. Kiprijanovski, T. Arsov** Distribution of root system of apple trees on different dwarfing rootstocks
I - 8	**H. Domi, T. Spahiu, E. Kullaj, F. Thomaj** Influence of M9 rootstock on the reproductive behaviour of apple cultivars under dry, semi-arid growing conditions
I - 9	**H. Domi, T. Spahiu, E. Kullaj, F. Thomaj** Rootstock influence on apple canopy architecture under high radiation and temperature
I - 10	**Dragana Vukojević, M. Misimović, Nada Zavišić, Jasmina Simić** Effect of foliar fertilizers on thinning on apples fruits
I - 11	**Gordana Đurić, B. Pašalić, Mirela Kajkut** Lenticels as pomological characteristic of pear fruit
I - 12	**M. Kiprijanovski, T. Arsov, V. Gjamovski** Evaluation of quality characteristics of some autumn pear varieties
I - 13	**Lj. Radoš, V. Milošević** Structure of the pear (*Pyrus communis* L.) generative tree of cultivar Abbe Fetel
I - 14	**Sanja Savić, Lj. Radoš** Pear pollen viability determination by suspension drop method
I - 15	**M. Kulina, Mirjana Radović, S. Berjan, Vesna Krajišnik** Pomological and chemical characteristics of some pears fruit varieties grown in terms of Bratunac
I - 16	**Biljana Barać, N. Mićić** Anatomical and morphological specificity in description of fruits of stone fruit trees
I - 17	**R. Stolić, N. Mićić** Generative buds bearing potential at different growth waves on one-year-old shoots in apricot

I - 18	**D. Nikolić, Vera Rakonjac, Milica Fotirić-Akšić** Properties of selected types of vineyard peach designed for juices and compotes
I - 19	**D. Vučković, N. Mićić, Sunčica Stevanović** Morphological specificities of plum leaf in pomological description
I - 20	**R. Prenkić, A. Odalović** Quality of cherry fruit varieties grown in podgorica region
I - 21	**Raimonda Sevo, H. Ismaili, Ilir ÇiÇi, Frida Çarka** Grafting of walnut (*Juglans regia* L.) with hot callusing method in Albania conditions
I - 22	**Mira Ćopić, N. Mićić, M. Cvetković, P. Ilić** Characteristics of chestnut male gametophyte in Potkozarje region
I - 23	**B. Popovski, Melpomena Popovska** Phenological and production characteristics of some strawberry varieties in the region of Skopje
I - 24	**M. Jovančević, R. Prenkić, S. Odalović, Jasmina Balijagić, Sanida Arslanović , M. Vreva** Fruit weight and shoot growth of cv willamette in the northern part of Montenegro
I - 25	**Brankica Tanović, Žaklina Karaklajić-Stajić, M. Nikolić, Jelena Luković, R. Miletić** Influence of a new growing technology on some production characteristics of blackberry cv. 'Čačanska bestrna'
I - 26	**Ana Selamovska, Melpomena Popovska, A. Markovski** Rooting of hardwood cuttings of small fruits and some stone fruit rootstocks
I - 27	**Branka Kalanović Bulatović , B. Dimitrijević , Z. Milovančević** The Republic of Serbia Viticulture and Wine Production – Current Issues and Developmental Potential
I - 28	**Nada Korać, D. Ivanišević , Đ. Paprić, I. Kuljančić, Mira Medić, Milena Popov** Phenological observation of Riesling italico grape variety in wine growing areas of Fruška Gora
I - 29	**D. Nikolić, Branislava Sivčev, Zorica Ranković-Vasić, Vesna Pajić, Ivana Radojević, S. Matijašević, Z. Bešlić** Discriminative analysis of productive properties of promising grapevine hybrids (*Vitis vinifera* L.)
I - 30	**D. Vujovic, Radojka Maletić** Diversibility of biological and technological characteristics of population Muscat Hamburg
I - 31	**D. Vujovic, Radojka Maletić** Grape yield and quality population of Muscat Hamburg
I - 32	**K. Boškov, K. Beleski, P. Hristov, M. Petkov, Z. Božinović, Violeta Dimovska, S. Petrović** Influence of trellis system on productive and technological characteristics of variety Victoria in Strumica vine growing district
I - 33	**Snežana Stanković, Ivana Mošić, Ivana Radojević** Effects of grapevine cultivar and wine aging on the anthocyanin composition of the wine
I - 34	**G. Milanov, K. Beleski, Julijana Cvetković, D. Nedelkovski** Influence of grape cultivars and technological treatments on quality of grape brandies
I - 35	**Liljana Saltirova, D. Nedelkovski, K. Boškov, G. Milanov, K. Beleski** Agrobiological and technological characteristic of some table interspecies variety growing in Skopje vineyard area
I - 36	**D. Nedelkovski, K. Boškov, Biljana Korunovska, G. Milanov, K. Beleski** Studying the content of starch correlated with resistance to low winter temperatures in some grapevine varieties
I - 37	**Tatjana Jovanović-Cvetković** Male gametophyte of female flowers in grapevine
I - 38	**Marina Rodić, D. Mijatović, Lj. Radoš** Productivity characteristics of the resistant grapevine cultivars Villardblanc, Villard noir, Chancellor and Nero

I - 39	**Vera Vukosavljević, D. Žunić, S. Matijašević, Rada Pajović, K. Boškov, Marina Stojanov, R. Kojović** Productive and technological characteristics of Pinot Noir Clones
I - 40	**Vera Rakonjac, Slavica Todić, Z. Bešlić** Characteristics of promising clones of grapevine Kreaca
I - 41	**Jelica Živić, I. Stančić, Sanja Perić, M. Vojinović, S. Petrović** The occurrence and abundance of the leafhopper *Scaphoideus titanus* Ball at the Kutina vine-growing area
I - 42	**Katerina Bandžo, Melpomena Popovska, S. Bandžo** Influence of the time if first fruit color change and the period of ripening of cherry varieties on the infestation by R. cerasi
I - 43	**Tatjana Perović, Snježana Hrnčić** Population dynamics of immature stages of the olive fruit fly *Bactrocera oleae* Gmel. (*Diptera, Tephritidae*) in region of Bar
I -44	**V. Jaćimović, Marija Radović, M. Bogavac, Đina Božović** The role of honey-bee (*Apis mellifera* L.) in the polination of fruit species
I - 45	**Jovana Hrustić, Brankica Tanović, Milica Mihajlović, Mila Grahovac, G. Delibašić, Aleksandra Bulajić** *Monilinia spp*. - causal agents of apple fruit rot
I - 46	**Biljana Lolić, A. Karačić, J. Pejičić, Duška Delić** *Phytophthora* species associated with strawberry root rot in west Herzegovina
I - 47	**N. Latinović, Milena Raičević, P. Vukša, Jelena Latinović** Microclimatic conditions and occurrence of phomopsis cane and leaf spot and downy mildew of grapevine
I - 48	**N. Jungić, Svjetlana Zeljković, Monika Tkalec, Nada Parađiković, R. Oljača** Growth and development of surfinia on rockwool under biostimulant treatment
I - 49	**S. Petrović, K. Boškov, M. Petkov, Z. Božinović, P. Hristov, K. Beleski, Violeta Dimovska** Influence of defoliation on quality of grape and wine of variety Riesling italian

Section 2. Vegetable growing - Oral presentation.

Small Hall of Hotel Leotar

Presiding Committee: dr Nada Parađiković, dr Drago Milošević, dr Rajko Vidrih

09^{00} – 09^{10}	**D. Milošević, S. Stamenković, P. Perić** Use of insecticides to control potato viruses depending on the type of aphid transmission
09^{10} – 09^{20}	**Mirjana Vasić,V. Mihailović, A. Mikić, J. Ćota, Aleksandra Tepić, Vida Todorović, Jelica Gvozdanović Varga** Grain legumes grown for use as pulses and vegetables
09^{20} – 09^{30}	**Jelica Gvozdanović Varga, Mirjana Vasić, A. Takač, J. Červenski, J. Ćota, Vida Todorović, Đ. Moravčević** Effect of production method on the quality of onions
09^{30} – 09^{40}	**N. Novković, Beba Mutavdžić, D. Ivanišević** Development of vegetable production in Vojvodina region
09^{40} – 09^{50}	**Sretenka Marković, Nataša Čereković, Vida Todorović, Nataša Kljajić, Dijana Mihajlović** The content of NPK nutrients in the vegetative organs of cauliflower (*Brasica oleracea var. Botrytis* L.) grown in soilless culture technique
09^{50} – 10^{00}	**Vera Rašković** The influence of the grafting and varets on the sensory characteristics of watermelon
10^{00} – 10^{10}	**L. Sinkovič, J. Hribar, R. Vidrih** Influence of storing of chicory (*Cichorium intybus* L.) on phenolic composition and antioxidative potential
10^{10} – 10^{20}	**Nada Parađiković, Monika Tkalec, Jadranka Mustapić-Karlić, Ivana Križan, T. Vinković** Growing *Pelargonium Peltatum* and *Pelargonium x hortum* from cuttings

10^{20} – 10^{30}	**Monika Tkalec, Nada Parađiković, Jasna Kraljičak, Marina Tepeš, Svjetlana Zeljković** Influence of temperature and light on growth and development of annual flowering species
10^{30} – 11^{00}	**Coffee Break**
11^{00} – 11^{10}	**Zorica Đurić, Snježana Hrnčić, I. Dabić, M. Vujanović, S. Mitrić** South american tomato moth (*Tuta absoluta* Meyrick) in the east Herzegovina region
11^{10} – 11^{20}	**Z. Jovović, Ž. Dolijanović, Ana Velimirović, D. Poštić, Snježana Hrnčić** Productivity analysis of five leading potato varieties in agro-ecological conditions of mountainous region in Montenegro
11^{20} – 11^{30}	**B. Nježić, B. Mitrović, N. Grujić, Snježana Hrnčić** Occurence of plant – parasitic nematodes in Rogatica in potato fields
11^{30} – 11^{45}	**Presentation of the Syngenta Agro company** Modern methods of vegetables protection
11^{45} – 12^{15}	**Discussion on oral presentations**
12^{15} – 13^{00}	**Questions and discussion on posters** Moderator: dr Nada Parađiković
14^{00}	**Lunch**

Section 2: Vegetable growing – Poster Session.

Small Hall of Hotel Leotar

Important notice

All authors within Fruit growing and viticulture section are invited to exibit theire posters at the designated poster area on Tuesday 20th March 2012 (during the entire day) and on Wednesday 21st March 2012 (until 09:00 hours). Authors are kindely requested to remove their posters immediately after discussion (no later than 13:30 hours). Posters that are not removed timely will be removed by the organiser.

II – 1	**D. Dimova, D. Svetleva, M. Dimitrova, Iv. Popov** The influence of the herbicide diflufenikan on certain biological features of bulgarian beans of sort Plovdiv 15 m
II – 2	**M. Dimitrova, D. Dimova, D. Svetleva, T. Georgieva, Iv. Popov** Effectiveness and selectivity of the herbicide diflufenikan in field beans
II – 3	**Azra Hadžić, J. Ćota, Edita Sarić, Irzada Hodžić, Nevzeta Salman , Jelena Čota** Energy and nutritional values of raw grain of domestic varieties of beans
II – 4	**V. Krastev, Dotchka Dimova, Diana Svetleva, Graca Pereira, Kalinka Kouzmova, Mariana Andonova** Characteristics of common bean mutant lines and cultivars grown under rainfed and irrigated conditions
II – 5	**Y. Dimitrov, Nedyalka Palagacheva** Risky periods of pesticide (insecticide and fungicide) pollution of vegetables grown in greenhouses
II – 6	**J. Ćota, Jelica Gvozdanović Varga, Azra Hadžić, Mirjana Vasić** Zenica's onion – a new variety of Bosnia and Herzegovina
II – 7	**J. Ćota, Azra Hadžić** Yield and quality of potato varieties
II – 8	**Nina Janjić, Ž. Erić** Morphometric and anatomical-histometrical characteristics of two varieties of the species *Solanum lycopersicum* L. infected by cucumber mosaic virus
II – 9	**Vera Rašković, Vera Milošević, R. Stepić, Lana Đukanović, M. Veselić** The effect of grafting, mulching, argo-textile and low tunnels on the fruit weight of watermelon

II – 10	**E. Brkan, J. Pejičić** Application of biostimulants in watermelon production
II – 11	**Nataša Čereković, M. Todorovic, R. Snyder, Sretenka Marković** Relationshipe between K_c and LAI for mulched and non-mulch cultivated malon grown under mediterranean climate conditions
II – 12	**Nikollaq Bardhi, N. Fasllia, Foto Kashta, Petraq Bame, Imer Rusinovsci** Suitability of new varieties of potato (*Solanum tuberosum* L.) in western part of Albania (Bassura).
II – 13	**I. Stančić, S. Petrović, J. Živić, S. Prodanović, D. Knežević** Uticaj uzgojnog oblika na rodnost hibrida paradajza *Solanum lycopersicum* L.
II – 14	**Todorović Vida, Aleksandra Gavrić Rožić, Sretenka Marković, M. Đurovka, Mirjana Vasić** Influence of temperature on yield and earliness of lettuce grown in the winter period
II – 15	**K. Drápal, P. Elzner, L. Janečka, M. Jůzl, M. Večeřa** Effect of fertilization with urea and urea with inhibitor of urease on yield and content of nitrate in potato tubers
II – 16	**B. Nježić, I. Macanović, N. Grujić, Snježana Hrnčić** Survey of root-knot nematodes in Nevesinje municipality
II – 17	**Milica Mihajlović, E. Rekanović, Brankica Tanović, Jovana Hrustić, M. Stepanović, Svetlana Milijašević-Marčić, Ivana Potočnik** Possibilities of use of *Bacillus subtilis* (qst 713) against soil pathogens of pepper
II – 18	**Ivana Maksimović, Marina Putnik-Delić, Ž. Ilin, M. Mirosavljević** Essential and trace heavy metal loads in conventionaly produced fresh onion and potato
II – 19	**Sanida Arslanović, Veselinka Zečević, Jasmina Balijagić, M. Jovančević, M. Vreva, E. Fetić, Helga Čizmadia** Investigation of organic and mineral fertilizers on the yield and quality of potato variety Kenebek
II – 20	**Zorica Đurić, Snježana Hrnčić** Onion fly (*Hylemia antiqua* Meigen) on onion in the Banja Luka region

Section 3. Animal Husbandry – Oral presentation

Small Hall of HET

Presiding Committee: dr Mića Mladenović, dr Nebojša Savić, dr Daniel Falta

09^{00} – 09^{10}	**D. Falta, M. Erbez, G. Chládek** A review report on current research relating to the interaction between micro-climatic conditions in cow-sheds and the general behaviour and milk production of dairy cows done in the Department of Cattle Breeding at Mendel University in Brno
09^{10} – 09^{20}	**D. Terčič, B. Žlender, Antonija Holcman** External, internal and sensory qualities of table eggs as influenced by two different production systems
09^{20} – 09^{30}	**C. Mekić, G. Trifunović, Zorica Novaković** Phenotype variability of reproductive and productive traits of sanska goat
09^{30} – 09^{40}	**G. V. Vinichenko, V. S. Grigoriev, V. V. Zaitcev, V. A. Safronova** The influence of natural minerals on the concentration total protein and its fractions in pigs for rearing and fattening
09^{40} – 09^{50}	**D. Nitovski, M. Milenković, Stoja Jotanović, Valentina Milanović, Bisa Radović, Dragana Grčak, M. Grčak** Plan of biosecurity measures on one hens farm
09^{50} – 10^{00}	**Rodne Nastova, Nedeljka Nikolova, V. Kostov** Fish as a health food – ecotoxicological viewpoint
10^{00} – 10^{10}	**Z. Marković, Aurelija Spirić, Dejana Trbović, Ivana Živić, M. Stanković, Katarina Bjelanović, Vesna Poleksić** Improvement of carp meat quality as a response to modern consumer's demand
10^{10} – 10^{20}	**N. Nedić, S. Milosavljević, R. Maksimović, G. Mirjanić, G. Jevtić** Hygienic behavior of selected familial groups of honey bee

10^{20} – 10^{30}	**M. Mladenović, Svetlana Srdić, G. Mirjanić** Physical - chemical properties of honey samples from the region of Trebinje
10^{30} – 10^{40}	**M. Mladenović, S. Milosavljević, Slađan Rašić, N. Zlatković** Productive traits of bees – *Apis mellifera carnica* of Jastrebac and Kopaonik ecotype
10^{40} – 11^{10}	**Coffee Break**
11^{10} – 11^{20}	**Mirjana Radovanović, Marija Stefanović, Dragana Radojičić** Honey quality of Moravički region
11^{20} – 11^{30}	**M. M. Urošević, D. Matarugić, D. Drobnjak, Z. Ristić, B. M. Urošević** The hunting fund and its use in the Republic of Srpska
11^{30} – 11^{40}	**B. M. Urošević, M. M. Urošević, D. Drobnjak, Z. Ristić, D. Matarugić** Correlation between parameters of aesthetic value for evaluation of roe deer's (*Capreolus capreolus* L.) antlers
11^{40} – 11^{50}	**Lj. Marinović** Biological plinth potential forest types of hunting area for deer and reintroduction of game
11^{50} – 12^{00}	**Zorica Novaković, Sofija Katić, C. Mekić** Newer aspects of animal and human echinococcosis diagnostics
12^{00} – 12^{15}	**Presentation of the Lallemand Animal Nutrition company** The use of Lallemand probiotics and prebiotics in animal feed
12^{15} – 12^{25}	**Presentation Bobar Bank -** Financial credit support to agricultural sector
12^{25}– 12^{45}	**Discussion on oral presentations**
12^{45} – 13^{30}	**Questions and discussion on posters** Moderator: dr Nebojša Savić
14^{00}	**Lunch**

Section 3. Animal Husbandry – Poster Session

Small Hall of HET

Important notice

All authors within Animal Husbandry section are invited to exibit theire posters at the designated poster area at Tuesday 20th March 2012 (during the entire day) and on Wednesday 21st March 2012 (until 09:00 hours).

III – 1	**D. Nikšić, Dušica Ostojić-Andrić, V. Pantelić, P. Perišić, M. M. Petrović, S. Aleksić, M. Lazarević** Effect of father on the parameters of biological test in Simmental calves
III – 2	**D. Falta, O. Polák, M. Erbez, G. Chládek** The influence of early and late stage of lactation on milk processing characteristics at Czech fleckvieh-simmental cattle
III – 3	**P. Dolezal, L. Zeman, Katarzyna Szwedziak, J. Dolezal, M. Tukiendorf, Martina Frohdeova** The use of yeast culture in the diet of dairy cows
III – 4	**Đ. Savić, Stoja Jotanović, M. Vekić, D. Kasagić** Evaluation of cow energy status changes during early lactation based on the concentrations of organic milk ingredients
III – 5	**P. Zejdová, D. Falta, M. Večeřa, O. Polák, T. Kopec, G. Chládek** The effect of calf sex on milk production of Czech fleckvieh – simental dairy cows in conditions of the Czech Republic
III – 6	**M. Večeřa, S. Studený, O. Polák, P. Zejdová, D. Falta, G. Chládek** The effect of milk production of Czech fleckvieh-simmental cows on all day preference of cubicle-row in summer months

III – 7	**O. Polák, D. Falta, M. Večeřa, T. Černý, P. Zejdová, G. Chládek** Influence of season and current performance on somatic cell counts in milk of Czech fleckvieh-simmental dairy cows
III – 8	**Danijela Kirovski, Ž. Sladojević, H. Šamanc, R. Prodanović, Đ. Savić, D. Matarugić** Effect of glycerol based energy supplement feed on metabolic status and production results of high-yielding dairy cows
III – 9	**D. Stančić, R. Mijatović, B. Stančić, Stoja Jotanović, I. Apić, M. Erdeljan** Prolonged postpartal anoestrus and reproductive performances of dairy cows (rewiev)
III – 10	**M. I. Urošević, I. Jajić, I. Radović, Jelena Ćulafić, Željka Miličić, N. Stojanac, I. Pušić** Organic pig production – harmonization of legislation in region with the European Union
III – 11	**Jotanović Stoja, Vekić M., Savić Đ., Stančić B., Marinković S., Jamedžija A.** Reproductive performances and morphometry of reproductive organs in gilts
III – 12	**M. I. Urošević, R. Ratajac, Dragica Stojanović, I. Radović, Jelena Ćulafić, Željka Miličić, N. Stojanac** The importance of defining veterinary standards in organic pig production
III – 13	**P. Horky, Petra Jancikova, L. Zeman, P. Dolezal** The effect of chromium supplement to feeds for boars on changes in laboratory evaluation of the ejaculate
III – 14	**S. Bjedov, L. Perić, M. Đukić Stojčić, N. Milošević, D. Milić, G. Živković** The effect of guadino acetic acid as growth promoter in fattening of broiler chickens
III – 15	**Nataša Vukelić, Vesna Rodić, N. Novković, Danica Bošnjak** Welfare of broilers and its influence on the purchase decision-making process of poultry meat
III – 16	**B. Milošević, M. Milenković, Z. Spasić, Jasmina Knežević, Slavica Ćirić** Effect of enzymes supplementation on the production results of fattening chickens
III - 17	**N. Lalić, B. Milošević, Z. Spasić, Sonja Samardžić, Izeta Omerović** The effect of organic selenium dietary supplementation on the production results of growing pullets
III - 18	**Z. Spasić, B. Milošević, B. Pešić, Slavica Ćirić, N. Lalić , N. Stolić** The effect of selenium dietary addition and its influence on the quality of fertile eggs
III - 19	**V. Dosković, Snežana Bogosavljević-Bošković, Vera Radović, S. Rakonjac** Effect of protease enzyme supplementation on the weight and proportion of edible slaughter by-products of broiler chickens
III - 20	**A. Novaković, E. Janić Hajnal, T. Radusin, Ž. Kevrešan, J. Mastilović** Conditions and problems of hygiene and manufacturing practice in production of traditional and regional products of animal origin on farms in Serbia
III - 21	**Ivana Živić, Zorka Dulić, M. Stanković, M. Spasić, M. Živić, Katarina Bjelanović, Z. Marković** Natural food dynamics in bottom fauna and its correlation with carp growth rate in semiintensive production system
III - 22	**Z. A. Ristić, Gordana Ušćebrka, V. Marković, D. Božić, D. Matarugić, M. Urošević, M. Kovačević** The significance of eggshell color on the pheasant hatching production results
III - 23	**M. Spasić, Vesna Poleksić, M. Stanković, B. Rašković, Ivana Živić, D. Vukojević, Z. Marković** Potential effects of using selected lines of common carp (*Cyprinus carpio* L.) and rainbow trout (*Oncorhynchus mykiss*, Walbaum) on fish production at Serbia
III - 24	**M. Stanković, Nada Lakić, Zorka Dulić, Ivana Živić, Vesna Poleksić, Z. Marković** Effect of origin and levels of proteins in feed mixtures on weight gain of carp yearlings
III -25	**D. Mikavica, N. Savić, N. Danilović, I. Komlenić** Body and roe mass correlation of brown trout females – *Salmo trutta* m. *fario* L., 1758. (salmonid hatchery Klašnik – Banjaluka)
III - 26	**M. M. Urošević, D. Drobnjak, D. Matarugić, B. Živković, B. M. Urošević** Effect of age on body weight at trophy value of antlers in roe deer (*Capreolus capreolus* L.)
III - 27	**Z. Ristić, D. Matarugić, D. Drobnjak, D. Božić, M. Urošević** Fasciolosis of deer in hunting ground of special nature reserve "Gornje podunavlje"
III - 28	**M. Urošević, D. Drobnjak, Y. Ograk** Body format of the turkish shepherd dog Kangal

Section 4: Agroecology and Organic Agriculture – Oral presentation

Red salon of Hotel Leotar

Presiding Committee: dr Mile Dardić, dr Slobodan Milenković, dr Tihomir Predić

09^{00} – 09^{10}	**M. Dardić** Role of organic agriculture in protection of natural and agriculture environment
09^{10} – 09^{20}	**Marijana Jovanović, Bojana Bekić, Lana Ivanović** Organic grass seed production and environmental protection
09^{20} – 09^{30}	**Gordana Dozet, Gorica Cvijanović, D. Cvijanović, Jelena Bošković, Vera Popović** Yield and oil content in soybean of organic and conventional cultivation method
09^{30} – 09^{40}	**Z. Govedar, Stoja Jotanović, D. Marčeta, Danijela Kondić, S. Keren, B. Bosančić** Features of using biomass as an energy source
09^{40} – 09^{50}	**V. Vorkapić , Ana Kojaković, Gordana Đurić, Stoja Jotanović, Danijela Kondić, B. Bosančić, Duška Šaša** Production of bioenergy in Posavina region
09^{50} – 10^{00}	**D. Budimir, Nikica Prskalo** Starting a biogas plant on cattle farms in Bosnia and Herzegovina
10^{00} – 10^{10}	**T. Predić, Marković, M., Rade Lukić, Petra Nikić – Nauth** Analysis of potential fertility of types of agricultural land of Republic Srpska
10^{10} – 10^{20}	**T. Predić, R. Lukić, Petra Nikić – Nauth, Tatjana Cvijanović, Tatjana Docić-Kojadinović, Tanja Lejić, Duška Jokić** Introduction of continuous monitoring of agricultural land of Republic of Srpska
10^{20} – 10^{30}	**N. Malić, M. Marković** Change in the pedological characteristics of the deposol at reclamation
10^{30} – 10^{40}	**R. Stepić, Vera Milošević, Vera Rašković, M. Dugonjić, Mladenka Đorđevć** Weed vegetation of cereals of upper Jadar and Pocerina
10^{40} – 11^{10}	**Coffee Break**
11^{10} – 11^{20}	**Sladjana Rodić Trifunović, Ružica Stričević, Nevenka Djurović** Water use efficiency of irrigated and rainfed crops of great importance in Serbia
11^{20} – 11^{30}	**R. Savić, Lj. Letić, Benka Pavel, G. Ondrašek, Vesna Nikolić** Spatial and temporal distribution of potential vulnerability to wind erosion processes in Vojvodina
11^{30} – 11^{40}	**V. Ninković, D. Marković** Volatile organic compounds mediate plant – plant and plant – insect interactions
11^{40} – 11^{50}	**S. Milenković, D. Marčić, D. Milošević** Efects of botanical insecticides on aphids in organic apple production
11^{50} – 12^{00}	**Ž. Laznik, S. Trdan** Entomopathogenic nematodes (Nematoda: Rhabditida) in Slovenia: from tabula rasa to implementation into crop production systems
12^{00} – 12^{10}	**Benka Pavel, Jasna Grabić, Atila Bezdan, Atila Salvai** Determining the presence and connectivity of non-forest greenery on the land consolidated area
12^{10} – 12^{20}	**Nada Rudan, D. Supić** Influence of weather conditions in 2011 on agriculture production
12^{20} – 12^{30}	**Snežana Trmčić, Ozrislava Milinković** Strategy for launching product on the example of “Devine colors” - ”Valspar“corporation
12^{30} – 13^{00}	**Discussion on oral presentations**
13^{00} – 13^{30}	**Questions and discussion on posters** Moderator: dr Mile Dardić
14^{00}	**Lunch**

Section 4: Agroecology and Organic Agriculture – Poster Session.

Red salon of Hotel Leotar

Important notice

All authors within Agroecology and Organic Agriculture section are invited to exibit theire posters at the designated poster area at Tuesday 20th March 2012 (during the entire day) and on Wednesday 21st March 2012 (until 09:00 hours).

IV – 1	**Z. Maličević, B. Railić, S. Mitrić, Dijana Mihajlović, M. Babić** The situation analysis of inspected machines for pesticides application in Republic of Srpska
IV – 2	**Gordana Babić, V. Trkulja, J. Stojčić, S. Radanović, G. Ostić, Bojana Ćurković, Jelena Mihić-Salapura, Dragana Kovačić** Testing the efficiency of pre. em. and post. em. herbicides on annual weeds population in corn crop
IV – 3	**Vera Milošević , R. Stepić , Snežana Petrović, Vera Rašković, V. Stepić** Comparative review of flora and vegetation Mačva row crop
IV – 4	**N. Panayotov, M. Dimitrova, L. Krasteva, D. Dimova, D. Svetleva** Investigation the efficiency and selectivity of some herbicides applied in cape gooseberry (*Physalis peruviana* L.)
IV – 5	**Z. Kovačević, Biljana Vučković, S. Mitrić** Weed of vineyards in Bosnia and Herzegovina
IV – 6	**Branislava Sivčev, Zorica Ranković-Vasić, Slavica Todić, Lj. Životić, Mirjam Vujadinović, Ana Vuković, Z. Atanacković** Production – technological properties of Pinot noir variety cultuvated in conditions of ecological production
IV – 7	**M. Vreva, Veselinka Zečević, Jasmina Balijagić, M. Jovančević, Sanida Arslanović, E. Fetić** Effect of locality and variety on yield of ecological production of buckwheat (*Fagopyrum esculentum*)
IV – 8	**V. Ninković, D. Marković** Volatile interaction between undamaged plants in intercropping system and their effect on aphids
IV – 9	**G. Ondrasek, D. Romić, R. Savić, I. Šimunić, V. Tanaskovik** Cadmium speciation assessment in salinised environmental conditions
IV – 10	**Dijana Mihajlović, Svetlana Antić Mladenović, D. Radanović, T. Predić, M. Babić, Sretenka Marković, Z. Maličević** Contents of the Ni, Zn, Cu and Pb in the agricultural soils of the plains in the northwest Repubic of Srpska
IV – 11	**R. Krobot, Veronika Mlejnková, L. Zeman** Effect of feeding mycotoxin – contaminated triticale for health, growth and production properties of laboratory rats
IV – 12	**D. Kirin, V. Hanzelová, S. Shukerova, Ľ. Turčeková, L. Pehlivanov, M. Nikolova, T. Barciová, S. Hristov** Ecological appraisal for the condition of the Velika river, Bulgaria

Section 5: Agricultural Economics and Rural development – Oral presentation

Large Hall of HET

Presiding Committee: dr Nebojša Novković, dr Zorica Vasiljević, dr Željko Vaško

08^{30} – 08^{40}	**Elenica Sofijanova, Liljana Koleva-Gudeva, Violeta Dimovska, A. Kuzelov** Measurement of quality management
08^{40} – 08^{50}	**B. Toscano** Crops insurance against drought
08^{50} – 09^{00}	**A. Aristakesyan** The role of agricultural education and training in global food security

09^{00} – 09^{10}	**Ž. Vaško, M. Ivanković, Aleksandra Figurek, Marija Lasić** Sensitivity analysis of milk production to the change of the level of milk collection price and premiums
09^{10} – 09^{20}	**S. Ceranić , Tamara Paunović , N. Novković** Business records, evaluation, quantification and business analysis of family farms
09^{20} – 09^{30}	**L. N. Ružičić, P. Petrović, K. Gligorević, M. Oljača** Economic and technological parameters for optimal use of tractor
09^{30} – 09^{40}	**M. N. Drašković, S. Smiljić, Milena Kukrić** Prediction of organic food production using system dynamics methodology
09^{40} – 09^{50}	**D. Šnjegota** Improving the regulatory framework of agricultural production in the Republic of Srpska in order to improve the financial position of farmers
09^{50} – 10^{00}	**J. Šuman, S. Kovačević, A. Žgela** Increase the financial value of corn through its processing of starch and starch derivatives
10^{00} – 10^{30}	**Coffee Break**
10^{30} – 10^{40}	**Svetlana Turudija Živanović, N. Novković, T. Živanović** Analysis of the business market of medicinal and aromatic plants in Serbia
10^{40} – 10^{50}	**V. Zarić, Zorica Vasiljević, Danijela Petković** The possibility of commercial production products with geographical origin and traditional products of the Republic of Serbia – the case of Sjenica cheese
10^{50} – 11^{00}	**S. Mirjanić, Ž. Vaško, Gordana Roković, Aleksandra Figurek** Analysis of agriculture cooperatives in Republika Srpska
11^{00} – 11^{10}	**S. Mirjanić, Ž. Vaško, Gordana Roković, Aleksandra Figurek** Objectives and directions of cooperative development in Republika Srpska
11^{10} – 11^{20}	**Zorica Vasiljević, I. Tanasijević, M. Radošević** New initiatives in agricultural extension services in the Republic of Serbia
11^{20} – 11^{30}	**N. Ristić, Živana Krejić** Characteristics of rural development in the European Union
11^{30} – 11^{40}	**Živana Krejić** The remaining windmills in Serbia and their opportunities for development of specific forms of tourism
11^{40} – 12^{00}	**Short Break**
12^{00} – 12^{10}	**D. Brković, M. Hamada** Evaluation of leader program in Slovak Republic – case study LAG "Vršatec"
12^{10} – 12^{20}	**Ljiljana Drinić, Marina Savić** Problems in agriculture and rural development Republic of Srpska
12^{20} – 12^{30}	**Danica Bošnjak, Vesna Rodić** Regional characteristics of agricultural population in Vojvodina
12^{30} – 12^{40}	**E. Ramić, Zorica Vasiljević** Investments into the rural areas on undeveloped municipalities of Bosnia and Herzegovina
12^{40} – 12^{50}	**D. Milić, Zorica Sredojević** Growing blueberries as an opportunity to reduce poverty in rural areas in Serbia
12^{50} – 13^{00}	**Presentation Bobar Bank -** Financial credit support to agricultural sector
13^{00} – 13^{25}	**Discussion on oral presentations**
13^{25} – 13^{55}	**Questions and discussion on posters** Moderator: dr Željko Vaško
14^{00}	**Lunch**

Section 5: Agricultural Economics and Rural development – Poster Session.

Large Hall of HET.

Important notice.

All authors within Agricultural Economics and Rural development section are invited to exibit theire posters at the designated poster area at Tuesday 20th March 2012 (during the entire day) and on Wednesday 21st March 2012 (until 09:00 hours).

V – 1	**Cornelia Petroman, I. Petroman, Diana Marin, C. Statie, A. Dumitrescu** Solutions for destination management on agri-tourism farm
V – 2	**V. Filipović, V. Ugrenović, Ivana Simić** Organic production in the future EU common agricultural policy (2014 – 2020)
V – 3	**K. Alexandrov** The sustainable development of the rural municipalities in Bulgaria and the opportunities to become a tourist destination
V – 4	**A. Ostojić, Ljiljana Drinić, N. Novković, Gordana Rokvić** Trends in production and processing of meat in the Republic of Srpska
V – 5	**T. Radusin, E. Janić Hajnal, A. Novaković, Ž. Kevrešan, J. Mastilović, P. Ikonić** Identification and analysis potential of regional characteristic non-food products in rural regions of Serbia
V – 6	**Elizabet Janić Hajnal, Aleksandra Novaković, Tanja Radusin, Jasna Mastilović, Ž. Kevrešan** Conditions and problems of hygiene and manufacturing practice in production of traditional and regional products of plant orgin on farms in Serbia
V – 7	**A. Wasilewski** Policy measures for development of rural entrepreneurship: en example of EU financial support for local infrastructural investments in Poland
V – 8	**M. Wigier** The agri-food sector in Poland – an analysis and assessment of the CAP results in the years 2000-2010
V – 9	**A. Maksimović** EU IPA fund - an opportunity to development of agro - tourism in Brčko District
V – 10	**M. Mamuza, Ž. Vaško** Determing the effectiveness of apple production using analytical calculation
V – 11	**K. Boškov, B. Anakiev, K. Beleski, P. Hristov, M. Petkov, Z. Božinović, Violeta Dimovska** Twenty years' development of Macedonian agriculture (1991-2010)
V – 12	**A. Ostojić, D. Milunović** Correlation between vegetable producer prices and cropped land in the Republic of Srpska
V – 13	**Majlinda Çakalli** Economic analysis of fruit tree nurseries in Albania
V – 14	**Majlinda Çakalli** Changing the albanian subsidy policy in the context of low-profit farms
V – 15	**Georgeta Rata** Romanian bordei "pit-house": a diachronic approach

Section 6. Genetic resources – Oral presentation

Large Hall of Hotel Leotar

Presiding Committee: dr Gordana Đurić, dr Eva Thorn, dr Liliya Krasteva

15^{00} – 15^{10}	**Gordana Đurić, Marina Radun, D. Mandić, Vida Todorović, Dragana Pećanac, V. Radić, Danijela Kondić, Tatjana Jovanović Cvetković, Nataša Pašalić** Implementation of Programme for conservation of Plant Genetic Resources in Republic of Srpska, 2009 – 2011
15^{10} – 15^{20}	**J. Jakše, Tjaša Rešetič, Dunja Bandelj, Branka Javornik** Molecular tools in research of local olive varieties from Slovene Istria

15^{20} – 15^{30}	**V. Meglič** Slovene plant gene bank and genetic resources program at the Agricultural Institute of Slovenia
15^{30} – 15^{40}	**Suzana Kratovalieva, Gordana Popsimonova, Sonja Ivanovska** Conservation status of plant genetic resources in Republic of Macedonia
15^{40} – 15^{50}	**Lidija Tomić, Nataša Štajner, Nada Korać, D. Ivanišević, Branka Javornik** Reconstruction of parentages from Balkan grapevines by microsatellite analysis
15^{50} – 16^{00}	**Nataša Štajner, Lidija Tomić, Tatjana Jovanović-Cvetković, D. Mijatović, Nada Korać, D. Ivanišević, Elizabeta Angelova, Z. Božinović, Branka Javornik** Results of the project: "Towards the preservation of autochthonous grapevine (*Vitis vinifera* L.) varieties in WBC"
16^{00} – 16^{10}	**L. N. Ružičić, Ljiljana Kostadinović, R. Jevđović** Effects of agro-technical measures on yield and content of essential oils in marigold (*Calendula officinalis*)
16^{10} – 16^{30}	**Coffee Break**
16^{30} – 16^{40}	**Gordana Đurić, V. Stupar, Z. Stanivuković, Nataša Pašalić** Evaluation of the University city complex park in Banjaluka
16^{40} – 16^{50}	**D. Drobnjak, M. Urošević, D. Matarugić** *Očuvanje genetičkih resursa autohtonih rasa domaćih životinja u Srbiji*
16^{50} – 17^{00}	**Biljana Rogić, B. Važić, Mila Savić, N. Savić, Marina Stamenković Radak** Efective population size in buša and gatačko goveče: ecological and molecular approach
17^{00} – 17^{30}	**Discussion on oral presentations**
17^{30} – 18^{00}	**Questions and discussion on posters** Moderator: dr Gordana Đurić
20^{00}	**Gala Dinner**

Section 6. Genetic resources – Poster Session

Large Hall of Hotel Leotar

Important notice

All authors within Genetic resources section are invited to exibit theire posters at the designated poster area on Wednesday 21st March 2012 from 13:30 until 15:00 hours. Posters that are exibited before timing will be removed by organizators.

VI – 1	**Liliya Krasteva, N. Velcheva, T. Mokreva** Principal component analysis of a canning determinate tomato collection in the IPGR, Sadovo – Bulgaria
VI – 2	**Liliya Krasteva, S. Neykov, Kana Varbanova, Tsvetelina Stoilova, Se-Jong Oh, Chung-Kon Kim, Na-Young Ro, On-Sook Hur, Ki-An Lee** Preservation of local genetic resources of some vegetables from *Solanaceae* in Bulgaria
VI – 3	**Darja Kocjan Ačko, I. Šantavec, Monika Cvetkov, M. Šifrer** Cultivation and consumption value of proso millet (*Panicum miliaceum* L.) in researches of Biotechnical faculty in Ljubljana
VI – 4	**Milena Savić Ivanov, Maja Ječmenica, Danica Berleković, U. Ungurović** The national information sharing mechanism on plant genetic resources for food and agriculture in Serbia
VI – 5	**A. Ibraliu, A.Celami, I. Kaziu, F. Elezi, N.Kadiasi, Z. Gjoni, J. Shehu, X. Mi** Diversity of *Hypericum perforatum* L. in Korabi Mountain and Lura National Park in Albania

VI – 6	**R. Jevđović, G. Todorović, M. Kostić, Jasmina Marković, Z. Maksimović, Maja Jevđović, Sanja Mitić** Herba yield and content of essential oil of Pannonian thyme (*Thymus panonicus* All. *Lamiaceae*) depending on the investigated year, genotype and soil type
VI – 7	**E. Toromani, M. Sallaku** Value chain analysis of medical plants from Vlora region in southernwest of Albania
VI – 8	**Belul Gixhari, Ilir Çici, Raimonda Sevo** Geographic distribution of *Prunus* species in Albania
VI – 9	**Đina Božović, V. Jaćimović, Biljana Lazović** Autochthonous apple varieties in central part of Montenegro
VI – 10	**Mirela Kajkut, D. Mandić, Lidija Tomić, Marina Radun** Initial genetic characterization of Rye accessions (*Secale cereale* L.) in Gene Bank of Republic of Srpska
VI – 11	**B. Bosančić, Gordana Đurić** Comparative analysis of morphological characteristics in defining the level of domestication of Cornelian cherry (*Cornus mas* L.) in the area of the Drvar valley
VI – 12	**Sunčica Stevanović, Gordana Đurić, Marina Radun** Morphological characterization of Service tree (*Sorbus domestic*a L.) in Banjaluka region
VI – 13	**Slavojka Malidžan, Lidija Tomić, Nataša Štajner, M. Radulović, Branka Javornik** Genetic diversity of citrus germplasm collection from Montenegro as inferred by microsatellites
VI – 14	**Frida Çarka, Rajmonda Sevo, Alban Ibraliu, Hajri Ismaili** Exploration, characterization, collection and conservation of *V. vinifera* L. ssp. *sylvestris* germoplasm in Albania
VI – 15	**Lidija Tomić, Nataša Štajner, Branka Javornik** Presence of chimerism within old asexually propagated grapevine cultivars from Balkans
VI – 16	**Sonja Ivanovska, Mirjana Jankulovska, G. Stefkov, Jelena Acevska, Lj. Jankuloski, D. Boshev** Assessment of genetic diversity in opium poppy (*Papaver somniferum* L.) based on agro-morphological characters
VI – 17	**Sanja Vasiljević, A. Mikić, V. Mihailović, S. Katić, D. Milić, Đ. Karagić, B. Milošević** Characterization and utilization of red clover (*Trifolium pratense* L.) collection in Novi Sad
VI – 18	**Fetah Elezi, Belul Gixhari, Alban Ibraliu** Genetic variation of new wheat lines
VI – 19	**Diana Kirin** Biodiversity and heavy metal pollutions in freshwater ecosistems in border areas from Tundzha river, Bulgaria
VI – 20	**Gordana Đurić, Ljiljana Došenović, Jelena Davidović** Botanical garden of University of Banjaluka
VI – 21	**B. Stančić, I. Stančić, Stoja Jotanović, R. Šahinović, S. Dragin** The usage of oocytes and embryos in animal genetic resources conservation *ex situ* (a review)

Section 7. Field crop production – Oral presentation

Small Hall of Hotel Leotar

Presiding Committee: dr Desimir Knežević, dr Đorđe Gatarić, dr Danijela Kondić

15^{00} – 15^{10}	**D. Knežević, Danijela Kondić, Aleksandra Yu. Dragović, V. Kovačević, Yueming Yan** Advancement in plant breeding
15^{10} – 15^{20}	**Y. Alkenov, T. Atakulov, Zh. Ospanbaev, K. Erzhanova** The effeciency of direct seeding of winter wheat in the piedmont zone of the south-east Kazakhstan

15^{20} – 15^{30}	**Danijela Kondić, D. Knežević, A. Paunović** Grain weight of the examined genotipes of triticale *(× Triticosecale Wittmack*) in agroekological conditions in Banjaluka
15^{30} – 15^{40}	**D. Knežević, A. Paunović, Veselinka Zečević, Milomirka Madić, Jelica Živić, M. Aksić, M. Jelić** Study of spikelets number per spike in winter wheat cultivars (*Triticum aestivum* L.)
15^{40} – 15^{50}	**S. Radanović, J. Stojčić, G. Ostić, M. Štrbac** New Banjaluka two-line corn hybrid BL 46
15^{50} – 16^{00}	**G. Ostić, S. Radanović** Sowing models of hybrid seed corn NS-640 in agroecological conditions of Banjaluka Lijevče area
16^{00} – 16^{20}	**Coffee Break**
16^{20} – 16^{30}	**R. Hrastar, R. Vidrih, J. Hribar** *Camelina sativa* as an alternative oilseed
16^{30} – 16^{40}	**M. Vidrih, Klemen Eler, S. Trdan** Reintroduction of control grazing for calcareous grasslands preservation in Slovenia
16^{40} – 16^{50}	**D. Tomić , V. Stevović , D. Đurović** Effect of foliar phosphorus and potassium treatment on seed yield and yield components of red clover (*Trifolium pratense* L.) cultivars grown under dense planting conditions
16^{50} – 17^{00}	**Đ. Karagić, B. Milošević, A. Mikić, S. Katić, D. Milić, S. Vasiljević** Changes in field pea germination ability during desiccation phase of maturation
17^{00} – 17^{10}	**M. Glavić, S. Toromanović, A. Zenunović** The quality of grass silage and haylage on farm in Bosnia and Herzegovina
17^{10} – 17^{20}	**S. Barać, M. Biberdžić, A. Đikić, Bojana Milenković, N. Ubavić** Results of exploitation investigations of automotive combine for maize harvest in the conditions of Toplica county
17^{20} – 17^{45}	**Discussion on oral presentations**
17^{45} – 18^{15}	**Questions and discussion on posters** Moderator: dr Desimir Knežević
20^{00}	**Gala Dinner**

Section 7. Field crop production – Poster Session.

Large Hall of Hotel Leotar

Important notice

All authors within Field crop production section are invited to exibit theire posters at the designated poster area on Wednesday 21st March 2012 from 13:30 until 15:00 hours. Posters that are exibited before timing will be removed by organizators.

VII - 1	**V. Filipović, D. Dedić, V. Ugrenović** Results of the research on different hybrids of standard grain quality white kernel maize in 2010 and 2011
VII - 2	**G. Todorović, M. Sečanski, T. Živanović, R. Protić, M. Kostić, R. Jevđović** Inbred lines from different cycle selection donors of favorable alleles for the improvement of grain row number of F_1 maize hybrid
VII - 3	**V. Kovačević, Mirta Rastija, J. Brkić, D. Iljkić** Specificity of weather characteristics in Croatia 2010 and 2011 with aspect of maize growing
VII - 4	**Nastasija Mrkovački, I. Đalović, Đ. Jocković** PGPR as bio-fertilizers and their application in maize

VII - 5	**S. Milošević, S. Mirjanić, M. Marković** Possibility of increasing volume, structure of production and use of domestic wheat seed in agriculture of the Republic of Srpska
VII - 6	**M. Biberdžić, M. Jelić, N. Deletić, S. Barać, S. Stojković, Dragana Lalević** Grain yield of triticale and rye as affected by fertilization of acid soils
VII - 7	**Vera Đekić, Mirjana Staletić, Jelena Milivojević, Vera Popović, M. Jelić** Nutritive value and yield of oat grain *(Avena sativa L.)*
VII - 8	**T. Georgieva, P. Zorovski** Content of non-essential amino acids ih the grains of winter and spring varieties of oats (*Avena sativa* L.) under the conditions of central southern Bulgaria
VII - 9	**G. Đurašinović, D. Mandić, Bojana Savić, S. Kikić** KOSTA – new variety of winter barley
VII - 10	**D. Andov, Danica Andreevska, Emilija Simeonovska** The yield and some morphological properties of newly introduced italian rice varieties grown in Macedonia
VII - 11	**D. Dimova, L. Krasteva, N. Panayotov, D. Svetleva, M. Dimitrova, T. Georgieva** Evaluation of yield and stability of perspective winter barley lines
VII - 12	**Y. Dimitrov, Maya Dimitrova, Nedyalka Palagacheva** Weed association among winter oilseed rape plants – a medium for propagation of economically significant pests on vegetable crops
VII - 13	**Marijana Spirkovska, Z. Dimov, Z. Arsov, Romina Kabranova, Marija Srbinoska** Agronomic characteristics of winter oil rape hybrids depending of nitrogen top dressing
VII - 14	**J. Marković, R. Štrbanović, M. Petrović, B. Dinić, M. Blagojević, D. Milić, N. Spasić** Estimation of red clover (*Trifolium pratense* L.) forage quality parameters depending on the cultivar, cut and stage of growth
VII - 15	**V. Radić, B. Đurić, Đ. Gatarić, B. Petković** Components of yield of grass-clover mixtures in hilly-mountainous areas
VII - 16	**N. Malić , Ž. Lakić** Yield and seed quality of tall fescue (*Festuca arrundinaceae* Schreb.) produced on deposol during the reclamation process
VII - 17	**Bojana Milenković, S. Barać** Structure of time silage harvers and cutting height silage maize
VII - 18	**Borislav Railić, Z. Maličević** Time determination for the drying of corn using dryer technology

Thursday, March 22, 2012.

Large Hall of Hotel Leotar

10^{00}	**Round table** Opportunities for absorption of pre-accession funds in Bosnia and Herzegovina.
12^{00}	**Conclusions and closing of Symposium**

2. PLENARY SESSIONS

MOLECULAR MARKERS IN AGRICULTURE

Branka Javornik

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The development of DNA technology has provided a number of methods of detecting differences at the DNA sequence level and thus of identifying the molecular markers that are most effective in generating a large number of polymorphisms, which are not influenced by environmental factors. Various PCR-based molecular markers have enabled the fine-scale genetic characterization of plant genomes and they supply a large amount of data that can be used for a variety of genetic studies and for breeding purposes in many plant species. The development and characteristics of the most commonly used molecular markers (RAPD, AFLP, SSR, and SCAR) will be presented. The application of molecular markers in agriculture will be demonstrated by examples of genebank management (RAPD markers for clarifying samples in the hop genebank), cultivar identification (SSR markers in olives and vitis), genetic diversity studies (AFLP and SSR markers in hop for germplasm characterization and determination of its geographic origin), development of markers for marker assisted selection (SSR marker for sex determination in hop) and for plant pathogen diagnostics (SCAR marker for detection of the phytopathogenic fungus *Verticillium albo-atrum*).

BIOTECHNOLOGICAL APPROACHES FOR BREEDING VEGETABLE AND CROP SPECIES AT BIOTECHNICAL FACULTY (LJUBLJANA, SLOVENIA): RESULTS ACHIEVED AND A PROGRESS REPORT

Bohanec, B.

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A long term approach or our research group is to develop modern techniques of plant biotechnology and to apply these techniques in applied breeding programs. In this respect we did improve various approaches for haploid induction in onion, cabbage, rocket and oil seed pumpkins. Haploid or doubled haploid lines are then used for simplified genetic analysis or applied as breeding lines in the process of breeding hybrid varieties. At the moment cabbage doubled haploid lines are approaching line registration and line testing (cooperation with Agricultural Institute of Slovenia), while onion haploid lines served as mapping population (cooperation with University of Wisconsin, USA). Studies of oil seed pumpkins are more recent. The aim is to develop hybrid cultivars resistant to several viral and fungal diseases, and research is in progress. Tissue culture related studies also included ploidy manipulation (adventitious regeneration in hop), somatic embryogenesis (onion and ornamental alliums), cell suspensions (Taxus, Salvia, Mandragora) and genetic transformation studies (onion, tobacco, Mimulus). Other genetic studies included genetic characterization of various agricultural plants or their interspecific hybrids such as asparagus, clovers, cucurbits, elderberry, wild allium species. In this respect species emphasis was on genome size variability and phylogenetic relationships performed using molecular marker studies. Past achievements and present research goals will be presented and discussed.

Key words: *plant breeding, plant biotechnology, haploid induction, genetic studies*.

THE USE OF HEAT TREATMENT FOR MAINTANINS POSTHARVEST QUALITY OF FRUITS

Jemrić, T.

University of Zagreb, Faculty of Agriculture, Department of Pomology, Croatia

Due to the restriction of use of synthetic chemicals and pesticides, alternative treatments for maintaining quality and controlling pests and decay on fruits after harvest are becoming more and more important. Among such treatments, heat treatments are very popular due to their minimal environmental impact. Among them, hot water dips are especially convenient since they can be easily incorporated into the postharvest management practices.

In this lecture, the ability of heat treatments to control physiological disorders such as superficial scald and decay on apple, chilling injury and decay on Satsuma mandarin and decay on nectarine will be shown. Critical factors determining the efficacy of such treatments are the choice of appropriate temperature and exposure time to avoid heat damage and achieving the induction of beneficial physiological processes inside the fruit.

Although the same, or even better, results can be achieved with chemical treatments, such as application of 1-MCP, heat treatments still remain useful postharvest treatments for organically grown fruits.

Key words: *heat treatments, potharvest quality, physiological disorders, fruit*.

PLANT GENETIC RESOURCES AS A PART OF THE BIODIVERSITY

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Plants are part of the biodiversity and a major resource for human welfare. Most of them are threatened by various factors such as excessive collection, unsustainable agriculture and forestry practices, urbanization, pollution, land use changes, invasive species, as well as climate change.

Within the European program, the National strategy and the National plan for biodiversity conservation, the Institute for Plant Genetic Resources, Sadovo - Bulgaria participates with particular program for conservation and wise use of crops and their wild relatives.

In the botanical garden 425 plant species from 54 families are maintained. The largest segments are Fabaceae - 97 and Poaceae - 54 species. There are also species from Alliaceae, Asteraceae, Brassicaceae, Lyliaceae and Ranunculaceae, as well as rare, endemic and endangered plants.

The National gene bank was constructed in 1984 and carried out a scientific program for long term storage of germplasm seed under controlled conditions, according to the FAO standards. The National gene bank maintains more than 60 000 samples of 3291 taxa. In the base collection are stored 48,293 samples.

For studying and maintaining of plant genetic resources of vegetative propagated species accessions of potatoes, vines, hop, essential oils and ornamental species are in vitro propagated and stored. Complete in vitro technologies for propagation are created. In in vitro collections are stored 170 varieties of potatoes, 103 grape varieties and rootstocks, 17 varieties of mint, 10 – hop and 50 - varieties of essential oils and ornamental species. Using biotechnological methods are developed methods for cell suspendial cultures of valuable and rare for Bulgaria species to produce secondary metabolic products in vitro thereof - alkaloids, glycosides, flavonoids, terpentenoids, carotenoids, saponins, pigments, vitamins and other specific chemical compounds.

Key words: *plant genetic resources, expeditions, ex situ, in situ, in garden, in vitro storage*.

CHALLENGES OF FOOD SECURITY AND SUSTAINABLE USE OF PGR

Eva Thörn

Swedish University of Agricultural Sciences

Climate change is one of the most serious threats of our time. Seasons will shift, temperatures will increase and sea levels will rise. Nevertheless, our planet must still supply all living organisms with air, water and food and the challenge of securing supply of food for the growing world population is enormous. Drought and flooding will become more frequent with serious consequences for agriculture. New and altered diseases to crops will emerge and change distribution. Therefore sustained growth in the agricultural sector with extensive efforts focused on crops, livestock, fisheries, forests, and biomass as well as on commodities will be needed in order to prevent hunger, enhance rural livelihoods, stimulate economic growth and maintain and restore ecosystem functions and services.

Future crop research will have to focus on disease resistance, enhanced tolerance of abiotic stresses, reduced post-harvest losses and nutritional qualities. Existing and new technologies including biotechnologies needs to be applied in breeding research and the potential of genomics needs to be further exploited. Development of a new cultivar will normally need a minimum of ten years and not infrequently as much as up to 20 years. It is therefore essential that plant breeding will have clear goals and priorities and have access to and make the best use of available genetic diversity and resources for the development of improved cultivars adapted to the predicted future climate and environmental conditions.

Furthermore the range of crops growing in the farmer's fields will have to be expanded. Innovation in breeding goals, particularly for the development of new or niche markets needs to be encouraged. In connection to this seed laws, plant varieties protection and access and benefit-sharing laws which have direct impacts on agro-biodiversity and their effects and interaction have to be thoroughly assessed.

Agricultural biotechnology could play an important role in assisting public breeding systems to be more efficient in producing improved local crop varieties adapted to local conditions and needs but investment in the public breeding sector will be necessary as well as in agricultural extension services. Strategies and visions for future agro- and bio-science are therefore needed. Adoption of agro-biotechnology to local needs will be important and using bio-resources innovation systems as strategic tool for sustainable economic growth will be a basis for sustainable development. Strong public research efforts will be essential for harnessing the benefits of agro-biotechnology to the needs of small-scale farmers. Ownership of patents and the restrictions on access to technology is however critical which in turn restricts the Freedom to Operate of public institutions. Close collaboration between public sector R&D institutions and the private sector therefore needs to be established.

All issues touched upon are key elements of the International Treaty on Plant Genetic Resources for Food and Agriculture and also reflected in the supporting instrument of the Global Plan of Action. In order to strive for food security in the future it will be essential that stakeholders of plant genetic resources in all countries of the world will be given the necessary support, tools and conditions to increase their efforts for development and collaboration across boarders.

Key words: *climate change, agriculture, biotechnology, plant breeding, plant genetic resources, ITPGRFA.*

FEATURES AND PROSPECTS OF ORGANIC VITICULTURE

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In the race for larger amounts of food, we are forced to conquer new agricultural areas in which most have low production potential. It is the basic reason for the application of artificial fertilizers and pesticides. For a poor ground for getting more yields it is necessary to introduce artificial fertilizers. In combating the factors that reduce yield, disease, insects, animals and weeds, application of chemical substances is necessary. They effectively act and destroy the population.

High yields of conventional production provide the survival of civilization, but in industrialized countries there is overproduction. This surplus food is a problem for the realization of profits, the prime mover of capitalism. One way of reducing the overproduction in the EU is encouraging the farmers to change the conventional with organic production.

The other side of the application of chemicals is their detrimental effect on human health.

Today's scientific knowledge in agriculture enables us to find and fix errors. Access to the new organic farming called, consists in producing food in an environment where there is perfect balance between climate, soil, plants, animals and man. The creation of this complex system is limited by environmental conditions, genetic potential of varieties and simultaneously obtaining high quality products. In light of these factors there are two concepts.

The first concept is the concept of finding locations with the best environmental conditions for a particular culture.

The second concept is breeding varieties with increased resistance to external influences.

Organic farming is the peak of scientific knowledge in agriculture and viticulture create ecosystems by man, who understands how it works every part of the system.

Key words: *organic farming, viticulture*.

ANALYSIS OF PERFORMANCES IN PRIMARY AGRICULTURAL PRODUCTION AND FOOD INDUSTRIES OF SERBIA

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Agriculture is one of the pillars of economic development of Serbia, and its importance for national economy, despite the economic and social and have an ecological component. However, despite the large potential in the agricultural sector, which is the result of favorable climatic conditions, natural features of land and available water resources, it is not optimally utilized. Precisely because of this potential in the agriculture of Serbia is not an ordinary economic sector, since in all municipal or regional strategies defined as one of the strategic directions of development. However, successful participation in international markets limits the range of food products is insufficient compared to the current offer in the developed world, where research has been neglected for the greater utilization of existing capacity through the introduction of new lines and products. As a limiting factor highlights the fluctuation in market quality products to the lack of standards and for non-compliance and insufficient control of the existing standards. Also, the slow adjustment of the business market criteria that are based on the introduction of modern systems of management and marketing. Lack of predictability in the business of the food industry is conditioned by the lack of long-term contractual relationship between the food industry and producers of raw materials and lack of market integration, primary agricultural production and industry for their input using just agricultural products.

Key words: *primary agricultural production, food industry, standards, associations, competitiveness*.

3. ORAL PRESENTATION

3.1 Fruit growing and viticulture

OCCURANCE OF APOSPOROUS EMBRYO SACS IN APPLE IN HIGHLY INTENSIVE ORCHARD MANAGEMENT SYSTEMS

Mićić, N.[1,2], Gordana Đurić[2,1]

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In this paper, the issue of the occurance of aposporous embryo sacs was raised by means of another question, and that is the question of restricting constitution of female gametophyte which can be used for the induction of selective embryo abortion for the purpose of apple fruit thinning in highly intensive orchard management systems. These studies always assume normally developed embryos, while the previous ones have indicated that aposporous embryo sacs of different apple cultivars are differently represented (diploid and triploid cultivars) and they occur with varying frequencies in certain vegetations. On this basis, the question may be raised to which extent aposporous embryo sacs are available to selective fruit thinning, or, in other words, what may be the proportion of these embryos in final fruit set among the different apple cultivars in highly intensive orhard management systems (rootstocks strongly modify vigour and there is a great pressure of agrochemicals by means of mineral nutrition, the use of phytohormones to control growth and yield, and intensive treatment with pesticides and herbicides, as well).

The research was carried out within the following diploid cultivars: Idared, Gloster, Granny Smith, Lepocvetka as well as triploid cultivars, such as: Jonagold, Mutsu and Kolačara. Before fixation, the ovaries had been processed under a binocular microscope in the form of tiles with the following cutting orientation along the axis: micropyle – halaza. The fixation was carried out according to Navashin, and the samples were embedded in paraffin and cut into 8-µm-thick sections. The preparations were stained with *Delafield's Hematoxylin.* A total of 673 cross-sections of ovules with the embryo sacs were visually inspected.

The analysis of the architecture of embryo sacs in the observed cultivars indicates that their structures are normal and typical ones, while apart from having the embryo sacs in their typical position, some of the ovules also have an additional embryo sac laterally placed or just below. These additional sacs have been recorded as aposporous embryo sacs. The aposporous embryo sacs presence among the observed diploid cultivars ranged from 1,8 % to 4,6 %, while the presence among the triploid cultivars ranged from 3,2 % to 8,3 %. The atrophy of the individual elements of the egg apparatus was also found among the triploid cultivars.

In highly intensive orchard management systems, the occurance of aposporous embryo sacs may play a role in fruit setting in apple. The relation between these embryon sacs and agro-chemicals for fruit thinning is an open question.

Key words: *female gametophyte, diploid and triploid cultivars, fruit setting.*

APPLE OVULE SETTING IN FUNCTION OF SUSTAINABLE FRUIT DEVELOPMENT

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The study of the constitution of the apple female gametophyte through microphenophases of the flowering of the individual flowers in the inflorescence has shown the complex algorithm of ovule maturity for fertilization in the inflorescence and opened a question of the number of the set ovules as the factor of the fruit viability on the trees in intensive orchard management systems (rootstocks strongly modify vigour and there is a great pressure of agrochemicals by means of mineral nutrition, the use of phytohormones to control growth and yield, and intensive treatment with pesticides and herbicides, as well). As the function of fruit development and its viability on the tree is embryo development, the control of embryo development is an important element of the control of fruit trees yield capacity, especially of the fruit trees in intensive orchard management systems.

The study of the correlation between the number of the set ovules and fruit viability till physiological maturity was carried out within the following cultivars: Royal Gala, Idared, Jonagold, Golden Delicious, and Granny Smith in the intensive orchard of the family Mamuza in Prijedor. The trees that were in the eighth year and with the yield of 22 – 28 kg/tree were on the rootstock M9. The experimental trees were not treated with agro-chemicals for fruit thinning. During the fruit dropping in June the dropped fruits were picked up under the trees (20 fruits per each of the 5 trees). The analysis of the degree of embryo development was conducted as well the classification into two groups: 1) the seeds with normally developed embryos compared to the embryos of the fruits that remained on the trees, and 2) non-viable seeds with the seed coat without developed embryos (the embryos were aborted soon after the setting or in the early stages of development). From each of those trees there were taken 20 fruits that are physiologically mature and the analysis of normally developed seeds and non-viable seeds was conducted.

Based on the analyses that were performed we may conclude: Among the observed cultivars, during the fruit dropping in June, there were dropped those fruits which approximately had less than 30% of the ovules with normally developed embryos; Among all the cultivars observed, physiologically mature fruits approximately have more than 70 % of the set ovules that gave normally developed and physiologically mature embryos. Among diploid cultivars, it was more than 75 %, while among triploid cultivars, it was more than 55 %.

Genotype differences in the structure of the developed embryos in the dropped and physiologically mature fruits have been discussed in this paper as the factor of the control of apple tree yield capacity in intensive orchard management systems. The fact that physiological maturity has been reached within the fruits that have more than 70 % of the set ovules and gave normally developed seeds, clearly indicates that the question of the control of apple yield capacity in intensive orchard management systems must be studied and defined as the concept of genotype specific pomotechnics in the function of a viable embryo development, in other words, physiologically mature fruits.

Key words: *apple, female gametophyte, non-viable seeds, fruit dropping, physiologically mature fruit.*

FRUIT GROWTH AND POSTHARVEST PHYSICAL AND CHEMICAL PROPERTIES OF NECTARINE [PRUNUS PERSICA VAR. NECTARINA (AIT.) MAXIM.

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[2]*Fruit Research Institute, Kralja Petra I/9, 32000 Cacak, Serbia*

A 3-year study was done to compare the blossoming and harvesting date, fruit physical and chemical composition of six nectarine cultivars ('Mayfire', 'Weinberger', 'Caldesi 2000', 'Nectared 4', 'Fantasia', 'Syrio') grafted of vineyard peach [Prunus persica (L.) Batsch.] and grown with 2.778 trees ha-1 on vertisol niar Cacak (Western Serbia). A high variability among and within cultivars was found and significant differences were observed among them in all properties analyzed. Year-by-year variations were observed for blossoming and harvesting date, length of fruit growth, soluble solids content, fruit weight and fruit firmness. On the basis evaluated data, the best fruit performances were registered in 'Caldesi 2000' and 'Syrio'. Contrary, the poor fruit physico-chemical properties were observed in 'Mayfire', especially in 'Nectared 4'. This evaluation may help to select a set of nectarine cultivars with better fruit quality attributes, which in our growing conditions might be indicated in 'Caldesi 2000', 'Syrio', somewhat 'Weinberger' and 'Fantasia'.

Key words: *chemical composition, flesh firmness, fruit size, fruit shape, HDP system, nectarine*.

VIGOUR, CROPPING AND FRUIT SIZE OF PLUM (*Prunus domestica* L.) CULTIVARS DURING THE FIRST YEARS AFTER PLANTING

Glišić, I.[1*], Glišić Ivana[2], Milošević, T.[1], Gorica Paunović[1]

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This paper presents results on the vegetative growth (vigour), yield traits and fruit size of three plum cultivars developed at the Fruit and Grapevine Research Institute in Čačak (Čačanska Lepotica, Čačanska Rana and Čačanska Najbolja) evaluated from the second year through the fifth year after planting. The cultivars were grafted onto Myrobalan (*Prunus cerasifera* Ehrh.) rootstock and planted at a spacing of 4 m x 2 m (1,250 trees ha^{-1}). The trees were trained to a Spindle Bush system. During the experiment, routine pomological operations, including shoot bending, shoot tip pinching and shoot notching, were used to control vigour, enhance precocity and improve fruit size.

The final tree vigour (TCSA), calculated in the fifth year after planting, was lowest in Čačanska Lepotica (37.07±1.05 cm^2), and considerably higher in Čačanska Rana (65.61±3.20 cm^2) and Čačanska Najbolja (71.76±1.87 cm^2).

Čačanska Lepotica and Čačanska Najbolja produced their initial yields in the second year after planting (Čačanska Lepotica 2.25±0.17 t ha^{-1}, Čačanska Najbolja 1.85±0.19 t ha^{-1}), whereas the initial yield of Čačanska Rana was obtained in the third year after planting (2.48±0.11 t ha^{-1}). Generally speaking, cropping was lowest in Čačanska Rana, its cumulative yield (second year through fifth year) being 20.11 t ha^{-1}, followed by Čačanska Najbolja (23.96 t ha^{-1}) and Čačanska Lepotica (39.83 t ha^{-1}). The cropping coefficient was highest in Čačanska Lepotica (0.30±0.02 kg cm^{-2}) and considerably lower in Čačanska Najbolja (0.11±0.02 kg cm^{-2}) and Čačanska Rana (0.10±0.01 kg cm^{-2}).

The average fruit weight showed substantial variation across cultivars, ranging from 37.70±0.85 g (Čačanska Lepotica) to 51.50±1.06 g (Čačanska Najbolja) to 52.90±1.25 g (Čačanska Rana).

The results obtained suggest that the use of standard pomological operations during the growing season instead of winter pruning induced precocity, moderate yield and good fruit size in vigorous cvs. Čačanska Rana and Čačanska Najbolja, with the best performance, in general, being exhibited by Čačanska Lepotica.

Key words: *vigour, cropping, table plum cultivars.*

POMOTECHNICAL OPERATION RELATED TO THE INITIATION OF THE DEVELOPMENT OF VEGETATIVE BUDS WITHIN PLUMS

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In this work it has been studied the influence of notching to the extent of the initiation of the dormant buds and initiation of the additional activation of the growth of the winter vegetative buds in plum as well as characteristics of shoots that are developed as a result of this operation. Within intensive cultivation in stone fruits, basic question in the establishment of the projected ratio of the growth and generative potential is the issue of the formation and positioning of vegetative buds at the certain location within the treetop. Notching is a pomotechnical measure that enables reaching this. Within the researches the notching is applied to the one year part of the leading shoot of plum in the Spindle training system. Studies were done on following cultivars Čačanska lepotica, Čačanska rodna, Stenlej and Hanita. Spontaneous development of the vegetative buds on the leading shoot within all analyzed cultivars is low and ranged between 6,80-9,18%. Initiation of the development of the vegetative buds by notching ranged between 95,77 and 98,11%.

Position on the leading shoot and total length of the vegetative shoots established as a result of notching application is telling about necessity of the use of this treatment within the beginning years of formation of spindles training systems in plums.

Key words: *cultivar, notching, shoot*.

SUSCEPITIBILITY OF APPLES TO VARIOUS DISORDERS DURING STORAGE

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Appropriate storage regimes may prolong the storage life of apples for 12 months i.e. until the next season. To maintain fruit quality during storage, controlled atmosphere (CA) storage containing cca 1 % of O2 and the same concentration of CO2 is widely used. With the purpose to combat some storage disorders, storage operators are trying to lower O2 concentration to cca 0,7 % and/or elevate CO2 concentration to around 2 %. Ultra low (ULO) oxygen concentration is beneficial in preventing superficial scald, while elevated CO2 may retard fungal growth and spore germination. Employing such stress conditions may inhibit the appearance of disorders and is being assessed as replacement of phytochemicals. The major drawback of such extreme atmosphere composition is the induction of anaerobic metabolism and consequent tissue browning. Among factors responsible for susceptibility of fruit toward extreme storage atmosphere composition, genetic factors, pedoclimatic conditions, fruit density (microstructure), application of phytochemicals, etc are most frequently mentioned. Among phytochemicals the most extensively studied are application of Ca before harvest and application of 1-methylcyclopropen (1-MCP) after harvest. Ca treatments in orchard alleviate problems with physiological disorder 'bitter pit' but also increase the emission of flavour-contributing volatile esters during ripening. While application of 1-MCP inhibits ethylene production, appearance of scald, maintain better firmness, acidity and green colour on the other hand strongly reduces the emission of aroma volatiles. According to some observations, 1-MCP also increases the susceptibility of apples toward increased CO2 concentration. Cool growing conditions is also known to increase the susceptibility of apple to CO2 injury.

Key words: *1-MCP, apple, Ca, disorders, internal browning, scald, storage.*

COMPARISON OF THREE CHARDONNAY CLONES (*Vitis vinifera* L.), GROWING IN SKOPJE'VINEYARD REGION, R.MACEDONIA

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Some agro-biological and technological characteristics of three Chardonnay clones selections, including 95, 124 and 277, cultivated in Skopje's vineyard region, R. Macedonia (during the period from 2006 to 2008) were determined. Certificated seedling material was introduced from France in 1999/2000, cultivated and studied at the vineyards of the Department of viticulture and enology, Institute of Agriculture, Skopje. The aim of the study was to apply optimal agro-technical and ampelotechnical measures and to compare the characteristics of the three Chardonnay clones (95,124,277) cultivated in same agro-ecological conditions. Different values of the examined characteristics were observed because of the selection specification, as well as, the ecological conditions during the period of examination. It was determined that the yield was most stabile for the clone 277 with a coefficient of variation of 14.4, and the biggest variation of 21.7 was noticed for the 124 clone. Considering the chemical composition, more significant variation was observed for the sugar content in the grape must from the clone 277, while, insignificant variations were noticed for total acids in the must of all clones studied. The content of alcohol in the wines is from 12.88 vol% in the clone 277 to 13.95 vol% in the clone 95 for the examined period, and insignificant variations are found in the three clones. Wines from all three clones from the vintage 2006 are with a increased content of the total extract, and for the examined period wines with the most extract from the clones 95 (21,30 g/L) and 277 (21,20 g/L) With the highest degustation rating from 17,97 points is the wine which is made from the clone 277.

Key words: *Chardonnay, clones, yield, wine, degustation rating.*

RESEARCH OF ORIGIN AND WORK ON CLONAL SELECTION OF MONTENEGRIN GRAPEVINE VARIETIES CV. VRANAC AND CV. KRATOSIJA

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Viticulture production and winemaking of Monetenegro is mostly based on breeding of autochthonous grapevine varieties. Nowdays, vranac and kratosija (zinfandel) are economically the most important grapevine varieties in viticulture and winemaking sector, as well as, in producing red wine in Montenegro. Wine Vranac became a national brand and also is the most recognized and the best product of company „13. jul Plantaze“. Beside vranac variety, a significant place in Montenegrin autochonous grapevine varieties takes kratosija variety. According to many literature data, kratosija is autchthonous grapevine variety originated and involved in culture of breeding before vranac variety. Because of its heterogeneity, it is not so represented in Montenegrin vinyards and it is mostly found in combination with vranac variety. Results of vranac variety origin researching are shown in paper. Genetic identification which approved originilaty of vranac variety is shown and it is also approved that atochthonous variety kratosija has the same genetic profile as cv. zinfandel. Paper presents multi-years results of examination of variability their populations and of work on clonal selection. Mother vines were selected and vineyards of prebase and base category of vranac variety potential clones were planted. Achieved results in view of manifesting agro-biological, economic and technological characteristics indicate on need for further work on clonal selecton of these grapevine varieties.

Key words: *origin, population variability, vranac, kratosija, clonal selection.*

SCREENING FOR PHYTOPLASMA PRESENCE IN WEST HERZEGOVINA VINEYARDS

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Surveys for grapevine yellows phytoplasmas in Bosnia and Herzegovina have been conducted since 2004 and vineyards in Srpska region where mostly monitored. In 2011 an extended survey was done in vineyards of West Herzegovina, the most important region for grapevine industry. Four areas were inspected for presence of phytoplasma symptoms and 57 grapevine and weed samples were collected for laboratory analyses. Nested-PCR/RFLP analyses allow to verify presence of bois noir (BN) phytoplasma, *tuf* type-b in 15 symptomatic grapevine samples collected in all surveyed areas.

Key words: *grapevine, phytoplasmas, survey, PCR/RFLP analyses, 'bois noir'.*

SAN JOSÉ SCALE *Quadraspidiotus perniciosus* Comstock (Homoptera: Diaspididae) – A DANGER FOR FRUIT PRODUCTION IN MONTENEGRO

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The San José Scale (*Quadraspidiotus perniciosus* Comstock) is very polyphagous pest which attacks over 150 hosts plants. Apart from many fruit crops, especially apple, peach, pear, plum, and *Rubus*, it is also detected on many deciduous trees and shrubs (*Acer*, *Crataegus*, *Euonymus*, *Fagus*, *Ligustrum*, *Populus*, *Rosa*, *Salix*, *Tilia, Ulmus*).

It is listed as an A2 quarantine pest by EPPO.

Regarding some previous data about its presence in some apple orchards in northern part of Montenegro and on peaches in surrounding of the city of Podgorica, in 2010 and 2011 nurseries in Podgorica surrounding area and production orchards in Zeta, Crmnica and surrounding of Nikšić and Danilovgrad were visually inspected. In both years of inspection symptoms of attack were not detected in nurseries with apples, pears, peaches and plums.

In 2010 presence of the San José Scale was detected in apple orchards in area of Danilovgrad (locations Kosić and Begovina) and Crmnica (location Godinje), followed by characteristic symptoms of attack on fruits and twigs. During 2011 the pest was found on same locations in apple orchards, whilst in Crmnica (Godinje) additionally on a pear. For the first time, its presence was detected in area of Zeta (location Vukovci) on apples and pears.

In both year of inspections symptoms of attack were not found in area of Nikšić where apple orchards are commonly present.

Apart from visually detected symptoms of attack on apple and pear trees, samples with infested fruits and twigs were additionaly observed in laboratory in term to confirm identification of the pest.

Regarding presence of the San José Scale in producing orchards, although still in restricted area of Danilovgrad, Crmnica i Zeta, there is a real danger of its appearence in nurseries which could lead it to become one of the most dangerous and most important fruit pest in Montenegro.

Key words: *the San José Scale, Quadraspidiotus perniciosus, production orchards, apples, pears, spreading on new areas*.

PLACE AND FUNCTION OF HORTICULTURAL OBJECTS IN PROCESS OF SUSTAINABLE DEVELOPMENT OF URBAN PATTERN OF TREBINJE

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The aim of this study is to review the core of preservation and further development of the green pattern objects in the city, within the domain of urban development trends in Trebinje. The awareness of the need to preserve nature, support its native values, and its appropriate treatment in the urban context and beyond, becomes imperative for all human activities in space. The ecological function of the objects of landscape architecture and horticultural objects in the modern life conditions in Trebinje, sets the questions of presence, the way of the future use and preservation of these spatial components of the urban pattern in order to improve the environment and restore the identity of the city. This implies achieving a more humane urban environment of Trebinje, enriching the city scenery, richness of experiences, better reintegration of the green structure objects, connecting the urban tissue with surrounding natural landscape and a significant contribution to improving environmental indicators. With this study we observe the sustainable context of Trebinje as a permanent category since its environmental values, the spirit of the city, and city's landmarks are all contained in its memory. A satisfactory presence, the forming and sustainable greenery development can be provide only by interpenetration of natural, created, and common influential factors of the environment, based upon planning oriented settings in all phases of implementation.

Key words: *horticultural objects, green pattern, sustainable development, ecological principles.*

3.2 Vegetable growing

USE OF INSECTICIDES TO CONTROL POTATO VIRUSES DEPENDING ON THE TYPE OF APHID TRANSMISSION

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Viruses occurring in the countries that emerged from the break-up of the SFRY are a constraint to the production of table potatoes and, particularly, seed potatoes. Outbreaks of potato virus Y through a high infection rate of table potatoes limit quality seed potato production in lowland and hilly regions. Under these conditions, seed potato production is hindered due to a high infection pressure of potato virus Y which spreads far more rapidly compared to leaf roll virus, virus S and other viruses.

The related literature and, notably, pesticide manufacturers and traders normally recommend insecticide use to control virus infection of seed crops. This arises from a logical conclusion that aphid vector control results in virus transmission control. The present study aims at clarifying a frequent dilemma over whether insecticide use is effective in preventing the infection of healthy plants with potato virus Y and leaf roll virus.

Numerous studies worldwide, which have been confirmed by research in Serbia, with the findings presented in this paper, have shown that insecticide use is ineffective in preventing the non-persistent aphid-borne transmission of viruses (potato virus Y, PVY) from an external source of infection. Consequently, no positive effect of insecticide use can be expected if seed potato production is practiced at a high rate of spread of infection sources.

Insecticide use can be effective in preventing PVY transmission from infected plants within the crop only if seed potatoes are produced in locations without external sources of infection.

Insecticides used to prevent the infection of healthy potato plants with the persistently transmitted leaf roll virus have some positive effects. Given the fact that, in Serbia, the initial first-year infection of healthy plants with virus Y is several times higher than that with leaf roll virus, with the use of insecticides failing to ensure protection against PVY, this practice cannot have any positive effect in the virus control under high infection pressure conditions.

Key words: *potato, viruses, aphids, insecticides, virus control.*

GRAIN LEGUMES GROWN FOR USE AS PULSES AND VEGETABLES

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Grain legumes (Fabaceae) have always held an important position in the agriculture of our parts of the world. They are part of traditional diet, where they are used as pulses and as vegetables. In the framework of organic food production, attempts are made to reintroduce traditional crops grown in individual climatic regions. The paper gives an overview of the main grain legumes grown in our parts and it reviews recent research results.

Throughout the history of mankind grain legumes alternated and replaced each other. Vicia faba, one of the first plants cultivated by man, is nowadays grown at small areas or in gardens, as old variety or an ecotype. The situation is similar with Ervum lens, Lathyrus sativus, Cicer arietinum and Vigna unguiculata. Few samples of these species have been collected in recent years. Pisum sativum is a major vegetable grain legume, but its use as young pods or dry beans has practically disappeared. Phaseolus vulgaris is the best known and the most widely used pulse and vegetable. Phaseolus coccineus is grown on a limited scale. It is used as green grains and as dry grains. It is also maintained as an important genetic resource, and there exist new cultivars. Other species, whose introduction has been attempted in recent decades, can actually be successfully grown in our parts. In the first place, those are species from the genus Vigna, some of which have been considered to belong to the genus Phaseolus until recently. Most important among these are V. unguiculata var. sesquipedalis, used as green beans, Vigna angularis and Vigna radiata used as dry beans. Lablab purpureus is typically grown in gardens as a decorative plant.

We believe that each of these grain legumes has a future if appropriate agricultural production methods and uses are defined for each of them. A review of existing research, we conclude it is necessary to collect indigenous genetic materials, assess their value, include genotypes in breeding programs and develop an adequate assortment of cultivars. It is also necessary to define optimal cultural practices for growing these crops for different purposes and methods of use.

Key words: *grain legumes, pulses, vegetables.*

EFFECT OF PRODUCTION METHOD ON THE QUALITY OF ONIONS

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Onions are used year-round, fresh or processed. Each of these uses requires specific cultivars and specific cultivation technology. Onions are traditionally grown from sets, but growing from seed becomes a common practice. In their turn, each production methods requires a special range of cultivars and application of a technology capable of ensuring adequate yield and quality of onions.

We studied the effect of production from sets (fall and spring) and from seeds (spring) on the quality of production of two onion cultivars, Kupusinski jabučar and Holandski žuti. Trials were organized at the experiment field of Institute of Field and Vegetable Crops in Novi Sad, for three years. The following characteristics were analyzed: bulb size, dry matter content and the percent of bolting. Fall planting brought largest bulbs of both cultivars. Planting date had no effect on dry matter content in Kupusinski jabučar. In the case of Holandski žuti, dry matter content in the bulb was higher with spring planting. Both cultivars had the highest percentage of bolting in the fall planting in both varieties, but the percentage was considerably lower with the former cultivar. The cultivars differed in bulb size. Kupusunski jabučar had a considerably larger weight of bulbs when planted in the fall and when directly sown in the spring. The two cultivars were similar in dry matter content, but the content was typically higher with sets planting than with seed sowing. The analysis of variance indicated that there existed statistically significant effects of the cultivar, year of growing, production method and their interactions.

Key words: *onion, quality, planting, sowing, sowing dates*.

DEVELOPMENT OF VEGETABLE PRODUCTION IN VOJVODINA REGION

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Vegetable production is one of the most intensive kind of crop farming. It is proved by yields and economic effects per unit of land. Subject of research in this paper is the analysis of changes in production (area, yield, total production) of important vegetables in the Vojvodina region, during period 2000- 2010. Results of research have to clearify tendencies and importance of vegetable production, for conventional development of agriculture.

In this paper the quntitative methods of research have been used.

The objective of the research is an analyses of natural of important vegetables in Vojvodina: potato, tomato, pea, cabbages, onion, red peppers, beans, malones, carrots, cucumbers and garlic.

The characteristics of the vegetable development in the Vojvodina region are: Harvested areas are decreasing for vegetables in all; Average yields of all analyzed vegetable crops are increasing; Total production of vegetable crops are increasing.

Key words*: vegetables production, development, Vojvodina region*.

THE CONTENT OF NPK NUTRIENTS IN THE VEGETATIVE ORGANS OF CAULIFLOWER (BRASICA OLERACEA VAR. BOTRYTIS L.) GROWN IN SOILLESS CULTURE TECHNIQUE

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The experiment was carried out in the greenhouse in the Mediterranean Agronomic Institute of Bari (IAMB.) located in the south east of Italy. The aim of this research was to evaluate macronutrients (NPK) status of the cauliflower grown in three inert substrates (perlite, gravel and pozzolana).

Nutrient losses were very low due to a good management practice and control of fertilizers application. The highest NPK nutrients application efficiency is obtained in phosphorus and it was 97,2%. Among nutrients, potassium was lost in the highest percentage (11,6%). Obtained losses did not cause high pollution of the soil and ground water.

Key words: *nutrients, substrate, potassium, cauliflower*.

THE INFLUENCE OF THE GRAFTING AND VARETS ON THE SENSORY CHARACTERISTICS OF WATERMELON

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The study of research of the influence of grafting and sorts on sensory characteristics that have been done so far differ significantly and are often completely contradictory. The objective of this research is to determine the effect of grafting on the sensory characteristics in our production conditions.

Two hybrids (Celebration F1 – H1, Zengo F1 – H2), each of them grafted on two stocks (Emphasis F1 – K1, *lagenaria* –K2*),* were used as objects of the experiment.

Colleagues from the High Agricultural School in Sabac (8.7. 2008) and from the Agricultural Faculty in Novi Sad (12.7.2008.) were asked to evaluate the characteristics described in the paper with the grades 1-5, according to the tables, for a total of six tested watermelons. In 2009 the survey was conducted only in the High Agricultural School in Sabac.

In each of the three polls it was confirmed that non-grafted fruits have better characteristics than fruits grafted on domestic Lagenaria type rootstocks.

Key words: *watermelon, grafting, variets, quality*.

INFLUENCE OF STORING OF CHICORY (Cichorium intybus L.) ON PHENOLIC COMPOSITION AND ANTIOXIDATIVE POTENTIAL

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In the thesis, the content of total polyphenols, fatty acids and antioxidative potential (AOP) in external and internal leaves of different varieties of chicory was investigated. We analyzed the red varieties 'Leonardo', 'Trevisio', 'Mesola', 'Verona', stained variety 'Castelfranco', sweet varieties 'Jupiter', 'Uranus', 'Mercurius' and red headed variety which was randomly purchased. Chicories have been stored at a temperature of 0,1 - 0,8 °C and relative humidity between 90 and 95 %. Variety and leaves influenced significantly the content of total polyphenols and antioxidative potential, while storing influenced the antioxidative potential only. Outer leaves have significantly higher AOP and higher content of total polyphenols. Chicory contains from 100 to 700 mg/100 g total fatty acids. The highest ratio (60 %) is represented by linolenic acid, followed by linolic (30 %), palmitic (15 %) and oleic (1,5 %).

Key words: *chicory, polyphenols, antioxidative potential, fatty acids*.

GROWING PELARGONIUM PELTATUM AND PELARGONIUM X HORTUM FROM CUTTINGS

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Pelargoniums are plants from the family Geraniaceae, and one of the most popular summers flowering species that adorn the balconies and windows of the houses and are present in the market since the 18th century. In Croatia, the most commonly grown are ivy-geraniums (*P. peltatum*) and zonal (*P. zonale*) geraniums. They reproduce vegetatively because propagating by seed is expensive and only large horticultural companies can afford growing from seed. Every year new cultivars are produced, but geraniums still have a very simple genotype and are grown very successfully adhering to a few basic rules for their cultivation. The aim of this study with the species *Pelargonium peltatum* and *Pelargonium x hortorum* was assessing the effects of the use of hormones to stimulate root growth when planting cuttings to receive plants and monitoring the development of cuttings. Cuttings of two different types of pelargonium were treated with hormone Rhizopon to stimulate growth and rooting. Results showed that hormone therapy has no significant effect on growth of this geranium species. Differences between treated and control seedlings were very small, hormone-treated cuttings had faster growth of its root, and thus the growth and development of their above-ground parts.

Key words: *geraniums, cuttings, hormone therapy, rooting, seedlings*.

INFLUENCE OF TEMPERATURE AND LIGHT ON GROWTH AND DEVELOPMENT OF ANNUAL FLOWERING SPECIES

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Annuals are plants that germinate, mature, bloom, set seed and die in one growing season. They are sometimes referred to as bedding plants because they provide color and fill in garden beds. This research was conducted in the laboratory of the Department for Plant Production at the Agricultural Faculty in Osijek. The aim of this study was to determine the effect of two different temperatures (18 and 24°C) and the length of daylight (16 and 24h) on germination of annual flower species. For purpose of this study two types of annual flowers seeds were used, seeds of floral species Dahlia and Zinnia. Seeds were sown in trays at two different depths (2 and 3 cm) and kept in a chamber under controlled conditions at two different temperatures (18 and 24ºC). After three weeks of controlled conditions, the stems and roots of young plants were measured. Root length of both flower species was significantly influenced by sowing depth and temperature ($p = 0.01$). Dahlia stem length was affected by seeding depth and temperature ($p = 0.05$) while the length of Zinnia stems was not influenced by either temperature or planting depth.

Key words: *Dhalia, Zinnia, temperature, daylight, germination.*

SOUTH AMERICAN TOMATO MOTH (*Tuta absoluta* Meyrick) IN THE EAST HERZEGOVINA REGION

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Tuta absoluta Meyrick – South American tomato moth (Lepidoptera, Gelechiidae) is considered to be one of the most economically important pest of tomato. It is also found on eggplant, potato, pepper, some weeds (*Datura stramonium, Nicotiana glauca*) and common beans. It is present on the EPPO A2 quarantine list, while it is not on the lists of the European Union.

In order to determine the presence of *Tuta absoluta*, the pheromone traps Csalomon ® were placed in greenhouses and at the open field at the localities of Ljubinje, Trebinje 1, Trebinje 2 and Trebinje 3, in the Eastern Herzegovina region. Overview and replacement of the traps were performed at intervals up to 15 days.

Determination of the species was based on the analysis of morphological characteristics and male genitalia.

Intensity of the attack was evaluated by visual examination of the tomato plants for the presence of damages. In order to determine the active infestation and *Tuta absoluta* development stages, random samples of 100 leaves were taken and examinated under a stereomicroscope.

Using pheromone traps, the first adults were caught on 18th June 2011 at the localities of Ljubinje and Trebinje 1. By reviewing the pheromone traps, the greatest number of 184 adults was noticed at the locality of Trebinje 2, where the strongest intensity of the attack was recorded with 19% active infested leaves.

Key words: *South American tomato moth, Tuta absoluta, East Herzegovina, tomato, pheromone trap, intensity of attack.*

PRODUCTIVITY ANALYSIS OF FIVE LEADING POTATO VARIETIES IN AGRO-ECOLOGICAL CONDITIONS OF MOUNTAINOUS REGION IN MONTENEGRO

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According to the planted areas potato represents the leading crop in Montenegro, cultivated at 20% of arable land approximately. Zoning of potato production is strongly conected with natural conditions, nevertheless primary depending on the climatic conditions. Potato production aimed for storage (lately consumed during autumn, winter and finaly spring) with 83.2% is dominant type of production and it's mainly produced in mountainous region of Montenegro.

Analysis of genetic productivity potential of five leading varieties in Montenegro (Kennebec, Agria, Aladin, Tresor i Riviera) has been done during 2010 and 2011 in municipalities of Zabljak, on mold soil type at 1 500 meters of altitude.

The highest number of tubers was found in parcel planted with varieties Tresor and Aladin-8.5, while the lowest number of tubers was found in Kennebec-6.8 tubers per plant. Comparing to other tested varieties Kennebec had significantly lower number of tubers.

Varieties Kennebec and Tresor had averagely biggest tubers (96 and 91 g), and differences found were statistically very significant.

Biggest tuber yield was measured in variety Tresor - 32,5 t/ha, while the lowest tuber yield was in varieties Agria and Riviera (24,0 and 25,2 t/ha). Tresor had significantly higher tuber production comparing to other varieties.

Key words: *potato, variety, number of tubers, tuber size, yield.*

OCCURENCE OF PLANT-PARASITIC NEMATODES IN ROGATICA IN POTATO FIELDS

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Locality Borike in Rogatica municipality is one of the most important seed and eating potato production regions in Republic of Srpska and Bosnia and Herzegovina. A survey was carried out in harvest time 2011 and soil samples were taken from 20 fields. Nematodes were extracted from soil by using Oostenbrink elutriator and identified under dissection microscope. Nematode genera were identified by morphological characters. 9 genera of plant-parasitic nematodes were identified: *Pratylenchus, Meloidogyne, Tylenchus, Tylenchorhynchus, Trichodorus, Aphelenchus, Rotylenchus, Paratylenchus* and *Criconemoides*. *Pratylenchus, Tylenchus, Tylenchorinchus* and *Meloidogyne* were the most dominant genera, present in 19, 16, 16 and 12 samples respectively. *Paratylenchus* and *Criconemoides* were present only in one sample. Root lesion, root-knot and stubby root nematodes can cause serious yield losses in potato production. Number of *Pratylenchus* individuals per 100 ml was in range of 5 to 360, whereas number of infective juveniles of root-knot nematodes was in range from 10 to 1085 and in 4 samples number of individuals was more then 240. *Trichodorus* was found in 2 samples with 5, and 10 individuals per 100 ml of soil. This survey revealed wide spread and high population densities of root lesion and root-knot nematodes suggesting that those nematodes have already established in the area.

Key words: *root-knot nematodes, root lesion nematodes, survey, population dencity*.

3.3 Animal Husbandry

A REVIEW REPORT ON CURRENT RESEARCH RELATING TO THE INTERACTION BETWEEN MICRO-CLIMATIC CONDITIONS IN COW-SHEDS AND THE GENERAL BEHAVIOUR AND MILK PRODUCTION OF DAIRY COWS DONE IN THE DEPARTMENT OF CATTLE BREEDING AT MENDEL UNIVERSITY IN BRNO

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Problems with global warming are worldwide discussed. Relatively specific problem is negative impact of high temperature on cattle in conditions of stable microclimate. Also animal welfare together with heat stress is a topic, which is discussed more and more frequently. Because of those reasons we study an impact of chosen micro-climatic values on production and behaviour of dairy cows representend by Holstein and Czech Fleckvieh-Simmental Cattle in last five years. Czech Republic has warmer and drier climate for lowland areas and a colder and wetter climate for highland and mountain areas, but separately relative humidity has no impact on observed parameters. The most important is temperature or temperature-humidity index (THI). Findings suggest that when the cow-shed temperature exceeds 23°C or 72 THI, milk production decreases by up to 30%. Also milk quality and cheesemaking properties are affected by micro-climatic conditions. The rennet coagulation time is shortened in summer temperatures but quality of curd (fresh cheese) is very poor. As far as the behaviour is concerned cow significantly ($p<0.05$) prefer left side when they lies. This laterality is not significantly affected by temperature but the higher temperature the higher number of cow on left side. The THI also can have an impact on milking frequency in automatic milking system (milking robots). If the 70 THI is exceeded the visits of cow in parlour declines. This results can be very important for farmers because they can avoid to easy mistakes what makes not only big economic looses and also reduces welfare quality.

Key words: *milk production, behaviour, heat stress, Czech Fleckvieh Simmental Cattle, Holstein*.

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EXTERNAL, INTERNAL AND SENSORY QUALITIES OF TABLE EGGS AS INFLUENCED BY TWO DIFFERENT PRODUCTION SYSTEMS

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This study was conducted to determine the effects of two production systems (organic vs conventional cages) on egg quality parameters during the late laying period. At the age of 18 weeks the pullets from Slovenian Prelux-G strain were housed in two different systems, i.e. organic and conventional cage, and eggs were sampled three times per system when the hens were 69, 75 and 78 weeks of age. The organic rearing unit consisted of one barn with exits to a grassland area. In the conventional rearing system hens were kept in cages with one hen per cage, providing 1287 cm^2 of floor space per bird. Hens were fed either with a standard organic diet supplemented with certified organic raw materials or with a complete feeding mixture for conventional egg production. The effects of production system were investigated on external quality as measured by egg and shell weight, shell colour and thickness and interior quality as measured by albumen height, Haugh units, yolk colour and incidence of blood and meat spots. The sensory attributes of fresh and hard boiled eggs were evaluated by using the quantitative descriptive analysis. A team of four trained panelists measured intensity of egg's sensory attributes in a numerical scale. Additional tests included fresh yolk and albumen pH analyses and hard-boiled yolk colour measurements. Yolk colour was evaluated through lightness (L*), redness (a*) and yellowness (b*). The fatty acid profile of yolk lipids was determined by gas chromatography. The eggs produced in organic system had paler yolks ($P<0,001$) and thinner egg shells ($P<0,05$) than the eggs produced in the conventional cages. Overall sensory quality was improved in eggs deriving from hens allocated in cages. Differences between organic and cage eggs indicated lower redness and higher yellowness ($P<0,001$) in organic eggs than in cage eggs. The organic eggs were characterised by a higher content of α-linolenic and docosapentaenoic acid ($P<0,05$) and lower content of linoleic acid ($P<0,05$) than the eggs from cages. The ratio of omega fatty acids, n-6/n-3, was most favourable in the organic eggs (5,93:1). In the cage eggs, the ratio n-6/n-3 was significantly ($P<0,05$) higher (9,55:1).

Key words: *laying hens, table eggs, quality, cages, organic*.

PHENOTYPE VARIABILITY OF REPRODUCTIVE AND PRODUCTIVE TRAITS OF SANSKA GOAT

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Goat milk is biologically highly valuable protein food meant for kid diet as well as raw material for making different milk products.

In the past few years Republic of Serbia has begun to revive the goat production, but still in very insufficient level. With aim to increase goat milk production import of high milk yielding goat breeds has been commenced (alpine, sanska, Bunte deutche Edelziege). Therefore we consider that from zootechincal, genetic and economic point of view it is justified to widely research reproductive and productive traits of sanska breed, because for importing main breeds are sanska and alpine.

Gestation period in our research was averagely 152 days with variations between 142-163 days. It has been determined that length of gestation period for goats with one kid is slightly longer than for goats that carry twins.

Goat fertility varies and mostly is depending on number of kids, individual heritable traits, diet, keeping and preparation for insemination, age of the goat at first insemination, kidding frequency, length of use in breeding. In our research fertility was approximately 130%.

Body weight of kids at birth was at average 3.54kg. Singles were 56.38%, twins 37.92%, and triplets 5.70%.

For average lactation length of 245 days 598kg of milk was produced.

Taking in to consideration the obtained results we can conclude that imported young sanska breed has very good genetic base for high milk yield, and we can expect significantly higher production compared to our domestic goat breeds.

Key words: *sanska goat, fertility, body weight at birth, milk production.*

Ministry of Science project TR 46009

THE INFLUENCE OF NATURAL MINERALS ON THE CONCENTRATION OF TOTAL PROTEIN AND ITS FRACTIONS IN THE BLOOD OF PIGS DURING REARING AND FATTENING

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In this abstract are shown the results of influence of natural minerals on total protein and its fractions in the blood of the Large White breed pigs during rearing and fattening.

Key words: *natural mineral, total protein, albumin, resistance*.

The use of natural minerals as an additive to the basic diet of animal nutrition in specific concentrations is necessary for correction of metabolic processes, resistance of organism to diseases. Blood proteins are the most objective indicators of metabolic processes in the animal organism. According to the nature the changes of total protein and its fractions can be judged about physiological state of animals, resistance to unfavorable environmental factors.Therefore, the study of quantitative changes of total protein and its fractions in pigs' organism under the influence of natural minerals is a hot topic of research.

First time, established the influence of natural mineral "Vodnit" and its mixture with natural mineral "Mainit" on the concentration of total protein and its fractions in the blood of pigs during rearing and fattening (90 and 180 days old).

Conclusion: 1. Increasing of total protein from 1.1% to 4.9% and albumin from 1.6% to 8% in the blood of pigs of experimental groups relatively to their control counterparts. 2. Due to increasing the blood concentration of total protein and albumin, the body's defense also increases.

PLAN OF BIOSECURITY MEASURES ON ONE HENS FARM

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Biosecurity on a farm is implementing a series of activities aimed at preventing the entry of infectious micro-and macro-organisms and their spread by farms.Good Biosafety program is an effective way to reduce the risk of the outbreak and spread of infectious diseases from animals to animals and from animals to humans.

For biosecurity on the farm is responsible owner of a farm that needs to be done with professional service biosecurity plan that will ensure full and effective implementation of biosecurity measures. In making any biosecurity plan must take into consideration the potential risks and key issues that may arise. Plan of biosecurity measures to be proposed of biorisk possible solution in the form of actual and anticipated threats, where threats to enumerate all the production to production manager can assess the threats should be prioritt in solving them.

Our article on a farm hens farm owner did plan of biosecurity measures. Prior to the Plan are made Biosafety assessment indicators as recommended S.Hristov (2007), found Biosafety risks and respond to prepared questions, as recommended S.Blezinger (2011), to identify critical control points. The questions referred to questions from the existing records of monitoring checklists for sanitation, use of equipment checklists, checklists prevention and measures for combating infectious diseases and monitoring the health of the farm, check list for poultry vaccination, control of traffic on the list of farms.

Plan of biosecurity measures on the basis of the analysis included the planning of activities on the farm, animal health monitoring and maintenance of required records. In addition to these elements of biosecurity measures plan includes a plan to isolate animals on the farm, plan the treatment of suspected disease, plan the movement of people on farms, movement of vehicles on the farm, handling equipment on the farm, to prevent animals entering the farm, farm management, the determination person to be contacted in case of accident situations.

Plan of biosecurity measures are basically on the three main components. They are: isolation, traffic control and sanitation. We have proposed the introduction of the owner (HCCP) standards, where would be the monitoring and analysis of critical control points to prevent or reduce the possibility of cross contamination and infection to enter the farm.

Key words: *biosafety, biosecurity plans, farm hens.*

FISH AS A HEALTH FOOD – ECOTOXICOLOGICAL VIEWPOINT

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Fish body metal (Cd, Pb, Zn, Cu, Al, Cr, Ni, Fe, Mn, Sr, Co) contents measurements, target organ and tissue distribution pattern analysis, bioaccumulation and biomagnifications studies have been undertaken on wide range of fish species belonging to various trophic levels within fish community from the Tikvesh reservoir in R. Macedonia. The results of the current study indicated liver, kidney and gonads as target organ for metal accumulation and muscle as the tissue with the lowest concentrations of metal residues. Fish caught between 2006-2008 from investigated area could be recommended as health food concerning metal burden, since Macedonian alimentary standards for Cd and Pb in edible tissues have not been exceeded.

Key words: *fish, metals, Tikvesh reservoir, R. Macedonia.*

IMPROVEMENT OF CARP MEAT QUALITY AS A RESPONSE TO MODERN CONSUMER'S DEMAND

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In the past decades technology development in all human activities implies easier and more sophisticated labor. Less physical activities, very often, is not accompanied with reduced calorific food intake. As a consequence there is increase of diseases such as: increased body mass, diabetes, stroke, high blood pressure, and coronary diseases. In order to solve such problems it is important to direct animal production towards breeding animals with reduced fat content.

Although fish meat is not responsible for any of the diseases mentioned, on the contrary, fish meat contributes to these diseases prevention; even so people choose to consume fish with reduced fat content. Carp is a freshwater fish species most frequently cultured and consumed in the Balkans, yet one of the frequent objections in this species choice is its high fat content. However, with improved technology of semiintensive production, fat content can be reduced by replacing grains as traditional added feed with concentrated feed. That way fat content in carp body is decreased from 10, even 20 % to 2 to 5 %. Additional effect of added concentrated, primarily extruded, feed is increase in omega 3 and omega 6 fatty acids, as well as their better ratio. Since semiintensive production is based on combining added and natural food, a stimulation of development of an extremely important natural component - bottom fauna could significantly contribute to better fatty acid content in carp. In fact family Chironomidae, particularly *Chironomus plumosus,* frequently found in carp ponds, contain a high concentration of omega 6 and omega 3 fatty acids. This is of special importance for cyprinid fish and their body fat content.

Carp with less and improved fat quality will certainly be more attractive to a choosy consumer.

Key words: *carp, extruded feed, meat quality, semiintensive production, modern consumer*.

HYGIENIC BEHAVIOR OF SELECTED FAMILIAL GROUPS OF HONEY BEE

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For modern beekeeping, of particular importance is the selection and breeding of bees that show traits of resistance to diseases. Hygienic behavior was, at first, considered as the ability of honey bees to fight against the American foulbrood. This trait is now defined as the ability of worker bees to recognize infected, infested or dead pupae in brood cells, open and eliminate them.

The aim of this study was to evaluate differences in hygienic behavior of different selected familial groups of honey bee and to make recommendations for further breeding. The experiment was carried out on the apiary of the selection center in Prokuplje - south Serbia (43°14´26.56"N and 21°35´54.97"E) and performed on colonies housed in Langstroth Rooth hives with ten frames. Each familial group had initially 10 bee colonies each. In two-year study, groups of bee colonies were monitored and analyzed. Hygienic behavior was studied using "pin-killed" method on 50 capped brood cells, and the reading was done after 8 and after 24 hours.

Determined variability indicates that some studied familial groups have better expression of hygienic behavior. By reading the results after 8 and after 24 hours, it was found that the bees from the third group cleaned 7.57% damaged cells or 9.31% more damaged cells than the average for the apiary. Although the factor of familial groups was not statistically significant, the results offer the possibility of selection of queen bees with better hygienic behavior to create lines with a pronounced hygienic behavior.

Ključne riječi: *honey bee, hygienic behavior, selection.*

FIZIČKO HEMIJSKA SVOJSTVA UZORAKA MEDA IZ REGIJE TREBINJA

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Jedan od najznačajnijih direktnih proizvoda medonosnih pčela je med koji je osnovna hrana pčela, a danas sve više hrana i lek čoveka. Posebno su interesantna fizičko hemijska svojstva meda iz okruženja Trebinja, s obzirom da ovo područje poseduje specifičnu medonosnu floru, koja se drastično razlikuje od brdsko planinskog dela Republike Srpske.

Ispitivano je pet uzoraka meda iz regije Trebinja i to: med od kadulje, zanoveti, livadski i drače, a od relevantnih parametara fizičko hemijskih svojstava, ispitivana je količina invertnih šećera, količina saharoze, procenat vode, kiselost, elektroprovodljivost, količina mineralnih materija, sadržaj hidroksimetilfurfurala, količina nerastvorljivih materija i polenska analiza.

Rezultati ispitivanja pokazuju da su gotovo svi parametri u skladu sa Pravilnikom o kvalitetu meda RS, izuzev tri uzorka koji pokazuju veću elektroprovodljivost i veću količinu mineralnih materija

Ključne reči: *med, fizičke osobine, hemijske osobine, polenov prah.*

HONEY PRODUCTIVITY OF BEES – APIS MELLIFERA CARNICA OF JASTREBAC AND KOPAONIK REGION

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As part of the selection and breeding of honey-bee in Serbia 5 Centers for Apis mellifera carnica selection program take part. In the center of the selection, breeding and reproduction of bees at the College of Agriculture and Food Technology in Prokuplje, exist 8 separated lines of Jastrebac and Kopaonik ecotype. Within one line there are 10 breeding queen-bees of the same origin which are being examined for the qualitative and quantitative characteristics that are important for improving our honey bees (Mladenovic and co-authors, 2007).

The experiment focused on examining the four lines of honey-bees in productivity during the acacia pasture by the modified Szabo method, whereby the entries in the measurement was done three times: before the pasture, 3 days after the beginning of the nectar intake, and after the acacia pasture.

According to the obtained data, the line DV1 singled out with the highest average nectar intake (average intake for 3 days was 9.3 kg, i.e. average total intake of nectar in the acacia pasture was 14.8 kg), while the weakest line was PKH1 (average for 3 days intake was 6.4kg, and for the whole period of nectar collection was 10.5 kg).

This study has clearly demonstrated and confirmed the great diversity of bee colonies in the tested lines and large differences between the compared lines (Rasic, 2009). The particular contribution of these experiments is the facilitation of choice and selection of the best bee colonies that will contribute to the improvement of these economically most important characteristics of the honey bee.

Key words: *bee selection, Kopaonik and Jastrebac ecotype, honey productivity, local Apis mellifera carnica.*

These data are the result of the Project 46009

HONEY QUALITY OF MORAVICKI REGION

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The present study was undertaken to determine the physico-chemical parameters of honey samples obtained from beekeepers in Moravicki Region in Serbia. Water content, ash, pH, apparent reducing sugars and apparent sucrose, content of HMF and diastase activity, were determined after the Harmonised Methods of the International Honey Commission. Samples of monofloral-acacia and polyfloral honeys were tested. These samples were found to meet all major national and international honey specifications.

Key words: *honey, quality, physico-chemical parameters*.

THE HUNTING FUND AND ITS USE IN THE REPUBLIC OF SRPSKA

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Republic of Srpska covers an area of 25,035 km^2, which consists of the various climate types. The variety of climate conditions and the existence of diverse biocenoses that allow existence fairly large number of species of flora and fauna.

On the territory of the Republic of Srpska total number of hunting grounds is 91. The basic desire of all is to fill the maximum capacity of hunting, and to achieve optimal of the strength. In order to reach the desired objective rationall plan must be managed at all levels. The catch must be the goal, but the purpose of safeguarding and realizing the optimum number of animals in hunting. It is necessary to point out that it can only be hunted in real growth, which will be achieved if the spring count, as a measure of determining the parent fund, the maximum realistic. It is frequently the cause of unrealistic shooting that leads to disastrous consequences. Management plans must take into account all the maximus objective facts on the ground. The main planning document is the " Development program of hunting in Republic of Srpska, for the period from 2010 to 2020." which was adopted by the Hunting Association in the Republic of Srpska.

Proper management of the implementation of planning documents in practice can achieve the desired results, that game is enough to be healthy and trophy value is high.

Key words: *hunting, forest management plans, biocoenosis, hunting grounds*.

THE CORRELATION BETWEEN THE PARAMETERS OF AESTHETIC VALUE FOR THE EVALUATION OF ROE DEER (CAPREOLUS CAPREOLUS L.) ANTLERS

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The roe deer (Capreolus capreolus L.) is the most populous and the most widely spread species of European "*Hochjagd*" and represents, along with the wild boar, the most important game species for trophy hunting.

The small size of roe deer trophies, combined with great distance and poor visibility, both common in roe deer hunting, frequently make estimation of trophy's worth in CIC points difficult. The aim of this study was to find the correlation between a number of trophy parameters relevant to CIC beauty score that can and the parameters that cannot be easily assessed while out hunting. In other words, the aim was to establish whether it is possible to estimate the diameter of the coronet based on the length, symmetry and type of the antlers, and to determine how precise such estimation can be.

For the purpose of this study, 116 roe deer trophies were measured. Roe deer, the trophies of which have been used in the study, were hunter-harvested over the last four decades on hunting grounds in the Republic of Serbia and on the territory of the former Socialist Republic of Bosnia and Herzegovina and the Socialist Republic of Croatia. Measurements of antler length, shaft length and coronet circumference were taken and trophies were assorted into one of the five categories according to appearance.

The measured assets were tested and compared through the T-, Z-, and nonparametric tests. The observation was that that there is no significant difference in the antler length, shaft length and coronet circumference correlation, regardless of the type of trophy, whereas it was apparent that symmetric trophies with larger tines had shorter shafts and larger crowns. The correlation between the coronet circumference and antler length was established as medium to strong.

Key words: *antlers, roe deer, coronet, tine, shaft, trophy, correlation.*

BIOLOGICAL PLINTH POTENTIAL FOREST TYPES OF HUNTING AREA FOR DERR AND REINTRODUCTION OF GAME

Marinović, Lj.

Srbijašume, Negotin, Serbia

The vegetation of certain areas shown on the sum of types of hunting areas and different forest habitats, from the point of living conditions offered by different animals have ecological significance. Certain types of hunting areas are largely consistent with the types of forest communities that have a variety of stocks, estimates of food and use of wildlife for a sustainable metabolism and body weight. The main purpose of this presentation and composition of vegetation across the biological characteristics of the load bearing potential of certain forest types, is to provide objective and reliable determination of population density in the range stipulated in certain game species habitat. Also in the etiology of game, tracking seasonal migration and the importance of each type of hunting areas of forest habitat for survival and development of wildlife, hunting and a better spatial distribution of breeding and technical facilities as well as overall management of the hunting area.

Our modeling of biological resources supporting the reintroduction of deer in the area of Beljanica – Crni vrh and hunting area of Homolje in Žagubica, was conducted on the basis of parameters from the Environmental Studies Polish Academy of Sciences for a variety of forest habitats phytocenoses, applied to our conditions. On the basis of existing forest vegetation types estimated biomass of herbaceous plants and floor zone woody browse, which can be used by deer during winter in a particular type of stock and dry matter in the 100 ha of habitat, with no visible damage to the forest and with 60% digestibility of matter. The amount of food and eating wild game taken from the 150-day winter period from November to March the average daily consumption of 4.5 kg dry matter for maintenance of metabolic energy. This leads to how much each type of forest habitat productive hunting areas can Supply heads of deer food on 100ha of land, which is supporting the biological potential of these forests during the winter.

Based on the analyzed types of forest habitats in the study area of biodiversity 25000ha hunting productive surfaces, mosaic distribution of different productivity and biomass, which eat other complementary and need to replenish in feeding of deer based on wildlife, the habitat conditions are favorable to be suitable for the cultivation and sustainable development this game. The optimum height of the parent stock of deer, on the basis of the biological potential of supporting certain types of forest habitats in the total study area is the lpp 400gr range from 315 to 530 animals. Therefore it can be concluded that the standards of determining the biological potential of supporting this method is more accurate determination of the approximate estimates of quality evaluation.

Key words: *biological potential, deer, reintroduction.*

NEWER ASPECTS OF ANIMAL AND HUMAN ECHINOCOCCOSIS DIAGNOSTICS

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Echinococcosis is zoonosis. Parasitic disease caused by cestode from *Echinococcus* family. Four forms of this parasite can induce disease in human organism.

Echinococcus granulosus causes cystic echinococcosis, while *Echinococcus multilokularis* causes alveolar echinococcosis, whereas E.vogeli and E.oligarthrus cause polycystic echinococcosis.

These four species differ in geographical distribution, permanent and intermediate hosts, looks and cyst localization as well as in characteristics of adult forms. Diagnosing of echinococcosis in animals and humans is conducted based on morphological and morph-metrical parameters cystic forms. For adult forms diagnosing is done based on same parameters and based on egg resistance. For intermediate hosts and humans diagnostics is being confirmed with organ tissue changes, laboratory parameters, ultrasound diagnostics and parasitological examination of cyst contents.

Latest research in gene mapping show genetic variations that can be found in adult and cystic forms of this parasite species.

Based on latest PCR research method new classification of ten new genotypes has been determined: G1- sheep, G2-tansmanian sheep, G4-horse, G5-cattle, G6-cammel, G7, G9-pig, G8-deer, and G10-phenoscandinavian. G1, G2, G3, belong to *E.granulosus sensu stricto* species, G4 belongs to *E.equinus* species, G5 belongs to *E.ortleppi* species, G6, G7, G9, and G8 and G10 belong to *E.canadesis,* lion genotype belongs to *E.felidis* species.

In Serbia patients who were surgically treated for cystic echinococcosis, with PCR diagnostic method it has been determined that they were infected by species that came from sheep (G1) and pigs (G7).

Key words: *echinococcosis, diagnostic, genotyping*.

CONDITIONS AND PROBLEMS OF HYGIENE AND MANUFACTURING PRACTICE IN PRODUCTION OF TRADITIONAL AND REGIONAL PRODUCTS OF ANIMAL ORIGIN ON FARMS IN SERBIA

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Traditional agricultural and food products represent an expression of culture and lifestyle resulting from the local climatic, agricultural and economic conditions that determine production and processing practices. They have characteristics that distinguish them from similar and generic products, either in terms of composition (raw material and primary products -species and/or variety- and their combination) or production and processing methods. Traditional agricultural and food products can have positive impact on rural development and the preservation of biodiversity but knowledge and skills of producers very often represent the limiting factor for further improvements. The research with the focus on conditions and problems of hygiene and manufacturing practice in production of traditional products was conducted. Small producers, farms and households involved in the production traditional and regional products were surveyed regarding the existing technical and personnel conditions in the production. The survey has covered the following areas: status of the facility, knowledge of the principles of good hygiene and manufacturing practices and applied processes in the production. The survey covered 70 producers of traditional animal products. According to results obtained on the basis of research conducted among small producers most producers have clear recognition of need for permanent hygiene maintenance, but in recorded cases where hygiene is not part of daily activities knowledge of producers has to be upgraded. Producers in meat processing apply, by tradition good processing practice. Some improvements may be introduced relating animal welfare and application of additives and supplements, but the main point should be quality standardization. It is also very important and necessary to adopt a legal framework for small producers of traditional products regarding the requirements for the conditions in which the production takes place.

Key words: traditional products, hygiene, practice production.

3.4 Agroecology and Organic Agriculture

ROLE OF ORGANIC AGRICULTURE IN PROTECTION OF NATURAL AND AGRICULTURE ENVIRONMENT

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The main mission of conventional agriculture is to produce enough food to feed entire human population (*Saunders, 2008, Lazic et al., Milutinovic, 2006*.). Without doubt, conventional agriculture improved overall food production but did not provide required self-sufficiency and expected food safety. Based on high investments and total dependence on external inputs (oil, mineral fertilizers, pesticides…) as well as the impact on soil, environment and rural economy, conventional agriculture becomes *unsustainable*. There are numerous examples and warnings that conventional technologies that are used today in agriculture are technologies which itself are not sustainable (*www.tehnologija,*). If the World realized that can not continue as before; the question is what is the alternative? The ways indeed are different, only the choice is responsibility for us and generations to come. However, the profit motive is so strong that responsibility even for us is insufficient and towards others completely questionable.

In recent period of economic development, agriculture of Republic of Srpska was low investment industry (small amounts of mineral fertilizers, pesticides …) and agricultural land is biologically and chemically well revitalized and slightly contaminated with undesirable and hazardous substances. Because specific mode, quality of composition and product safety, diversity of grown species, the organic agriculture is ecologically profitable and economically self-sustainable (*Dardic et al., 2010*). Thereby is set the basic goal of the research; if and how much contribution agriculture of Republic of Srpska gave to conservation of natural and agricultural environment?

Key words: *organic agriculture, environment, protection*.

ORGANIC GRASS SEED PRODUCTION AND ENVIRONMENTAL PROTECTION[1]

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Safe grass seed production belongs to domain of organic production, which enables getting of quality final product. Produced seed is the first and the most important phase in the process, because from the seeds production will depend the need to use protection chemicals later. With the right mix of favorable characteristics of the legumes, one can provide quality forage which later impacts the health of cattle and meat for food industry. Aspect of production safety brings new issues into production. Respecting the legislation, placing of domestic grass varieties of controlled origin, which are not contaminated with diseases and presence of weed seeds, using adequate agrotechnics and genetic potential, is going to contribute to organic production development and environmental protection. Use of intact natural resources, with introduction of good agricultural practice which recommends reduced use of mineral fertilizers as well as agricultural chemicals, will introduce innovation into production. Cooperation with advisory services in agriculture will connect producers with renowned seed houses and integral protection methods. Only quality products can enable breakthrough into foreign market, reduce production expenses and enable environmental protection.

Key words: *organic grass seed production, environmental protection, legislation*.

[1] Paper is a part of research at the Project 46006 "Sustainable agriculture and rural development in the function of achievement of strategic goals of Republic of Serbia within Danube Region", which is financed by the Ministry of Education and Science of Republic of Serbia, project period 2011-2014

YIELD AND OIL CONTENT IN SOYBEAN OF ORGANIC AND CONVETIONAL CULTIVATION METHOD[1]

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The study was conducted in conditions of organic and conventional growing technologies on the calcareous chernozem after wheat crop. Factors tests were three varieties of soybean (Galina, Sava and Mima), which were sown at three different planting densities (400 000, 500 000 and 600 000 plants per hectare) which represented a second factor tests. Data were analyzed by analysis of variance methods by split - plot experimental design, where the factors of examination: variety and sowing density and the differences between treatments were tested by LSD test. The aim of this study was to determine the yield and oil content in soybean grain depending on the genotype and planting density in organic and conventional cultivation.

The average yield in the conventional technology of production was 4.84 t ha^{-1} and was higher in comparison with organic production method where the recorded yield of 4.68 t ha^{-1}. The analysis of average yield varieties was found statistically significantly higher yield varieties Mima in relation to the cultivar Sava in both growing technology. Other differences were not statistically significant. The planting density in conventional production was not significantly affected the yield. When the interaction cultivar x density there was a significant difference. Variety Mima had a significantly higher yield than cultivars Sava density of planting 400 000 to 500 000 plants ha^{-1} or very significantly higher yield at density 600 000 plants ha^{-1}. Influence of planting density in an organic way of growing soybeans was highly significant. With a planting density of 500 000 plants ha^{-1} was achieved at a significantly higher yield compared to other densities tested.

On average, evident in both growing technology was achieved average oil content of 21.78%, with a higher percentage of oil found in organic production (21.88%) compared to conventional production (21.68%). In both modes of production variety Mima had the highest oil content, because the artwork is genetically conditioned. Increasing planting density in both production technology decreased the oil content in grain. Increasing planting density in both production technology decreased the oil content in grain. In both test technology production have shown a high negative correlation between protein and oil content in soybean grain (-0.91** organic and conventional -0.86**).

[1] The work is part of the research project III 46006 "Sustainable agriculture and rural development in order to achieve the strategic objectives of the Republic of Serbia in the Danube Region" and project TR 31031 "Improving the competitiveness and sustainability in organic crop and livestock production using new technologies and inputs" which is funded by the Ministry of Education and Science Republic of Serbia.

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FEATURES OF USING BIOMASS AS AN ENERGY SOURCE

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Biomass is a potential energy resource that can significantly contribute to an energy portfolio with low greenhouse gas emissions and to certain extent it can help to reduce overall energy dependence of the Republic of Srpska. In this article we presented biomass potential from forestry and agriculture sectors in the Republic of Srpska including the wide range of biomass resources available and potentially available that are suitable for conversion-to-energy technologies. The study showed that large amounts of biomass exist in forests, however, it's utilisation is complex as forests are supposed to provide multiple functions and values. This implies that absolute forest biomass exploitation is not concentrated, hence forests are not to be clearcut and biomass for energy can be obtained with similtaneous achievement of multiple goals. Along with forest biomass, biomass potential from agriculture was described as well. Most attention was given to biomass products from crop and animal husbundry. Agricultural products also present significant potential for energy production. It was concluded that agricultural and forest product residues in the Republic of Srpska can provide a biomass energy conversion feedstock without increasing land requirements. However, due to complexity of forest ecosystems and agricultural production, the most appropriate utilisation techniques are yet to be found along with development of biomass market.

Key words: *biomass potential, energy, forest products, agricultural products*.

PRODUCTION OF BIOENERGY IN POSAVINA REGION

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The Article describes results of the project "*Agricultural Biomass Cross-border Development of Energy in Posavina - ABCDE Posavina*" implemented within IPA Cross-border Programme between Croatia and Bosnia and Herzegovina whose main objective is the promotion of agrobioenergy in rural economies by including utilisation of agricultural biomass for energy purposes in Posavina region. The region includes Vukovar-Srijem County (VSC) in Croatia and four municipalities (Odžak, Domaljevac-Šamac, Orašje, Šamac) and district Brčko in Bosnia and Herzegovina (BiH). These areas represent valuable agricultural land with a good potential for economic utilization.

Analysis of agricultural biomass potential includes production of biogas in co-digestion of manure (cattle, pigs and poultry manure) and maize silage (input of maize silage is limited at 30% of feedstock mass), biodiesel from oil rapeseed and bioethanol from maize. Potential GHG savings are estimated for the biogas and biofuels use.

Theoretical biogas energy potential is estimated at 1,386 TJ/yr for VSC and 574 TJ/yr for BiH. Based on the theoretical potential for the production of electricity and heat from biogas, total installed capacity in VSC would be 19.8 MW_e while in BiH 8.2 MW_e. Related theoretical potentials for biodiesel production are 4,258 TJ/yr (VSC) and 1,415 (BiH) while for bioethanol these are 6,140 TJ/yr and 1,689 TJ/yr respectively. It is assumed that 50% of total theoretical biogas potential and 30% of total theoretical biofuel potential are achievable. Annual GHG savings for biogas use are estimated at 31.30 $ktCO_2$-eq (VSC) and 26.84 $ktCO_2$-eq (BiH). Annual GHG savings due to biodiesel use are estimated at 37.46-64.22 $ktCO_2$-eq (VSC) and 12.45-21.34 $ktCO_2$-eq (BiH) and for bioethanol use at 54.02-92.61 $ktCO_2$-eq (VSC) and 14.86-25.48 $ktCO_2$-eq (BiH).

STARTING A BIOGAS PLANT ON CATTLE FARMS IN BOSNIA AND HERZEGOVINA

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Today, energy is wealth and also occupies an important role in the cost of cattle production. The reduction of existing resources is essential to turn the search renewable energy sources.

On the other hand, increasing the number of animals per farm leads to problems with its proper storage the manure and manipulation whit it. Before us is the adoption appropriate EU directive regulating this issue, which will lead to even more problems for farmers. Strengthening of production facilities and increase production by increasing demand for energy is increasing.

Here there are opportunities for biogas production in cattle farms and use the same energy production. This energy would be used for the farmer or sold in the energy market.

In this moment a problem for the mass production of energy from biogas is a lack of clear legislation and low cost of purchase of energy obtained from renewable sources.

Key words: *bio-gas, renewable energy, cattle production*.

POTENTIAL FERTILITY OF SOIL TYPES OF AGRICULTURAL LAND OF REPUBLIC SRPSKA

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The basis of planning and use of agricultural land of the Republic of Srpska as the basis of the planning process of using agricultural land is a strategic document of the Government of the Republic of Srpska that was drafted in 2009 by the Agricultural Institute of RS, the Department of Agrochemistry and Agroecology. Data on land resources of the RS are systematically sorted into digital GIS database, which depending on the goal; provide opportunities for a wide variety of analysis and modeling. The basis of Srpska made in this methodology, presents a dynamic component of the planning process of land use RS.

In this work, for the first time, the basic GIS analysis of Soil Map of BiH (1:50000) was made for the Republic of Srpska. Using digital maps of land cover and land use of RS (LC / LU) by GIS analysis the data from the soil map extracted soil types that are used for agricultural production and analysis of the potential fertility of the soil types. Of the total agricultural land of RS (1047724 ha) arable land (arable land, gardens, orchards, vineyards and meadows) cover 719 902 ha (68.7%). Out of these, acidic soils having limited physical and chemical characteristics for the cultivation of most crops, occupy 340 557 ha or 41.2%. Hydromorphic soils, on which the amelioration measures need to be carried out in order to have fertility potential, take 127 858 ha (17.8%). Out of these areas, now in the RS (4.25) a detailed drainage (drainage pipe) has been made on the 5340 ha in the eighties of the last century. This paper presents a detailed analysis of agricultural land by class (automorphic, hydromorphic soil) and soil types, especially for arable land, especially for grazing.

All results are presented in digital form in a Geographic Information Systems (GIS). They are made in the ArcGIS software, the Gauss Krueger projection at a scale 1:50000.

Key words: *soil types, agricultural land, arable land, pastures, GIS.*

INTRODUCTION OF CONTINUOUS MONITORING OF AGRICULTURAL LAND OF REPUBLIC OF SRPSKA

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Strategy of sustainable agricultural development is impossible without monitoring changes in the soil as an integral part of environmental monitoring. From 1992 to 1997, the monitoring of land is introduced respectively: Bulgaria, England, Finland, Czech Republic, Norwign, Slovakia, France, Holland, Hungary, Austria, Spain and Germany. Slovenia introduced it in 2007, and Croatia in 2010. Because of the many specifics of land in relation to water and air, this job is very complex and expensive, and the importance of protecting land was not sufficiently recognized by decision makers in the RS and FBiH. However, the importance of monitoring land is stressed by the EU, which is by the implementation of Section 6 Programme of Action for the Environment, raised the importance of land protection at the level of protection of water and air. *("Environment 2010: Our Future, Our Choice" - Decision of the European Parliament and Council of the European Union 2002*). European Commission in 2006 proposed to the European Parliament and the Council of the European Union Water Framework Directive for soil protection COM (2006) 232 aimed at ensuring the protection of land based on the principle of conservation of its function, prevention of soil degradation, mitigation of degradation and repair of degraded land. Agricultural Institute of RS, ie. Department of Agrochemistry and Agroecology from 2002 to 2011 completed several major projects aimed at the introduction of continuous monitoring of agricultural land, the only monitoring within environment monitoring that is not introduced in RS. This paper presents the results of previous research and implemented projects that were aimed at finding the most appropriate model for establishing a permanent monitoring of agricultural land in the RS. Also, it presented a model for establishing a permanent monitoring of pollution of agricultural land of the RS, which will meet all EU requirements and is acceptable for the economic situation of the Republic of Srpska.

Key words: *monitoring, agricultural land, pollution*.

CHANGE IN THE PEDOLOGICAL CHARACTERISTICS OF THE DEPOSOL AT RECLAMATION

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Research on the reclamation of deposol in the lignite mine Stanarihas been performed since 2007. In a three years period, agrotechnical and biological measures of the reclamation were implemented on the experimental plot. During the cultivation of crops, mineral fertilization and liming were performed. The conducted research includes the change of the basic physical and chemical characteristics in the surface layer of the treated deposol. Analyses were performed in 2009. and 2011. Changes in the mechanical part were monitored by reduction in the clay fraction, which didn't result in. Significant improvement of the reaction of the soil wasn' tconfirmed. Slight increase in concentration of the physiologically active P2O5 and K2O is the result of the application of mineral fertilizers. Adsorptioncapacity and degree of saturation of base cations in the meliorated deposol were increased. The content of trace elements was reduced at the end of the test period. The presence of toxic elements is below the allowable limit. On the experimental plots where reclamation measures were implemented, there is improvement in of physical and chemical characteristics of the meliorated deposol.

Key words: *meliorated deposol, physical and chemical characteristics, biological reclamation, Stanari*.

WEED VEGETATION OF CEREALS OF UPPER JADAR AND POCERINA

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Visoka poljoprivredna škola strukovna škola Šabac

The studying of the weed vegetation of cereals has been the research topic of our numerous scientific workers (Kojic 1951, 1953, 1972, 1973; Kovacevic 1953, 1956, 1973, 1976; Sinzar 1965, 1967; Jelesijevic and co-workers 1975, 1077; Milijic 1980; Stepic 1984; Milosevic 2008).

Tis paper is aimed at examining the composition of weed phytocenoses, syntaxonomic affiliation, life forms incidence and the presence of floral elements. The research has been conducted during 2011 on the surface of 400 km^2 and the distance between the lowest (Jevremovac 88m) and the highest point (Cer 687m) being 600m. On the basis of the results obtained, the weed vegetation of cereals of upper Jadar and Pocerina belongs to the association Consolido-Polygonetum aviculare (Kojic 1973). The association has a terrophyta character, according to the biological spectrum (63.21%) with the high presence of perennial weeds of geophyta (22.64%), hemicryptophyta (13.21%) and the transitory forms 0.94% - Terro-hemicryptophytas. In total, 106 weed species from 29 families have been found.

Regarding the phyto-geographical characteristics, it can be said that this association has a high incidence of floral elements that are widespread (Euro-Asian, Sub-Euro-Asian, Sub-Middle-European, Cosmopolitan, Sub-circumpolar and Middle-European), having 76.43% i.e. 81 taxon.

Key words: *upper Jadar, Pocerina, cereals, association, floral elements*.

WATER USE EFFICIENCY OF IRRIGATED AND RAINFED CROPS OF GREAT IMPORTANCE IN SERBIA

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Numerous analyses have shown that sucsessful field crop production strongly depends on natural water supply. Climatic conditions varied from year to year especially precipitation depth and rainfal occurence. Natural water supply (rainfall and capilary rise) rarely meet crop water requirements, therefore irrigation has great role in yield assurance and quantity as well as agricultural production in general.

Results obtained from perannual experiments carried out on field crops showed out that yield could be increased from 50 up to 100 %, even more if extreme drought occurred during growing cycle. Irrigation as a key factor in high and good quality yield assurance should gain greater importance in agricultural practice in Serbia. Apart to this, land use could be increased, new cash crop introduced and crop rotation improved.

The aim of this work was to determine water use efficiency (WUE) of irrigated and rainfed crops grown in Serbia: soybean, sunflower, maize, sugar beet, alfalfa, fodder sorghum, green bean, union and cabbage. Analysis of crop water consumption and obtained yield was based on data collected from various scienticic publications.

Research of water use e.g. by soybean were carried out in the period from 1979 – 2004 throughout the whole country of Serbia. Average value of WUE of irrigated soybean was 0.81 kg/m^3 and 0.72 kg/m^3 of rainfed ones. Maximal value of 1.05 kg/m^3 were obtained during growing cycle of 2002 and minimal of 0.29 kg/m^3 during extremely rainy 1999. Obtained results of water use efficiency are much higher in comparison with those ones obtained in China (0,57 kg/m^3 of irrigated and 0,25 kg/m^3 of rainfed soybean), and comparable to those obtained in Italy (0,85 kg/m^3) and other most developed country. Irrigation effect differed by years, but not strictly due to rainfall amount and occurence. It indicates that WUE depends also on some other factors, such as extreme temperatures, frost, hail, nutrient suppy, plant health etc. Yield of some crops strongly depends on available soil moisture such as onion, alfalfa, fodder sorghum, maize and soybean with clear relationship, whereas of some crops such relation cannot be found. Yield prediction could be based on obtained relationship and water availability and this can be useful tool for decision makers, insurance company etc. Comparing data of WUE obtained in this research with those obtained in highly developed country it is possible to discover in which direction further research should be done in order to increase not only water use efficiency but also to establish good agricultural production.

Key words: *water use efficiency, irrigation, field crops, vegetables*.

SPATIAL AND TEMPORAL DISTRIBUTION OF POTENTIAL VULNERABILITY TO WIND EROSION PROCESSES IN VOJVODINA

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Wind erosion represents significant type of degradation of arable agricultural soil. Natural and antrophogenic factors in Vojvodina are favourable for the occurance and development of intensive wind erosive processes. Along with the numerous causal factors of complex process of wind erosion (relief, climate, soil, vegetation, manner of land usage, land consolidation, etc.), in this paper accent is especially on climate as an agressive component of wind erosion processes. Primarily wind, and then precipitation and temperatures, i.e. unfavourable coincidence of the aforementioned climatic elements, directly or indirectly effect the potential occurence and the development of wind erosion. Actual realisation of the process, that is, forming of wind deposits, depends on all the other factors.

Continental climate of spacious Pannonian Plain with frequent strong and dry winds that sometimes exceed 40 m/s; annual precipitation sums are sometimes even below 300 mm; great temperature amplitudes, distinctively plain relief, insufficient (6.4%) and poorly arranged woodland; over 70% arable land with soil of fine mechanical composition that are sometimes without any vegetation and can be highly erodible during the intensive agricultural production; agricultural plots that are expanded by land consolidation; small areas under irrigation systems; changed pattern of crop planting; extremely dry periods during several years, those are just some of the factors that indicate that Vojvodina has really high potential endangerment by wind erosion.

Based on unfavourable coincidence of climatic factors, one can distinguish areas and periods when the conditions of potential occurance of wind erosion are at its most agressive. It is determined that, according to the climatic factors, the area of Banat is more endangered than the other areas (3 to 4 times more so). The most intensive processes are possible in early spring (April) and in fall (October), expecially in extremely dry years. Spatial and time assessment of erosion potential has practical value, because it enables measure planning for anti-erosional conservation of land and water. Climatic zoning can serve well with planning locations and types of windprotection belts, appliance of conservational agriculture or some other protective measures etc.

Key words: *wind erosion, erosion factors, intensity of erosion, soil degradation.*

VOLATILE ORGANIC COMPOUNDS MEDIATE PLANT-PLANT AND PLANT-INSECT INTERACTIONS

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Plants constantly release volatile organic compounds (VOCs) into their surrounding environment. These VOCs can play very important role for plant survival. It is common that complex of biotic and abiotic stimuli force the plants to change their volatile profile as a result of adaption to given situation through new physiological and biochemical adjustments. For instance, in last 20 years it has been shown that pathogen infection, herbivory attack and mechanical damaging force the plants to modify their volatile profile as a respond to damage. Changes in volatile profile of damaged plants can be used by neighboring receiving plants as information about potential risk of possible upcoming attack. These volatile interactions may induce resistance in receiving plants making them less attractive to herbivory and at same time more attractive for herbivore natural enemies. These volatile interactions between plants can occur between different plant species as well between different genotype of same species. Here we are going to review the main findings on volatile interaction between plants and their implications in tritrophic interactions.

Key words: *volatile profile, plant-plant interactions, tritrophic interactions*.

EFFECTS OF BOTANICAL INSECTICIDES ON APHIDS IN ORGANIC APPLE PRODUCTION

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Preventive methods have to be "the first choice" in the control of pest organisms in organic agriculture. If there is a justified reason, some of the active ingredients which are allowed considering Regulation EC 889/2008 Anex II, e.g. national regulations (Organic Production Law and Regulations) can be applied.

The efficacy of botanical insecticides in the control of aphids in organic apple production was evaluated. Pyrethrins and combination of pyrethrins and rotenone were more efficient compared to rotenone applied alone. Combination of pyrethrins and piperonyl butoxide showed quick initial effects. Toxic effects of neem-based insecticide (*Azadirachta indica* extract) proved to be slowly. In the concept of integrated protection, besides the application of botanical insecticides, tolerant and less susceptible cultivars are grown.

Organic production is less profitable if more treatments with botanical insecticides are conducted. The aim of the study was to reduce application of botanical insecticides to a minimum level thus preserving natural enemies of aphids and to define an optimal method in the control of these pests.

Key words: *apple, organic production, botanical insecticides, aphids*.

ENTOMOPATHOGENIC NEMATODES (NEMATODA: RHABDITIDA) IN SLOVENIA: FROM TABULA RASA TO IMPLEMENTATION INTO CROP PRODUCTION SYSTEMS

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Studies of entomopathogenic nematodes (EPNs) are nonetheless in many countries of the world limited to laboratory work. The reason for this lies in the fact that nematodes are in such areas still regarded as the so-called alien species, since their presence has not been confirmed in natural environment. The first studies of EPNs in Slovenia began within the project L4-6477-0481-04 in 2004. In Slovenia the Rules on biological plant *protection* (2006) prohibit introduction of alien species into natural environment. Since until 2007 EPNs were in Slovenia considered as foreign species, all studies had been limited to laboratory experiments. Because we wanted to implement their use in food production in Slovenia, we decided to study the presence of EPNs also in our soil. After discovering these biological agents, Slovenia became one of the countries where the use of nematodes as means of biological protection is sanctioned by law also for outdoors application.

Key words: *entomopathogenic nematodes, biological control, Slovenia.*

DETERMINING THE PRESENCE AND CONNECTIVITY OF NON-FOREST GREENERY ON THE LAND CONSOLIDATED AREA

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Land consolidation is aimed at improving conditions for agricultural production. The improvement is reflected in the grouping of scattered and distributed agricultural allotments into larger parcels. New plots are of regular shape, suitable for the application of modern agricultural machinery, with direct access to the network of field roads. In order to form suitable plots in grouped ownership it is necessary to perform clearcut of almost all forms of non-forest greenery, because it represents an obstacle for land consolidation. The presence of non-forest vegetation in the area with a large percentage of arable farmland is of great importance. Functions of non-forest greenery are reflected to the protection of soil from drying and wind erosion, conservation of biodiversity and landscape outlook. This paper presents the possibility of determining the presence and connectivity of non-forest vegetation using Google Earth satellite imagery. Identified areas under non-forest vegetation are classified as a point, line and surface elements. Presence, interconnectivity and spatial distribution of non-forest vegetation has been determined by using geographic information system on land consolidated area of the municipality Ada. The state registered using satellite images was compared to condition which would be obtained after realization of a project of establishing windshield belts.

Key words: *land consolidation, non-forest greenery, geographic information system.*

INFLUENCE OF WEATHER CONDITIONS IN 2011. ON AGRICULTURE PRODUCTION

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This paper analyzes the temperature and precipitation in The Republic of Srpska in the period from October 2010 to February 2012 and their impact on agricultural production. The last two years had been very unusual when it comes to precipitation: 2010 was extremely wet (most rainfall in the last 50 year), 2011 was the driest one in the last 100 years, which had a negative impact on yields in agriculture. Mean air temperatures in 2011 were higher than long term average, evapotranspiration had been increased which further contributed to soil drying. High temperatures and lack of rainfall in the growing season have resulted in very poor yields and fruit quality in almost all crops and especially for corn and soybeans. The average soybean yield in 2011 is 1677kg/ha, which is 30% less than normal. The average corn yeld was 3784kg/ha, which is 14% lower compared to the 2010th year. In grasses and legumes also recorded lower yields by 30% depending on the time of harvest. Extreme weather conditions are continuing at the begining of this year: February 2012 is characterized by extremely low temperatures, unusually large number of ice days and very high snow cover.

Key words: *droughts, agriculture, The Republic of Srpska.*

DETERMINING THE PRESENCE AND CONNECTIVITY OF NON-FOREST GREENERY ON THE LAND CONSOLIDATED AREA

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Land consolidation is aimed at improving conditions for agricultural production. The improvement is reflected in the grouping of scattered and distributed agricultural allotments into larger parcels. New plots are of regular shape, suitable for the application of modern agricultural machinery, with direct access to the network of field roads. In order to form suitable plots in grouped ownership it is necessary to perform clearcut of almost all forms of non-forest greenery, because it represents an obstacle for land consolidation. The presence of non-forest vegetation in the area with a large percentage of arable farmland is of great importance. Functions of non-forest greenery are reflected to the protection of soil from drying and wind erosion, conservation of biodiversity and landscape outlook. This paper presents the possibility of determining the presence and connectivity of non-forest vegetation using Google Earth satellite imagery. Identified areas under non-forest vegetation are classified as a point, line and surface elements. Presence, interconnectivity and spatial distribution of non-forest vegetation has been determined by using geographic information system on land consolidated area of the municipality Ada. The state registered using satellite images was compared to condition which would be obtained after realization of a project of establishing windshield belts.

Key words: *land consolidation, non-forest greenery, geographic information system.*

STRATEGY OF LAUNCHING PRODUCT -ECO-FRIENDLY PAINT ON THE EXAMPLE OF DEVINE COLOR –VALSPAR CORPORATION BRAND

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Marketing strategy for a product, which is considered to be a market leader, is aimed to either maintain or increase its market share. This can be done with either improving the product, increasing the level of quality, number of retail shops or searching for the new marketing segments. Devine Color a Valspar Corporation brand is American company that represents ecologically-conscious alternative to standard paint for industrial and business interiors. Devine Color a Valspar Corporation brand, is one of the largest global coating manufacturers in the world dedicated to consumers and to ecology.

Purpose of this essay: Purpose of this essay is to show on the practical example Devine Color -Valspar Corporation brand, the importance of recognizing business opportunity as well as the importance of time factor and strategy for conquering new marketing segment in relation to competition, so that company could expand its operations far beyond their borders.

Problem: Devine Color availability is limited in many United States and most Canadian locations, which hinders product awareness. However, some of the company's distributors are farther reaching.

Establishing a relationship with internationally recognized retailers, such as Home Depot, Lowe's or „Wal-Mart",represents important business opportunity for Devine Color - Valspar Corporation brand.

Analytical methods used in the essay**:** Research was focused on modern business practice with use of relevant literature. Analytical methods used in this essay are: "SWOT" analysis, induction, deduction, synthesis, abstraction, generalization and analysis of subject-matter.

Results of the research: Use of the marketing strategy with purpose of launching product is explained on the case study of Devine Color -Valspar corporation brand. Devine Color has a goal to build up existing distribution network in the American market and to conquer Canadian market. Success of the launching campaign is from the great importance for Devine Color because Canada is ecologically conscious country and potential consumers have high purchasing power. Many competitors are already present on the market and they offer their products at much lower prices. To withstand and surpass competition, Devine Color must extensively promote its primary advantage of eco-friendly components in its products, variety of colors, durability and high quality. Product is made for everyone especially woman. For the purpose of marketing research analysis of Canadian and American statisticians have been taken in consideration as well as data from the United States Bureau of Labor Statistics. According to this data more men than women lost their jobs during the economic downturn, 18% of women are at present their families' primary breadwinners in terms of hourly earnings, 22% of wives earned higher incomes than their husbands and women account for more than $70 billion worth of purchases in the interior improvement industry. With carefully selected marketing strategy brand values have been communicated to the consumers. Devine Colors' communication goal is to spread brand awareness and build a foundation for brand equity.

Key words: *Marketing strategy, business opportunity, market, time, competitiveness, product eco- friendly paint, "Divine Color" – Valspar Corporation brand.*

3.5 Agricultural Economics and Rural Development

MEASUREMENT OF QUALITY MANAGEMENT

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Manufacturing a quality product, providing a quality service, or doing a quality job, one with a high degree of fitness for purpose, is not enough. The cost of achieving that quality must be carefully managed so that the long-term effect of quality costs on the business is a desirable one. These costs are a true measure of the quality effort. A competitive product or service based on a balance between quality and cost factors is the principal goal of responsible management. This objective is best accomplished with the aid of competent analysis of the costs of quality. The balance works like this: as quality goes down, costs go up, and as quality improves, costs will fall.

Key words: *cost, quality management, risks, benefits, quality cost system*.

CROPS INSURANCE AGAINST DROUGHT

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Weather condition is the key element of uncertainty in agriculture production. Nowadays, we are witnessing the global climate changes and understanding that the climate variations have substantial influence on the plants' production; it even refers to minor changes in the climate.

Drought is a period without water, followed by significantly high temperature and dry winds. Drought is either regular or temporal phenomenon, appearing nearly each year and lasting over shorter or longer period, causing serious consequences on yields reduction. It endangers stable production and limits the high one. Drought, its seriousness and importance depend on level of water shortage, size of influenced area as well as how long dry period takes and its warmth. Drought became nowadays certain but not uncertain risk where the only question is its intensity.

Drought highly effects the social-economic relations, life standard end the environment. Direct consequences of drought reflect in reduced yields of cultivated crops, reduced forests' productivity, increased risk of fire, increased mortality of wild animals.

In the past as well as nowadays, agricultural producers have been trying to protect their crops against catastrophic risks: risks with low probability, which however could cause fatal consequences due to irrecoverable loss.

Weather derivatives are the new tool in the agriculture production risk management. Weather derivatives cover low-risk incidences with high probability, whereas the standard insurance covers high-risk incidences with low probability. The derivatives were created with aim to protect crops production against frequent climate changes where such changes present uncertainty in the agricultural production. Weather derivatives are forward-contracts based on weather indexes (such as precipitations, temperature etc.); the value of those is obtained by deviations of weather conditions from perennial average. The value of deviation is obtained on the bases of real weather data.

The weather derivatives, as contracts based on the protection of crops against drought can be applied when high temperatures lasting for longer period are followed by insufficient precipitations or complete lack of precipitations, which causes fade of plants; if long-lasting, such conditions may even cause complete crops failure.

This work presents the weather derivatives' appliance in the crops' production insurance against drought. It provides explanations for which conditions the insurance could be made, while the insurance procedure is given from the moment of signing the contract till the final settlement.

Key words: *crops production insurance, weather derivatives, drought.*

THE ROLE OF AGRICULTURAL EDUCATION AND TRAINING IN GLOBAL FOOD SECURITY

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A steadily growing world population needs more and more food and energy since the natural resources are limited. The booming energy and bioenergy demand and the subsequent price increase have a knock-on effect on food price and poverty. To achieve the Millennium Development Goal of "Food Security and Nutrition" will be extremely difficult in the near future.

Recent studies suggest that there are about one billion hungry people worldwide. Additionally, figures in such studies show that the world will need 70 to 100 per cent more food by 2050 for about 9 billion people. The demand for energy, including bioenergy, and its price will also increase rapidly. The challenge of poverty reduction in the world seems impossible to accomplish.

In many countries of the world the level of productivity, profitability, produce quality and ecological sustainability in agriculture is very much below the natural and technological potential – with far reaching consequences for food security, economic prosperity and environmental stability. The major reasons for this situation are generally low standard of agricultural knowhow, the economic and technological education as well as the processing and marketing policy in a large part of the world.
Growing competition for land, water and energy, as well as the agricultural subsidy policy for bioenergy in developing countries demand even more agricultural resources for energy production at the expense of nutrition. Nevertheless a large agricultural capacity in many countries of the word still remains absolutely unused.

In this paper the major role of agricultural education for the increase in agricultural production for poverty reduction and environmental protection is explored. The world natural resources are sufficient to feed more than ten billion people. In this case the most urgent need is to improve the human resources, economic viability and ecological sustainability through better agricultural education and training, especially in those countries in which agriculture still forms the backbone of the economy and in which the gap between the efficiency of existing and potential production systems is too large.

SENSITIVITY ANALYSIS OF MILK PRODUCTION TO THE CHANGE OF THE LEVEL OF MILK COLLECTION PRICE AND PREMIUMS

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The income of milk producers depends on the amount of produced and sold milk and its selling price, plus a premium (if that kind of stimulus is applied). Following the result in the production of milk, on a sample of 21 farms in BiH, in the period of July 2010 - June 2011, by gross margin calculation was found that an average milk producer achieved gross margin of 1,031 KM per dairy head per year, at an average redemption price of milk from 0.577 KM/liter and the premium of 0.118 KM/liter. The collection price of milk and premium are subject to frequent debate and negotiation between the milk producers, processors and state. Coming from the deducted average conditions, the method of sensitivity analyses of gross margin to change the milk price and premium level was found how decrease and increase the milk collection price for ±50% and milk premium for ±100% reflected in the milk producer gross margin. The results of analysis confirm that milk production in the examined conditions is highly resistant to reduction in milk collection price and milk premium and detailed results of analysis are presented in the paper.

Key words: *milk,* collection price*,* premium, sensitivity analysis.

BUSINESS RECORDS, EVALUATION, QUANTIFICATION AND BUSINESS ANALYSIS OF FAMILY FARMS

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Family farms could be considered as a primary subject of agricultural production in Serbia. In its efforts to join the European Union, Serbia has made it clear that the agricultural sector needs to experience fundamental changes. Namely, this process will be quite difficult, because it implies the implementation of organizational and economic measures to comply with EU standards. Particularly complex situation on the farms is in the area of business records and business analysis of agricultural family farms. This situation is very unfavorable for the owners, because they are unable to quantify the investment nor the achieved results. The situation is especially complicated when family farms ask for the funds, on any grounds. Then the providers of funds have almost no idea of the farm business performance, economic power and its prospects. Any system of farm business records would significantly improve this situation on family farms. The methodology of this paper is based on the questionnaire and obtained data, which will be processed and implemented in family farms.

Key words: *family farms, business records, economic power.*

ECONOMIC AND TECHNOLOGICAL PARAMETERS FOR OPTIMAL USE OF TRACTOR

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The work was carried out to examine the possibilities of optimal utilization of the energy potential of tractor in conditions of exploitation, of which depends on its economic justification. All research results have been calculated by theory of tractors calculation of machine aggregates, and were used to calculate the coefficients, which are long in use in practice. Studies were performed on a tractor on the basic characteristics of the following: 103 kW engine power, specific fuel consumption of 195 g kWh^{-1} (235 cm3 kWh^{-1}, 24.20 l h^{-1}), operating weight of 9800 kg tractor (tractor brand is not listed, because the method can be applied to the application for any brand of tractor). The paper investigates the optimal tow-energy parameters of the tractor and made a determination range of the forces of exploitation in which the tractor pulls can be used economically. Pulling force, which are a function of mass of the tractor, were calculated using the coefficient of adhesion 0.27 - 0.41 and 0.46. Pulling power, which is a function of engine power, is calculated using the coefficient of efficiency 0,610-0,650-0,625. Skidding tractor wheels were obtained experimentally in the stubble. Tractor speed is calculated based on the pulling power and pulling force in the optimal exploitation range of forces pulling on the stubble. Work is ouhvatio tests and specific resistance of soil at plowing on chernozem and black marsh soil. Measurements were performed at the Institute of Agricultural Engineering of the Republic of Serbia, Belgrade. We also monitored the technological energy for plowing on chernozem and black marsh soil, which is a function of depth of plowing and the specific resistance of soil and serve as a basis for assessing the rationality tractor assembly unit for optimal utilization of energy resources tow-tractors. By determining the effect of the tractor, depending on the depth of plowing, effective work by the hour, it was found that the maximum effect is achieved when the Fv load and maximum activity coefficient (KKD), and with decreasing odds. Consumption of energy from the tractor, which does not depend on the type of tractor, that is, its weight and engine power, but of deep plowing and the specific resistance of soil is calculated based on the pulling power consumption and effective labor hours for plowing. The study showed that the maximum effect coincides with the maximum coefficient of tractor operation, and that the increase in engine power increases proportionally to the effect. Technology, energy consumption is a function of depth of plowing and soil specific resistance, and potential energy consumption of tractors per hectare depends on the structure of the energy balance for working tractors in service. All these parameters affect the economic viability, to purchase and use in service of a certain type of tractor.

Key words: *tractor, pulling power, pulling force, the mass of the tractor, soil resistivity, the power consumption technology, the economic justification.*

PREDICTION OF ORGANIC FOOD PRODUCTION USING SYSTEM DYNAMICS METHODOLOGY

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In this work the System Dynamics methodology is applied to predict the future state or behaviour of the production business system for the organic food production. Conceptual models are presented: a diagram of the causal connection and the axial flow diagram and their written mathematical simulation model in DYNAMO simulation language with: system state equations, the equations of system state changes, auxiliary equations, equations and parameters of the equations of initial value.

Key words: *System Dynamics, methodology, predict, simulation, mathematical model*.

IMPROVING THE REGULATORY FRAMEWORK OF AGRICULTURAL PRODUCTION IN THE SERBIAN REPUBLIC IN ORDER TO IMPROVE THE FINANCIAL POSITION OF FARMERS

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In relation to other branches of economy, agriculture is a very specific one. Due to a lower accumulative and reproductive capability, its economic position is below the average. Besides the natural limits, its unenviable position is influenced by the ones related to a specific role of agriculture in national and world contexts. In the beginning of 2007, the voluntary registration of agricultural managements started in Republic of Srpska and its basic purpose was to facilitate the analysis, planning and implementation of agricultural policy measures, based on the data collected. The authorized institutions in Republic of Srpska must also conduct a comprehensive analysis to define the optimal size of agricultural holding where it is depending on the kind and type of the production possible to accomplish an economically profitable production and the optimal structures of agricultural production on the state level.

Key words: *regulatory framework, agricultural production, financial position, farmers*.

INCREASE THE FINANCIAL VALUE OF CORN THROUGH ITS PROCESSING OF STARCH AND STARCH DERIVATIVES

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It is known that the leading agricultural crop in Republika Srpska and BiH is corn.

Areas that are currently used for planting and growing of corn are about 20 000 ha. The average yield are moving up to 8 t / ha. During the past ten years various factors have contributed to the continuous rise in prices of corn:

1. increased consumption of corn and its derivatives in cattle-breading and food industry,
2. climate changes that led to reduced production in neighboring countries and the world,
3. increase in fuel prices (diesel) and production materials.

Currently,the price of corn is about180 €/t.

Using of high technical standards in producing starch and starch derivates from corn,this value can be even increased to proportion 1:1.68.

The generating value of corn is carried over:

1. products- mainly sweeteners (high fructose syrups, dextrose monohydrat, maltose syrup, maltodextrin, hydrol.), suitable for the confectionery, bakery, pharmaceutical and other food industry.
2. byproducts (corn oil, meal, shell, gluten and CSL) suitable for human food industry and for cattle – feeding.

Besides that ,it is running the cooperative relation between small and medium companies and agricultural farms on the one side and the HPK on the other side.

The cooperative relations have various forms : production of maize, fodder production, feeding ruminants, dairy industry, further processing of the sweetener, transport, logistics, technical services (car mechanics, vulcanizers, restaurants), supply of energy (coal, wood and fuel oil), the new employment in all segments, etc. - represent a major promoter of regional development. This development is not only acting through economic segment, but also as a technical and technological progress of all the participants in this process.

During corn processing,the main product is High fructose syrup which price is 480€ and byproducts (corn oil, meal, shell, gluten and CSL), which cost 50 €.

Processing of 1 t corn (corn price is180 €/t) into HFS, refusing of cost of production (228€), we achive the increasing in price of 122€ (calculated per 1 ton of corn), or expressses in percentage 68%.

ANALYSIS OF THE BUSINESS MARKET OF MEDICINAL AND AROMATIC PLANTS IN SERBIA

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The market of medicinal and aromatic plants in Serbia is still undeveloped, with a tendency to adapt the international market, primarily the EU market. In structure, there is a clear diversification of participants in this market, which involves different actors: the collectors, producers of cultivated plants, the company registered for trading, the company registered for the production of dietetic products, tea manufacturers, wholesalers, retailers, consumers and others. From the aspect of the organization, all these actors are linked in the value chain, which have a different significance. Most participants, particularly those engaged in the collection and production, are not familiar with the organization in the sector of MAP, lack of market knowledge and relationships to govern it. Therefore, collectors and manufacturers depend on middlemen who have more important business in this market. Offer of medicinal plants is usually focused on meeting the needs of the domestic market. A small number of companies exporting finished products, and therefore it is necessary to develop a marketing strategy for placement on the international market. Also, players must seek to strengthen their position by means of vertical and horizontal integration, for only thus will provide a market for primary producers, successful and reliable supply for processors, lower prices and better quality for consumers, and reduced pressure on biodiversity.

Key words: *medicinal and aromatic plants, market, actors, organization.*

THE POSSIBILITY OF COMMERCIAL PRODUCTION PRODUCTS WITH GEOGRAPHICAL ORIGIN AND TRADITIONAL PRODUCTS OF THE REPUBLIC OF SERBIA - THE CASE OF SJENICA CHEESE

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Products with geographical origin and traditional products are produced in almost all regions of the Republic of Serbia. However, most of these products have a short marketing chain. The products are mainly sold at local level in direct marketing. If sales are made through intermediaries, they are mostly traders at the local level. These traders buy products directly from the manufacturers and perform further sales.

One of the most popular regionally specific products is a Sjenica cheese. The manufactures of this product are family farms and mini-dairies in this region. Processing milk is made into the type of craft production with preserved long-standing tradition of manufacturing methods.

The aim of this study was to estimate the potential for commercial production of Sjenica cheese, as well as to highlight the main challenges of product marketing. The survey was carried out under the project funded by the Ministry of Education and Science Republic of Serbia, which is realized under the slogan "Let's create wealth from the riches of Serbia"

The results show that although Sjenica cheese enjoys a good reputation among consumers, there are difficulties in selling existing quantity of production. For successful commercial production is particularly important joint marketing of small producers. This implies a common recipe for manufacturers and standardization of packaging. Joint marketing and extension of the marketing chain would contribute to increasing commercial production.

Key words: commercial production, Sjenica cheese, marketing.

ANALYSIS OF THE FARM COOPERATIVE MOVEMENT IN REPUBLIKA SRPSKA

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Republika Srpska has a long tradition of co-operatives. During that period, farm cooperative movement have passed through various stages of development, expiriensing ups and downs, both in its organizational, as well as material development. Despite significant results, cooperatives in the region have not grown into an association of producers who firmly and continuously improve the countryside, developing the agricultural sector and contribute to the economy of the RS. With exception of small number of cooperatives that are based on the principles of modern cooperatives, most of the cooperative organizations are not contributing to the development of cooperative mouvemet, agriculture and rural areas to the extent that it would be necessary.

The aim of this study was to analyze the situation of farm cooperative movement in Republika Srpska. In this sense, the following indicators and parameters have being analysed: the number, structure and activity of agricultural cooperatives, types of services that unions provide to their members, participation in the purchase of agricultural cooperatives, legislative - legal regulations in the field of cooperatives, cooperative management bodies, cooperative property, financial analysis of their business activities, cooperative auditing, human resources of cooperatives, cooperative development plans for the future. Primary sources of data were obtained using the survey of about 50% of active cooperatives in the RS, using interviews and participatory methods through workshops and focus groups. Secondary data sources were data from the Cooperative Registry, data from the business and financial statements, and the results of previously conducted analyzes of Cooperative Association, Ministry of Agriculture and other governmental and nongovernmental organizations. The results of analysis were used as the basis for the projection of directions and goals of development of farm cooperative movement in the RS for the period until 2016.

Key words: *farm cooperative movement, analysis of curent situation, Republic of Srpska.*

OBJECTIVES AND DIRECTIONS OF COOERATIVE DEVELOPMENT IN REPUBLIKA SRPSKA

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Cooperative organisation is a very important socio-economic process and an important social movement. Cooperative system of organization and business is an important segment of the economy of every country, especially those countries that are characterized by small scale commodity production. In a situation where the market of agricultural products in the RS and BiH occupied tens of thousands of farmers who produce, buy or sell small quantities of goods, their organization and cooperation is a key prerequisite for their development, and survival. Grouping and organizing farmers, is one of the strategic directions of development of domestic agricultural production and also development of rural areas. Therefore, the cooperative association is necessary to include the whole territory of the RS, a particularly less developed areas, because it is a chance to mobilize a natural, market, personnel and other resources, which for them represents a rare development opportunities. Despite the centuries-old tradition that cooperatives have in BiH and RS, they are long been in serious crisis.

The aim of this study was to determine the optimal model and the objectives of agricultural cooperative development in Republic of Srpska. It was concluded that one of the goals should be to redefine the role and importance of cooperatives, and a to run thorough revitalization of cooperatives in the RS, which should go in two directions: first, consolidation of existing cooperatives and the other is, to create conditions and support the establishment of new agricultural cooperatives, based on the original cooperative values. Creating a new organizational and economic solutions is a necessary prerequisite for the efficient operation of agricultural cooperatives. The issue of market and current funding of cooperative activities and capital investments (investments), are the factors of dependance for establishment and implementation of cooperative organization and its effects

Key words: *cooperatives, consolidation, sale and marketing, financing.*

NEW INITIATIVES IN AGRICULTURAL EXTENSION SERVICES IN THE REPUBLIC OF SERBIA

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Agricultural Extension Services in the Republic of Serbia operates through the 34 regional offices, whose work is coordinated by the Institute for Science Application in Agriculture (ISA) and the Ministry of Agriculture, Trade, Forestry and Water Management of the Republic of Serbia (MATFW). Total number of full-time advisers in Serbia is 213 (2011). Given the large number of family farms in the Republic of Serbia (778,000 according to the Census of 2002, and about 650,000 according to latest estimates, of which about 400,000 registered ones), the number of extension staff is deficient to meet the needs of the agricultural extension services in a qualitative way.

Taking in account the above-mentioned limitation, in September 2011 MATFW issued a call for all unemployed graduate agricultural engineers who were registered by the National Employment Service, to apply for training in agricultural extension services for getting an employment. The 5 days training past the 2300 agricultural engineers in domain of the following areas: extension skills and techniques, obtaining knowledge in the field of state support measures for improvement of agriculture and the acquisition of skills in presenting beneficial effects from the use of agricultural loans, as well as assessing the needs of agricultural producers. Around 1,550 agronomists have successfully completed training, passed the tests and signed contracts with MATFW to be hired as extension assistants throughout Serbia on the one-year period.

The aim of this initiative, that is being implemented under the title" The Skilled Knowledge for Your Property", is to be employed as many agronomists in the time when unemployment is one of the biggest problems of the Serbian economy, as well as to be merged the knowledge that unemployed agronomists possess with the farmers' experience that should contribute to the positive changes in agricultural production, reduction of operating costs on family farms, as well as an improvement of the rural life in general.

Each extension agronomist is in charge of at least 200 registered farms within the extension local services in which he/she was assigned. In this way, between 250,000 and 300,000 family farms have received advisors financed from the budget. Each agronomist was assigned to visit three farms a day, which should provide a complete picture of the existing situation, as well as of the needs and problems at the farms in Serbia.

This paper analyzes the initial experiences and results of the newly hired advisers covering villages in the municipality of Aleksinac in the region of Nis.

Key words: *extension services,* employment, family farms*, initiatives, Serbia*.

CHARACTERISTICS OF RURAL DEVELOPMENT IN THE EUROPEAN UNION

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The rural areas are communities that are characterized by specific social, economic, cultural, and other characteristics. The characteristics of rural areas can be viewed from more standpoints. In addition to the current situation, these features and their changes is considered useful in the context of these areas. For this purpose it is necessary to adequately define the area of observation. This paper also provides insight into the state and development of rural areas within the European Union.

Key words: *rural areas, rural development, the European Union.*

THE REMAINING WINDMILLS IN SERBIA AND THEIR OPPORTUNITIES FOR DEVELOPMENT OF SPECIFIC FORMS OF TOURISM

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The intentionof this paper is to draw attention to there maining windmills in Serbia, their historical development and their present condition. Information about the windmills is obtained from field studies, which showed that there construction and putting into operation of the remaining eight windmills would offer an outstanding contribution to and provide an opportunity for the development of specific forms of tourism in our country.

Key words: *windmills, Vojvodina, tourism, development, protection*.

EVALUATION OF LEADER PROGRAM IN SLOVAK REPUBLIC - CASE STUDY LAG "VRŠATEC"

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This paper will analyze and evaluate the implementation of LEADER program in Slovak Republic. The methodology applied follows the training that EU evaluators receive when they are requested to analyze the degree of implementation and the strategy of LAGs. In a field research in LAG Vršatec, semi-structured interviews are conducted, following the methodology applied by the European Court of Auditors. The structure of the paper will follow the evaluation procedure. First, situation analysis is described. Then, the local strategy formulated by the LAG is analyzed. In the end, the projects that are submitted and selected by the LAG with all actors involved and their relationships within the partnership will be presented. Considering the findings detailed in the previous sections, conclusions and recommendations are formulated to finalize the evaluation of the LAG Vršatec.

Key words*:* *LEADER, CAP, EU, Evaluation, Slovakia, interviews, LAG, Vršatec*.

PROBLEMS IN AGRICULTURE AND RURAL DEVELOPMENT REPUBLIC OF SRPSKA

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Agriculture is an economic activity, including plant and animal production and related service activities.Considering the current development trends, current situation and assess opportunities for development of agriculture in Republic of Srpska, can be seen a number of obstacles that hinder the development of the dominant sector of the said.Numerous studies have shown that in Republic of Srpska significant portion of rural areas devastated by demographic, but with a very respectable natural resources. A high percentage of arable and fertile land is not cultivated, water resources are under utilized, academic achievement is not implemented, are just some of the problems facing the agricultural sector as a whole.Compatibility of rural development with available resourcesare mutually reliant, that are mutually supportive, depends on the efficiency of agriculture, which strongly influence the economic development of each country.In relation to methodology is designed to situational analysis and review of the status of plant and livestock production, and development of rural areas of the Republic of Srpska. Analyzing these three areas, for the period 2007 - 2011. The. authors come to a number of findings and emphasize the development problems facing the Republic of Srpska.

Ključne riječi: *agriculture, rural development, difficulties, solution*.

REGIONAL CHARACTERISTICS OF AGRICULTURAL POPULATION IN VOJVODINA

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Agriculture has a specific role in Vojvodina's economy. The development of agriculture is to a great extent determined by quantitative and qualitative characteristics of an agricultural population. According to 2002 Census, Vojvodina's agricultural population makes about 26% of the agricultural population in Serbia, i.e. 24% of the country's active agricultural population. The potential of total and active agricultural population in Vojvodina has been decreasing continuously, both absolutely and relatively. From 1953 to 2002, the agricultural population in Vojvodina decreased by 863 thousand (501%). At the same time, the active agricultural population decreased four times, while the share of agricultural population in the total population dropped from 63% (1953) to 10.6% (2002). A decrease in the number of agricultural population is a process immanent in development and as such it happens in all countries. However, the process of de-agrarisation in Vojvodina was rapid, which could have a negative impact on efficient utilisation of available land and other resources. The authors of this paper, using appropriate statistacal methods, usually applied for this kind of research, analyse the basic characteristics of agricultural population in Vojvodina. The main data source is official statistical evidence, i.e. census books and other publications. The spatial analysis is restricted to the regions of Backa, Banat and Srem, while the temporal analysis is limited to the census years, with special attention given to 1991 and 2002 censuses. The aim of the paper is to point out human potentials and to assess whether there are significant differences between certain regions of Vojvodina and whether registered labour contingents stimulate or limit the development of agriculture.

Ključne riječi: *agriculture, agricultural population, de-agrarisation, Vojvodina, region.*

INVESTMENTS INTO THE RURAL AREAS ON UNDEVELOPED MUNICIPALITIES OF BOSNIA AND HERZEGOVINA

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In this paper there are presented results of research carried out in 42 rural municipalities in B&H, which are classified into the foolowing groups according to the criteria of development: extremely undeveloped, undeveloped and underdeveloped. This survey included respondents from three sectors: the government sector, NGOs and individual farmers.

Among other purposes, the aim of this research was to determine what is actual attitude of community according to the supporting of agricultural and rural development programs implemented by appropriate ministries, what was the structure of investments for the last three analyzed years in the examined areas and what was the structure of investments at the level of villages or the local community units.

Ključne riječi: *rural development, agriculture, investments, financing*.

GROWING BLUEBERRIES AS AN OPPORTUNITY TO REDUCE POVERTY IN RURAL AREAS IN SERBIA

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About three-fourths of the territory of Serbia consists of rural areas where there are roughly half the population. However, in these areas is neiskorišćih large percentage of agricultural land. In addition to numerous problems, such as. poor terrain for the application of mechanization, the representation of poor soil quality, unsuitable age and sex structure, and the like. in these areas there are a number of comparative advantages for the cultivation of rare and interesting market for the fruit, the property, such as blueberries. The scope, intensity and level of cost-effectiveness of blueberry production are the result of natural effects, the production - technical and socio-economic conditions.

Including a number of problems as limitations to development of rural areas, this paper presents an economic analysis of growing blueberries in the function of reducing siromaštava and viability of rural communities. The advantages of growing fruit in terms of investment and the potential use of funds of funds for rural development, as well as the possible source of income for producers. In addition to the primary production of blueberries, analyzed the possibilities of investment in processing facilities, processing, packaging and consequently economic development and other activity areas.

Key words: *growing blueberries, investment, rural areas, sustainability*.

3.6 Genetic resources

IMPLEMENTATION OF PROGRAMME FOR CONSERVATION OF PLANT GENETIC RESOURCES IN REPUBLIC OF SRPSKA, 2009 - 2011*

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The Programme for Conservation of Plant Genetic Resources in Republic of Srpska was established in 2008 and the Genetic Resources Institute of University of Banjaluka was appointed as a as a professional unit for coordinating the implementation of the Programme. The main objective of the Programme is effective management of plant genetic resources through continuous field inventory and collection, evaluation, exchange and conservation of germplasm. The Programme has been implemented by six working group: working group on fruit trees and vine, working group on cereals and maize, working group on vegetables, working group on forage crops, working group on industrial plants and working group on medicinal, aromatic and spice plants.

In the period 2009 to 2011 the inventory was carried out for 30% of the area of Republic of Srpska and the innovative approach was adopted for conservation of plant genetic resources by means of long term seed preservation and in vitro conservation as well as for morphological and molecular characterization, and regular updating of the database, as well. The contacts were established with producers for the purpose of on farm protection of local ecotypes and populations. In addition, the procedure was launched for declaring the site "Bukovica" with its total area of 65 ha as a protected natural area - to maintain genetic resources in a dynamic condition and state of development (*in situ* conservation). For plant species that can not be conserved in the form of seeds, an *ex situ* collection was established in the Botanical Garden. By the end of 2011 the Gene Bank had reached its full operation levels with 455 accessions on long-term storage at -18 ^{o}C, 150 accessions in a working collection and 100 accessions in a field collection. The Genetic Resources Institute with its 91 accessions is part of European web-based catalogue of the inventories of plant genetic resources (EURISCO).

Having adopted the Programme, the Republic of Srpska has not only fulfilled one of the world's peremptory obligation to conserve the biodiversity of agricultural crops, but also a moral obligation to future generations.

Key words: *inventory, characterization, ex-situ and in-situ conservation, EURISCO Catalogue.*

* The Programme for Conservation of Plant Genetic Resources in Republic of Srpska was adopted by National Assembly of Republic of Srpska in June 2008 (Official Gazette of Republic of Srpska

MOLECULAR TOOLS IN RESEARCH OF LOCAL OLIVE VARIETIES FROM SLOVENE ISTRIA

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Olive (*Olea europea* L.) is one of the most ancient cultivated plants characteristic for the Mediterranean area, where it represents the most important oil-producing crop. The genetic studies of varieties traditionally cultivated in the region and of their relationships with varieties from historically and geographically neighboring regions are important in order to clarify the identity of the native olive germplasm. The variety structure of olives in the region was shaped over several centuries and is also the result of a number of attempts to revitalize olive growing after frost damages or economical devastations. Old local varieties still grow in extensive or abandoned olive groves, but they are being replaced by introduced varieties, although their use could contribute to the typicality of olive oil produced in the region. To preserve valuable genotypes and to promote their cultivation, evaluation of olive genetic resources was initiated. We aim to identify and to establish a database of old local olive genotypes with the aid of molecular markers - microsatellites. Currently, microsatellites are the most promising marker system for an accurate and rapid identification of olive genotypes. The data on collection and genotyping of local olive varieties will be presented.

Olive fruit is also important model for studying its biochemical pathways which are known to account for synthesis of various important chemical compounds apart from acyl lipids, notably biophenols, esters, terpenes, pigments and tocopherols, among which some are unique to olive. Some of these components significantly contribute to the taste characteristic and storability of the olive oil. Little or nothing is known about the molecular aspects of olive fruit development, physiology, and biochemistry on the genomic level. We have employed a high throughput EST sequencing approach to generate novel EST sequences from developing olive fruits from high phenolic yielding variety 'Istrska belica', using next generation sequencing technology. About half a million sequences totaling at 160 Mb of fruit transcriptome was generated. Bioinformatics analysis of the NGS sequencing data will be presented.

Key words: *olive, microsatellites, EST, sequencing.*

SLOVENE PLANT GENE BANK AND GENETIC RESOURCES PROGRAM AT THE AGRICULTURAL INSTITUTE OF SLOVENIA

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Early projects to collect Slovenian autochthonous populations, ecotypes and landraces of agricultural species were initiated about 50 years ago. Phytogeographic and historical background has supported the development of the national program and through that conservation of plant genetic resources in Slovenia. In 1996 the Ministry of Agriculture, Forestry and Food started financing the Slovene Plant Gene Bank Program with the goal to maintain, evaluate, regenerate and preserve Slovenian autochtonous species, ecotypes, populations and landraces of agricultural, medicinal and aromatic plants, forest trees and other woody plants from Slovenian forests. They include Slovenian cultivars, old cultivars, landraces, various populations, clones and lines bred from autochtonous plants and ecotypes from the natural habitat important for food, agriculture and forestry.

In the Slovene Plant Gene Bank Program dealing with agricultural, medicinal and aromatic plants four institutions are involved: Biotechnical faculty of the University of Ljubljana, Institute for Hop Research and Brewing, Žalec, Faculty for Agriculture and Biosystemic sciences, University of Maribor and Agricultural Institute of Slovenia, Ljubljana. Germplasm collection at the Agricultural Institute of Slovenia houses among other, samples of grain legumes, Allium, Solanum tuberosum, Triticum, Brassica, Lactuca, forage crops, Rubus and Vitis. Each year limited number of accessions are planted in the field for seed multiplication characterization and evaluation. When mature, seeds are collected, cleaned, dried and stored at –20°C and at 4 °C. Genetic resources are also kept in in vitro conditions (potatoes and grapevine) and in vivo in permanent plantations (grapevine and small fruit). Seed samples and passport data were obtained in the past through assistance of local elementary and agricultural schools, Agricultural Advisory Service, newspaper ads and farmers. New accessions were acquired through donations and collecting trips. All of the accessions are recorded in a database divided into 5 fields: multicrop passport descriptors, additional passport descriptors, characterisation data, evaluation data and central seed bank holdings.

On the international level Agricultural Institute of Slovenia is involved in the work of the ECPGR FA and SeedNet which are aiming at ensuring long term conservation and facilitating increased utilization of plant genetic resources in Europe.

Key words: *plant genetic resources, national program, germplasm collection, characterization and evaluation, seed storage.*

CONSERVATION STATUS OF PLANT GENETIC RESOURCES IN REPUBLIC OF MACEDONIA

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This study provides an overview of preserved plant genetic resources at the level of taxonomic affiliation as genus, species and intraspecific. The number of input accessions into the gene bank is more than 3000 from which 2182 are now supplied with passport data and are part of a European web portal EURISCO. Of these total number of collections of different species is accounted 81 (vegetables - 28, legumes - 13, fruits - 12, grasses - 9, cereals - 8, MAPs - 8 oil crops / industrial - 2, grapevine - 1). In ex situ conditions (seeds) are stored 1198 accessions in total, on field 984 (560 - fruit, 424 - grapevine), and in botanical garden 44. The number of input accessions into the gene bank is more than 3000 from which 2182 are now supplied with passport data and are part of a European web portal EURISCO. Of these, total number of collections belong to 79 genera and collection counting 81 different species (vegetables - 28, legumes - 13, fruits - 12, grasses - 9, cereals - 8, MAPs - 8 oil crops / industrial - 2, grapevine - 1). In ex situ conditions (seeds) are stored 1198 accessions in total, on field 984 (560 - fruit, 424 - grapevine), and in botanical garden 44. In situ conservation was initiated with tomato and pepper in certain regions of Macedonia (Berovo Pehcevo), beans (Kicevo), alfalfa (Debar) and pears (throughout). In terms of characterization 30% of vegetables are described, approximately 30% of fruits, 40% of cereals, 50% of industrial, 70% of fodder crops are described and almost whole Vitis collection; description of MAPs is in the initial phase. Only in Vitis collection evaluation is completed in more than 60%, while in all other accessions is ongoing and is conducting with varying intensity.

Key words: *plant genetic resources, conservation, gene bank.*

RECONSTRUCTION OF PARENTAGES FROM BALKAN GRAPEVINES BY MICROSATELLITE ANALYSIS

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A total of 138 grapevine cultivars collected in five countries from the Balkan Peninsula were analyzed using 22 microsatellite loci. The microsatellite profiles of all samples were presented by allele sizes in base pairs. Analysis resulted in different trios. Some were false trios because the apparent parent offspring relationship was a result of near synonyms (clones or siblings). In a set of 138 samples one unknown parentage [Furmint (Knipperlé, Ortlieber) = Pinot Noir × Rebula Stara] was revealed and one pedigree already reported in literature (Župljanka = Pinot Noir × Prokupac) was confirmed. Godominka is described as being derived by selfing of Smederevka, which is an old Balkan cultivar. Analysis of 22 microsatellite loci showed that Godominka did not result from Smederevka selfing, based on the allele distribution. Petra is described as being the progeny of Pinot Noir × Kunbarat. Microsatellite analysis showed that Pinot Noir is not the father and Kunbarat cannot be the mother of this cultivar. Petra resulted in complete mismatch with Pinot Noir at four loci and with Kunbarat at 5 loci. Cumulative likelihood ratios showed that this parental combination has a sufficiently high statistical confidence to be confirmed. Pedigree analysis should be confirmed by ampelographic observations, since misnaming and mislabelling of the samples cannot be entirely excluded. Successful reconstruction of many pedigrees depends on availability of ancient cultivars and pedigree data of cultivars.

Key words: *genotyping, SSRs, parent, offspring, Vitis vinifera* L.

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RESULTS OF THE PROJECT: "TOWARDS THE PRESERVATION OF AUTOCHTHONOUS GRAPEVINE (*Vitis vinifera* L.) VARIETIES IN WBC"

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In order to identify autochthonous grapevine resources in the Balkan countries and revitalize their cultivation, an inventory of grapevines in this region was made and appropriate database of investigated plant materials provided. A total set of 196 samples collected in 5 different Balkan countries (Bosnia and Herzegovina, Montenegro, Macedonia, Serbia and Slovenia) was analyzed at 22 microsatellite loci amplifying 242 alleles. High polymorphic information content (0.743) and low cumulative probability for obtaining identical genotypes (2.96×10^{-20}) compared to some other studies show high power of selected molecular markers to resolve between analysed grapevine samples. Based on the obtained microsatellite allelic profiles, synonyms and homonyms, as well as misnaming or planting mistakes, were revealed. Genetic relatedness among samples was assessed by two different approaches, by genetic distance based model and by model based clustering, which resulted in nine groups of grapevine samples. This analysis showed that Serbian, Bosnian and Herzegovinian and Slovene genotypes have admixed genetic structure while original genetic structure was found in Macedonian and Montenegrin genotypes. The proportion of shared alleles among sampled cultivars resulted in an average of 35 %, which is lower than average similarity of mid-European cultivars showing higher genetic variability of analysed set of Balkan grapevines. By comparing allele composition of 22 loci, 29 grapevine samples had 36 specific alleles that could be markers for cultivars from Balkan region. Unique 138 genotypes from analyzed set of Balkan cultivars were also compared to the approximately 2000 grapevines genotyped worldwide establishing 15 groups of synonyms and 3 groups of homonyms and the rest of the genotypes presenting unique Balkan germplasm. All groups showed only a small portion of shared alleles among each other indicating presence of high diversity and thus valuable grapevine material worth of exploring for breeding purposes.

Key words: *grapevine, SSR, molecular markers, cultivar identification.*

Acknowledgements: The project «Towards the preservation of autochthonous grapevine (*Vitis vinifera* L.) varieties in WBC» has been funded by the 7FP, SEE-ERA.NET PLUS (2010-2012).

EFFECTS OF AGRO-TECHNICAL MEASURES ON YIELD AND CONTENT OF ESSENTIAL OILS IN MARIGOLD (*Calendula Officinalis*)

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This paper presents the results of the influence of applied agro-technical measures on yield and content of essential oil in marigold *(Calendula officinalis)* and reduce energy consumption during plowing, using a combination plow and subsoiler. Of technological operations, in addition to core processing, we applied the inter row cultivation of land to destroy weeds and maintain land in a loose condition which prevents drying and provides moisture retention. Land treatment is carried out in the fall, deep plowing, and at two depths: 20 and 40 cm and left until spring. Realized yields and essential oil contents were in the function of the depth of plowing. The results show the highest yield achieved at a depth of plowing calendula than 40 cm (1320 kg / ha to 1430 kg / ha), while the actual return on the depth of plowing for 110 kg / ha greater than the highest yield at a depth of 20 cm plowing. Realized yields a measure of marigold deep plowing effects on plant development and yield achieved and the economic efficiency of the application of increased depth of plowing in the production of marigold. The content of essential oil expressed as a percentage of plowing depth of 20 cm ranged from 0.019% to 0.030%. And plowing at a depth of 40 cm varied in the range from 0.029% to 0.038%. The results concluded that increasing the depth of plowing increases the yield and essential oil content in the production of marigold.

Studies have also included the comparison of results of the plow and the combination plow with shape of the spike in energy and fuel per hectare. Plug has a constant working width of 105 cm, and the plowing was done at a variable depth of 15 cm, 20 cm and 25 cm. All measurements were performed in ten replicates.
Test results of the energy balance of plow and plow with subsoiler at different depths of tillage and fuel consumption per hectare, showing an increase of energy consumption 23.25 kWh ha-^{1} to 41.6725 kWh ha^{-1}, which represents an increase of 1.79. The legality of the relationship of energy and fuel related and other work from the depths of 20 cm and 25 cm.

Presented research results confirm the fact that use of the combined tools: plow-subsoiler in the production of medicinal herbs - calendula, justified, because in this way ensures energy savings in tillage, without affecting the yield of cultivated medicinal plants. With increasing depth of plowing increases the total resistance of the soil, which increases fuel consumption. However, increasing the depth of plowing in the production of calendula, leading to increased yield and essential oil content. Based on the obtained results it can be concluded that the increase in yield and essential oil content justifies the increased use of deep plowing in the production of marigold.

Key words: *plow-subsoiler, yield, content of essential oil, marigold (Calendula officinalis), fuel consumption.*

EVALUATION OF THE UNIVERSITY CITY COMPLEX PARK IN BANJALUKA*

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The Park of the University City complex occupies 21 ha with facilities. There are 28 facilities in the University City complex; two of them are of cultural and historical value. The complex began as the Austro-Hungarian barracks "Vrbas" at the end of the nineteenth century and it was used for military purposes until 2004 when the area was assigned to the University of Banja Luka. In 2010 the Genetic Resources Institute began the implementation of the park reclamation and the project for the protection of the whole complex.

Having been neglected and in a very poor condition for a long time, the entire area of the complex had to undergo reclamation. One of the initial activities in this direction was the evaluation the woody plants in the University City Park. The location of each tree was determined as well as its number and mapped. All location data were directly taken on the ground using GPS system or by means of orthogonal method, and then transferred on to GIS. By means of the macroscopic examination of the trees and shrubs, the project established the presence of different pests, the health condition of alleys, and also the recommended reclamation measures.

It has been recorded a total of 1503 woody plants in the park, of which 1386 trees and 117 shrubs. Of the total number, 819 trees are conifers, and the rest of 684 are deciduous. A total 77 species (of which 25 species are conifers and 52 are deciduous) are noted. 212 woody plants have been estimated as valuable. Particularly important and valuable ones, actually, the real natural monuments are: Narrow-leafed Ash, Common Oak, a group of Swamp Cypress, a group of Elm Trees, an avenue of Plane Trees, and also individual specimens of rare or important species such as *Picea omorika* or *Abies grandis.*

If we review the recent results on the Park's evaluation, it can be concluded that the area of University complex is a significant collection of tree and shrub species for several reasons: it has aesthetic value, it is important as an educational area, the area for biodiversity conservation and the area for environmental protection and improvement, as well.

Key words: *collection of tree and shrub species, biodiversity conservation, natural monument.*

The project of recovery and protection of the University City complex Park is supported by the Ministry of Agriculture, Forestry and Water Management and RS Forestry Agency. Study feasibility of establishing a protected area was prepared by Institute for the Protection of Cultural-Historical and Natural Heritage of the Republic of Srpska.

CONSERVATION OF GENETIC RESOURCES OF AUTOCHTHONOUS BREEDS DOMESTIC ANIMALS IN SERBIA

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The constant increase in human population, with which the world is witnessing, requires activation of all living marine resources to produce sufficient quantities food. Animal resources are a previous life promoted in the direction of larger and better production of animal products. So was, created a number of highly productive breeds, which could have been improved their production potential just in terms of a good nutrition, housing and care. Newly races have become more dependent on man, the less resistance and are often not able to survive in conditions where no problems previously resided race from which they arise. All this caused in the world to come to the disappearance of a large number of indigenous ancient, primitive, low-ability, but mostly resistant strains and breeds of domestic animals. The depopulation of mountainous areas, as well as neglect and abandonment of livestock production in marginal areas, which could produce a highly productive breed, also led to the extinction of many races and strains of domestic animals.
In livestock production the problem of preserving low-productive native breeds of domestic animals, is still difficult to explain, and this fact makes it difficult to work on improving the use of animal genetic resources in practice. However, agrodiversity, including animal genetic resources, the new concept of sustainable use of genetic resources, occupy an important place, looking at natural resources, economic and social environment, and using the world experience.

The main activities related to the management and conservation of genetic resources in the future should relate to: inclusion of new conservation technologies (primarily related to the ex-situ), making publicly available database of breeders of indigenous breeds, the development of scientific research, work on human capacity building and infrastructure, working to popularize (livestock shows, fairs, publishing brochures, cooperation with the media), involvement of indigenous breeds in organic production systems, development of markets for animal products with protected geographical indications provided by the indigenous breeds, the development of agro-tourism protected areas, nature parks, continued cooperation on global and regional level.

Key words: *animal resources, indigenous breeds, preservation, animal production.*

EFFECTIVE POPULATION SIZE IN BUŠA AND GATAČKO GOVEČE: ECOLOGICAL AND MOLECULAR APPROACH

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The effective population size (*Ne*) is one of basic core concepts in population genetics. Monitoring the effective population size, which is parallel to monitoring genetic variability, is of importance to population genetic studies and is applicable in conservation strategies. In this study *Ne* was estimated for two population of Buša from different location and population of Gatačko goveče. Two methods were used to estimate *Ne*: ecological and molecular. The ecological method of estimating effective population size used the number of males and females used in breeding. Molecular methods for estimating *Ne* used data of variance of repeat number (SSMM), and the expected heterozigosity (IAM). The obtained ecological *Ne* (7,5 to 18,5) as proportional to census is within the range expected for cattle.. Molecular *Ne* according to the IAM method ranged from 3040 to 3947, and according to the SSMM method ranged from 28875 to 35196. The results indicate the importance of molecular methods in the assessment of *Ne* as valuable parameter in conservation of autochthonous cattle species

Key words: *effective population size, cattle,econservation egnetics.*

3.7 Field crop production

ADVANCEMENT IN PLANT BREEDING

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This paper presents rewiev of improvements in plant breeding considering to progress in technology and increasing in yield, quality, diversity and adapatability of plants. Modern plant breeding is a sophisticated which has origin thousand years ago, in primitive farmer selection of best plants in one year to produce seed for next crop. On the base of genetic inheritance the classical breeding in last six decades, contributed over three time increase of wheat yield and other plants, changed phenotype and significantly improved genetic base of resistance to pests and diseases, tolerance to drought and frost. Breeders objective is to develop genotypes better adapted to human needs (high yield, enhanced technological and nutritional quality, earliness, stress tolerance). A lot of requirements breeders achieved on the base of improved scientific farming practice, baking and milling technology, beverage production technology. Plant traits controlled by genes and breeders use different techniques to combine desired traits in one genotype. Conventional plant breeding use crossing of chosen parent cultivars, then selecting the best plants from the resulting offspring to be grown in further selection. On this way creation of genotypes is a complex, expensive and longterm professional scientific work (10 years for cereals). With increased knowledge and improved technology, breeders have developed ways to improve and accelerate the breeding process (two generations/year). More recent laboratory techniques enable breeders to operate at the level of individual cells and their chromosomes. Today is possible to create new genotypes through protoplast fusion, embryo rescue and assisted pollination, double-haploids, genome mapping, marker assisted selection and genetic modification. By genetic modification is possible add, modify or delete a trait without interfering two complete genomes.The advantage is in expresssion of specific genes in plant genotype without introduction of undesirable traits. Modern biotechnology can be used to improve human nutrition, and developing genotypes with significant higher yield and quality in compare to genotypes created in conventional breeding. However, geneticaly modified crops can be used after assessment in terms of human health, food safety and the environment. It can be concluded that hybridization, induced mutations, biotechnological methods have an important role in the progress of plant breeding.

Key words: *breeding, genotype, biotechnology, yield, quality.*

THE EFFECIENCY OF DIRECT SEEDING OF WINTER WHEAT IN THE PIEDMONT ZONE OF THE SOUTH-EAST KAZAKHSTAN

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In this abstract are shown results of field research carried out on the light-kashtan soils of piedmont zone in the south-east of Kazakhstan. The comparative research of traditional and no-till technologies of winter wheat cultivation in the semi-rainfed lands conditions.

In the south-east of Kazakhstan the winter wheat is grown mainly in the rainfed and semi-rainfed lands. Great prospects for the south-east of Kazakhstan has one of the fastest developing direction of conservation agriculture - the no-till technology - direct sowing. The novelty of this work is to establish the efficiency of direct sowing of winter wheat on the irrigated lands of south-east of Kazakhstan.

The main conclusions: 1. Research of different sowing norms sowing of winter wheat showed that the direct sowing was reduced seeding rates by 1.5-2 times. The optimum norm for direct sowing of winter wheat is 4 million germinating grains per 1 hectar, where it received from one hectare 26.8 centners of grain, and yield in the traditional technology - 26.1 centners / ha with seeding norm 6 million seeds per hectar. 2. Direct sowing of winter wheat on rainfed land showed a high efficacy of fertilizers in early spring. Nitrogen fertilizers in the tillering stage leads the restoration processes of plant growth and the formation of approximately equal of crops yields with traditional technology. 3. Economic calculations showed that the most effective way of winter wheat sowing is direct seeding, which produced a high level of profitability - 123%.

Key words: *resource-saving technology, direct seeding, no-till technology.*

GRAIN WEIGHT OF THE EXAMINED GENOTYPES OF TRITICALE (×*Triticosecale* Wittmack) IN AGROECOLOGICAL CONDITIONS IN BANJA LUKA

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Grain weight is a genotypic characteristic that is directly related to the realization of yield. Analysis of average grain weight was performed in ten genotypes of winter hexaploid triticale (Trimaran, Ticino, Odisej, Agrano, BLT21, BLT17, BLT10, Max 1793, Bogo and Tornado). Experiment was conducted during 2005/06, 2006/07, 2007/08. in Trapisti, region Banja Luka. During the experiment of winter triticale standard agricultural practice was applied. Microclimatic conditions during triticale cultivation in 2006 and 2008. were relatively similar, while in 2007. there was drought period occurrence. Statistical analysis of observed genotypes for the specified parameter was performed with method analysis of variance 10x3. Statistical analyses were done by using LSD test, while interactive effect was analyzed by graphical method. The average weight of triticale genotypes grain regardless of the year showed highly statistically significant differences, while in observation of years regardless of the genotype showed mutually statistically significant differences. Analysis of these relationships was observed through the interaction effects as a final evaluation of the observed genotypes. Based on the average values of the grain weight, winter triticale genotypes were evaluated. The average grain weight of triticale genotypes in the observed years showed the lowest average weight in 2007 (0.0369 g), while the highest yield was obtained in 2006 (0.0406 g). Statistically significant difference of the average grain weight of the observed genotypes of triticale regardless of the year showed that genotypes Bogo (0.0465 g), Odisej (0.0453 g) and BLT10 (0.0424 g). were those of the highest average grain mass without significant differences between them. These genotypes were evaluated as potentially productive genotypes under the agroecological conditions of Banja Luka.

Key words: *interaction, productivity*.

STUDY OF SPIKELETS NUMBER PER SPIKE IN WINTER WHEAT CULTIVARS (*Triticum aestivum* L.)

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In this paper was analyzed number of spikelets per spike in 20 genetically divergent wheat cultivars originated from different breeding centers in Serbia. The experiment was performed in randomized block design in three replication on the experimental field. Wheat cultivars were grown in two years which characterized different climatic condition. In both years samples of 60 wheat plants (20 plants in 3 replications) were analyzed in full maturity stage. After analysis were computed: the average value (x); the variance (σ^2); the coefficient of variation (V) as an index of relative variability of the trait and value of heritability. The significant differences between the average values were estimated by F-test values and tested by LSD (for 0.05 and 0.01). The analysis of variance was performed according to a random block system, allowing the calculation of the components of variance (σ^2_g-genetic) by using MSTAT program. The differences in average values for number of spikelets per spike in studied cultivars were determined. In this investigation the variability of number of spikelets per spike was established. The average number of spikelets per spike for both year of growing, varied from 19.8 in cultivar Danica to 24.8 in cultivar Gruza. Computed value of heritability (h^2=71.26%) indicates the high heredity of number spikelets per spike.

Key words: *wheat, cultivar, variability, spikelet, spike*.

ORAL PRESENTATION

BL 46 -NEW SINGLE-CROSS HYBRID MAIZE FROM BANJALUKA

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This paper presents properties the newly created domestic maize hybrid labeled BL 46, for which is Agricultural Institute of Republic of Srpska, Banja Luka submitted the request, under No. 207/2008. of 25 03. 2008th, to the Federal Ministry of Agriculture, Water and Forestry, Sarajevo, for the approval of varieties and hybrids.

Creator of the hybrid BL 46 is the Agricultural Institute of Republic of Srpska, Banja Luka, and the following plant breeders were involved in the creating of the hybrid: Jovo Stojčić PhD, Slavko Radanović Mr. sc. and Goran Ostić Mr. sc. In the process of plant breeding and creation of inbred line, the standard method of selection was used in combination with the early testing. Parent inbred lines are indigenous creations of equal vegetation length. The hybrid BL 46 was made as a result of hybridization of inbred line BL 39-14/2 on maternal position and BL 20-4 on paternal position. Newly created maize hybrid BL 46 possesses high, drought tolerance and good resistance to major pests of stalk and maize ear. The above mentioned traits render the hybrid suitable for grain and silage production in lowland and upland areas of Bosnia and Herzegovina.

The field and laboratory testing of the newly created maize hybrid was performed by the Federal Department for Agriculture Sarajevo in order to be approved for the production and the testing was conducted according to the unique method on two localities (Butmir and Odžak) in 2008, 2009 and 2010.

During the three-year testing, the hybrid BL 46 achieved significantly higher yield compared to the standard Bc-408B, and it belongs to the same vegetation length group as the standard. Compared to the standard, the tested hybrid realized more maize ears in average, higher grain yield per cob, higher 1000-grain weight and higher crude protein content, and showed higher resistance to braking and lodging as well.
According to the report on three –year field trials and laboratory testing of the hybrid and achieved results, the Administration Bosnia and Herzegovina for Plant Health Protection registered the hybrid BL 46 in the List of Varieties of agricultural plants in Bosnia and Herzegovina (Official Gazette No. 2/12), based on the conclusions of the Commission for the list of Varieties of the agricultural plants in Bosnia and Herzegovina,

Key words: *maize, hybrid, BL 46, yield, quality, resistance*.

SOWING MODELS OF HYBRID SEED CORN NS-640 IN AGROECOLOGICAL CONDITIONS OF BANJA LUKA-LIJEVČE AREA

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Yield and quality of one hybrid seed corn, in certain agro-ecological conditions, depend mostly on selection of sowing model of parental components, application of technology and weather conditions in production year.

Seed hybrid NS-640 has been produced in Banja Luka-Lijevče region for many years, as a result of scientific and business cooperation of Agricultural Institute of Republic of Srpska, Banja Luka and Institute for Field and Vegetable Crops Novi Sad. Novi Sad hybrid NS-640 is recognizable by its great adaptability and yield stability, and thus it is widespread in production of mercantile and silage corn in Srbija and Republic of Srpska, where excellent results are recorded regularly.

In order to achieve high and stable seed production in certain soil-climate areas, there is often a necessity to correct sowing models of parental components.

The research of the optimal sowing models was performed in 2009 and 2010 in the areas of Banja Luka and Nova Topola. Sowing models in conditions of dry cropping and with irrigation were tested in Nova Topola area. Two factors were tested as follows: sowing dates of paternal line – A and canopy density of maternal component – B. The testing of each factor included two variants: a1 – recommended sowing dates of paternal line, a2 – modified sowing date of paternal line, b1 – canopy density of 65.000 plants/ha and b2 – canopy density of 57.200 plants/ha.

The trials were set up in four repetitions, according to split-plot experimental model, with main plot size of 30 m^2, and the yield and 1000-grain weight of tested varieties were analyzed.

In both years of research, the highest grain yield was achieved in Nova Topola with irrigation and by variant a1b1 (3,18 t/ha in 2009, and 2,67 t/ha in 2010). The lowest yield was achieved with the same variant without irrigation (1,06 t/ha) in 2009, where in 2010, the lowest yield was achieved with a2b1 (1,21t/ha).

The analysis of 1000-grain weight showed direct correlation with seed yield and, in both years of research, the highest value was registered with variant a1b1 (317,4) in Nova Topola with irrigation in 2010, and the lowest was registered in Nova Topola with a2b1 (211,4 g) in dry cropping in 2009.

Key words: *corn, seed, NS-640, trial, variant, yield.*

CAMELINA SATIVA AS AN ALTERNATIVE OILSEED

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Camelina sativa, an ancient oilseed crop, is a member of the Brassicaceae family, with common names like false flax, gold of pleasure or leindotter. C. sativa has been grown by local farmers in the Koroška region since the middle of the 20th Century. C. sativa is characterized as a low-input crop and hence economical to produce. This allows the production to proceed under ecological conditions. The weight of 1000 seeds ranges from 0.8 to 1.8 g. The seeds contain up to 40% (wt.) of oil. Camelina oil contains around 35% (wt.) omega-3 essential fatty acid. Characterized as a functional food, Camelina oil is suitable for cold cooking or as a folk medicine. Due to its high protein content, oil cake is suitable for consumption by animals as fodder.

Key words: *Camelina sativa, Brassicaceae, false flax, vegetable oil,camelina oil, alpha linolenic acid.*

REINTRODUCTION OF CONTROL GRAZING FOR CALCAREOUS GRASSLANDS PRESERVATION IN SLOVENIA

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The aim of the paper is to present a development of sustainable karst grassland utilisation after the land use abandonment three decades ago. Results of the previous research indicate, that livestock grazing can have positive impact on biodiversity of the Karst region and well-kept landscape in this part of Slovenia. Limestone and dolomite rocks are forming karstic character of land, which could be reflected in specific floristic composition. Grazing livestock greatly affect the composition of the pasture plant communities, especially when combining different types of ruminants. With proper grazing management we can achieve a more complex pasture plant mixtures. This is due to selective animal grazing and grazing in patches where the effects vary in time and space. Animals collect the nutrients from wider area and return them in a more concentrated version to the soil. This has great influence on the specific stand and location fertility, vitality of the ecosystems and sward development with a wide variety of plants adapted to the local conditions. The key indicator of a land's stability and productivity is a succession. It is a process of change and development in the entire communities; soil, microorganisms, animals and plant life. To understand the nature of the forces that influence individual plants within a karst pasture sward, we need to consider developments in the sward from the plant's point of view. To maintain karst grasslands and to prevent bush encroachment, the grazing of livestock is of vital importance in the western part of Slovenia.

Key words: *karst grassland, grass sward, small ruminants, fencing, legumes, recultivation.*

EFFECT OF FOLIAR PHOSPHORUS AND POTASSIUM TREATMENT ON SEED YIELD AND YIELD COMPONENTS OF RED CLOVER (*Trifolium pratense* L.) CULTIVARS GROWN UNDER DENSE PLANTING CONDITIONS

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Proper mineral nutrition of red clover, especially on the acid soils is a prerequisite for the realization of maximum potential for seed yield. The field experiment with four cultivars of red clover were established on soil having a pH_{H2O} of 4.8, in order to be in conditions of dense planting (20 cm inter row) analyzes the effect of foliar application of phosphorus and potassium on yield and yield components (number of stems m^{-2}, number of inflorescences m^{-2}, number of inflorescences per stem, number of flowers per inflorescence, number of seeds per inflorescence and one thousand grain weight). Regardless of foliar phosphorus and potassium, varieties differed in the number of inflorescences per m^{-2}, number of flowers per inflorescence, number of seeds per inflorescence and seed yield. Foliar application of phosphorus and potassium in the phase of intensive growth of red clover had a positive impact on: number of stem m^{-2}, number of inflorescences per m^{-2} and seed yield in all varieties, as well as on the number of flowers per inflorescence, number of seeds per inflorescence cultivar Viola.

Key words: *red clover, phosphorus, potassium, seed yield, yields components*.

CHANGES IN FIELD PEA GERMINATION ABILITY DURING DESICCATION PHASE OF MATURATION

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Pea (*Pisum sativum* L.) is a plant species characterised by a non-uniform maturity, especially in genotypes with an indeterminate stem growth. This causes significant losses and seed damages during the harvest. Both losses and damages are minimal if the harvest is timely enough, at optimum seed moisture content. There is no consensus on the optimum seed moisture content for the harvest due to great differences in morphology, stem growth, earliness, seed maturity uniformity, seed shape and size and seed coat structure among the field pea genotypes. This was the reason for a study on the effect of seed moisture content on the most important parameters of the field pea seed quality. The seed moisture content, germination energy, germination, proportion of abnormal seedlings and 1000-seed weight were analysed in three dry pea cultivars (Jezero, Javor and NS-Junior) and at eight harvest stages. At the first harvest stage, seed moisture content was 20.44%, while at the eighth stage it was 11.26%. The best seed quality, with germination energy of 81.70% and germination of 90.11%, was at the sixth harvest time when seed moisture content was 12.92%. The poorest seed quality one was at the first harvest stage, with germination energy of 68.55% and germination of 78.56%. Cultivar Jezero, with shorter growing season, determinant stem growth and uniform maturity, had the highest germination energy (82.00%), germination (92.21%) and percent of abnormal seedlings (1.96%). Cultivar NS Junior, with the longest growing season, indeterminant stem growth and non-uniform maturity, had the lowest germination energy (70.39%) and germination (76.54%), and the highest percent of abnormal seedlings (3.58%).

Key words: *germination, field pea, moisture content, 1000 seed weight*.

THE QUALITY OF GRASS SILAGE AND HAYLAGE ON FARM IN BOSNIA AND HERZEGOVINA

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The aim of this research paper was to determine the value of grass silage and haylage on farms for milk production in Bosnia and Herzegovina, and on the basis of analysis results to make recommendations for improving the quality of forage and recommendations for feeding dairy cows. We analyzed samples of grass silage with 10 farms and haylage samples from 17 farms that have more than 20 dairy cows in the herd.

Determine the following parameters of grass silage and haylage: the degree of acidity (pH), dry matter (DM), crude protein (CP), crude cellulose (CC), mineral matter (MM).

The results show a satisfactory level of the average pH values (4.76 grass silage, haylage 5.33), a satisfactory level of DM (29.80% grass silage, haylage 48.26%), low content of CP (grass silage, 11.66%; haylage 12.69%), high content of CC (43.36% grass silage, haylage 42.03%), low content of MM (2.22 grass silage, haylage 2.05).

The results show large variations in all the tested quality parameters. pH value of silage ranged from 3.74 to 5.92, and haylage from 4.65 to 6.37; DM grass silage 19.10 to 29.80 and haylage from 37.84 to 64.13; CP grass silage from 6.55 to 18.34 and haylage from 7.36 to 24.36; CC grass silage 23.87 to 57.34 and haylage from 25.76 to 63.76; MM grass silage 1.54 to 2.87 and haylage from 2.10 to 2.87.

Key words: *haylage, grass silage, protein, cellulose, dry matter, mineral matter.*

RESULTS OF THE EXPLOITATIONAL STUDY OF SELF-PROPELLED MAIZE COMBINE HARVESTERS IN THE CONDITIONS OF TOPLICA COUNTY

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Working quality of an ear-picking device for mercantile maize is defined by amount of grain losses, by quality of harvested mass, and by straw chopper cutting height. Contemporary solutions for such machines should enable quality maize harvesting in various conditions, where losses and damage of grains would not exceed tolerable values. Ear-picking unit with stalk chopper, besides harvesting quality and proper work capacity, ought to chop up maize straw in order to ease later agrotechnical operations. This paper gives results of the exploitational study on working quality of two ear-picking device types of self-propelled combine harvesters for mercantile maize in agroecological conditions of Toplica County. The investigation has been aimed to establish work quality, work productivity and fuel consumption. Methods were based on adjusted standard methodology of evaluating ear-picking devices for mercantile corn, extended by additional parameters. The study was carried in two phases. During the first phase working conditions were established, while in the second phase working effects were established, as affected by the defined parameters. Quality of picked ears, grain losses, degree of grain shelling and damage, as well as straw chopper cutting height, were observed. Along with that, fuel consumption was determined by volumetric method and work capacity was measured chronometrically. The first type of ear-picking device for mercantile maize showed better working quality, comparing with the second one, under similar defined parameters. Mass harvested by the first device contained over 95% undamaged and 8.20 % unshucked ears, with shelling degree of 1.52%. Grain losses varied from 0.52-1.10%. In the second type there were around 93% of whole ears and 9.10% of unshucked ones, with grain losses of 0.73-1.65%. Shelling degree was 2.93%. Driving velocity significantly increased straw chopper cutting height, so it was 19.2-25.8 cm for the first device type, and 19.7-26.3 cm for the second one. Work productivity was between 1.97 and 2.30 ha/h.

Key words: *combine, maize, quality of work, losses, performance.*

4. *POSTER SESSION*

4.1 Fruit growing and viticulture

QUANTITY OF PRUNED APPLES TREES TRAINED ON INTENSIVE GROWING SYSTEMS

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In this paper are shown results for the influence of the training system, variety and location of growing of the apple trees on quantity of the pruned wood. The researches were conducted in two experimental orchards established in 2002 at Skopje (North Central part of Macedonia) and Resen (South Western part of Macedonia) on four different training systems (slender spindle, northern Holland spindle, V system and solex). Evaluated apple varieties were Jonagold Rubinstar and Breaburn type Herr. Trees were planted at two densities: 4 x 1.5 m (1667 trees/ha) for slender spindle and solex, and 4 x 1 m (2500 trees/ha) for northern Holland spindle and V system. The study has been performed during four consecutive years (2004–2007).

Significant differences of weight and length of pruned wood between different training systems, varieties and location were found. Weight of pruned wood expressed per hectare was highest at northern Holland spindle while lowest value was found at solex. According to location trees grown in Skopje has higher value for weight and length of pruned wood compared with those in Resen. Trees from cv. Jonagold Rubinstar have almost double weight of pruned wood of those from Breaburn type Herr.

Ključne riječi: *pruning, apple, training system, pruned wood.*

LENTICELS AS POMOLOGICAL CHARACTERISTIC OF APPLE FRUIT

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Although they are a component of pomological description and an important component of the aesthetic value of the fruit, as it has been first noted for Granny Smith cultivar, apple fruit lenticels have not been studied as a separate factor of pomological characterization in the production and environmental conditions of BiH and the region.

In this paper we analyzed the form and presence of lenticels on the surface of fruit epidermis as a cultivar characteristic under the given environmental and production conditions. The emphasis is placed on evaluating lenticele as an aesthetic component of fruits and their presence on fruits. The study was conducted on 10 cultivars in intensive fruit orchards (Elstar, Gala Must, Gala Schniga, Breaburn, Mairac, Granny Smith, Pink Lady, Pinova, Rubinette and Golden Reinders), 4 cultivars from the old sortiment (Reinette du Canada, Francuska kožara, Red Delicious and Welspur), and 11 autochthonous cultivars (Crvena ljutika, Đulabija, Kiseljača, Kolačuša, Limunika, Samonikla, Slatka jabuka, Srebrenjača, Šarenika i Zečuša) in the collection of the Genetic Resources Institute of the Republic of Srpska. The photodocumentation of the lenticels on fruits was created, and the comparison of their appearance and presence was made by means of image analysis software.

The average presence of the lenticels on fruits in the observed apple cultivars was 7.11 lenticel per 1 cm^2 of fruit epidermis. The lowest number of lenticels per 1 cm^2 of epidermis was found for the cultivar Pinova (4.3), while the highest number was found for Granny Smith (12.6). The interval of the variation of the number of lenticels per 1cm^2 of fruit epidermis in the cultivars that had a coefficient of variation below 30% was 3 - 10 lenticels per 1 cm^2, while for the cultivars that had a coefficient of variation over 30%, the interval of variation ranged from 3-23 lenticels per 1 cm^2 of fruit epidermis.

The evaluation of lenticels as an aesthetic component of fruits was done by means of observing the appearance and colour of lenticels on the primary and secondary fruit colour and the quality of being visible on fruits. Thus, the lenticels in the following cultivars: Gala Schniga, Breaburn, Granny Smith, Đulabija and Limunika make an attractive component in the fruit appearance, while the lenticels have the opposite effect in these cultivars: Red Delicious, Elstar, Mairac and Golden Reinders.

The question of genotype specificity in the structure of lenticels and their relatedness to intercellulars in deeper layers of tissue of fruit flesh, as an element of viability during the storage, is part of cytohistological study of the anatomy of lenticals, cuticle and subepidermal fruit issues in all 25 five cultivars listed in this paper.

Key words: *fruit description, commercial and autochthonous cultivars, aesthetic value.*

MORPHO-PHYSIOLOGICAL CHARACTERISTICS OF LEAF AS BASIS FOR GENOTYPE SPECIFIC MINERAL NUTRITION OF APPLE

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Genotype specific mineral nutrition through fertirrigation systems is technically available. It has become a standard in highly intensive orchard management systems. For consistent application of this concept, the key issue relates to the reliable definition of standards and monitoring the level of genotype specific mineral nutrition under the given agroecological conditions of orchard management. The aim of this research was to determine the average content of macro- and microelements in leaf blades of 23 apple cultivars (*Malus x domestica* Borkh.) and two pollinators (*Malus sikkimensis* (Wenz.) Koehne ex C.K. Schneid. and Malus niedzwetzkyana Dieck) and their classification in relation to leaf morpho-physiological characteristics (the surface and specific leaf weight). All cultivars and pollinators are on a board in the field collection and represented with 6 - 10 trees in the rootstock MM106.

100 leaves were taken for each apple genotype from the middle of the medium-length shoots at the end of July. Fresh leaves were scanned for software analysis of leaf blade surface. The petiole and central nerve were removed and Ø 10 *mm* sections were taken from both leaf blades. By means of drying the sections until a constant weight, leaf blade specific weight was determined. A total leaf blade dry weight (including the sections) was used for determining the contents of these elements: N, P, K, Ca, Mg, Zn, Mn, Cu и Fe. Through cluster analysis, the cultivars were grouped according to the contents of the elements and leaf blade surface. On account of leaf specific weight, the average dry weight accumulation of leaf blade was also determined.

The grouping of the cultivars using cluster analysis shows that:

- according to the surface, specific weight and dry weight accumulation in the leaf, the cultivers are grouped into four groups with two or three subgroups and Vista White cultivar as completely separate;
- according to the content of the observed macroelements, the cultivers are grouped into six groups with *Malus sickimensis* L. pollinator as completely separate;
- according to the content of the observed microelements, the cultivers are grouped into four groups.

Generally, the examined genotypes are specific according to the dry weight accumulation of leaf blades and content of macroelements, although the variation in the content of microelements among the genotypes is much more expressed.

Key words: *leaf specific weight, dry weight accumulation, macro- and microelements, cluster analysis.*

FOULING GROWTH STRUCTURE OF MULTIYEAR YIELDING PORTERS IN LONG CUTTING DURING RECONSTRUCTION OF APLLE TRAINING SYSTEM

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In this work it has been analyzed fouling structure of multiyear yielding porters as basic structural and productive units of Solaxe training system with the long pruning. For the cultivars Idared, Melrose and Gloster as model cultivars, there has been done reconstruction of Spindle training system to the training system Solaxe by introduction of long yielding posters. In the work there has been defined coefficients determining structure of multiyear yielding posters: a) coefficient of genotype potential of vegetative cone of lateral vegetative buds for making of generative buds – young yielding tree 29,7-56,9% (Idared - 56,9%, Melrose - 29,7%, Gloster-24,9%); b) coefficient of genotype potential of vegetative cone of top vegetative buds for transfer to the generative programme of differentiation 53,2 - 79,4% (Idared - 53,2%, Melrose - 79,9%, Gloster - 79,4%); c) coefficient of genotype potential of all vegetative buds on tree for creation of generative buds 36,7-57,5% (Idared-57,5%, Melrose -36,7%, Gloster - 37,2%); d) coefficient of fruit setting on the fructification shoots of apple 11,2-50,8% (Idared - 50,8%, Melrose - 11,2%, Gloster - 37,9%); and e) coefficient of genotype specificity in formation of the yielding branches on the fructification shoots carrying fruits 12,7-13,8% (Idared - 12,7%, Melrose - 13,2%, Gloster - 13,8%). Determined values of coefficients pointing out that there is genotype specificity within the observed cultivars related to the way and character of fouling growth of multiyear yielding porters what must be important when projecting the yield.

Key words: *cultivar, coefficient, potential*.

PRODUCTIVITY OF APPLE GROWN ON PSEUDOGLEY

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In this study was have analized the productivity two apple cultivars (Idared and Golden Delicious clone B) that are grafted on three rootstocks (M9, M26 and MM 106) and grown as slender spindles on the lowland pseudogley in the orchard. In the previous studies, the alternately presence of two micro-locations was determined in the orchard: 1) soil conditions typical of lowland pseudogley and 2) the conditions of micro depressions. The presence of a prolonged and increased humidity as well as occasional puddles was determined in micro depressions compared to the typical lowland conditions of pseudogley throughout the year.

During the analysis, the trees of the examined cultivars were in the period of full fruit bearing, and this study shows the average data for the three years of observation (from fifth to seventh year of the age of trees). We analyzed the following indicators: the number of mixed buds on the tree, the degree of development of the receptaculum of the central flower primordium in a mixed bud and the yield per unit area of orchard, as well.

A significant influence of micro-location and rootstocks, with certain differences between some combinations of cultivars/rootstocks, was determined for all analyzed parameters. All of them showed a decreasing trend in mean values as a result of the conditions prevailing in microdepressions.

Key words**:** *productivity, mixed bud, central flower, receptaculum, yield.*

BEHAVIOUR OF 'STARKING', GOLDEN DELICIOUS' 'RED CHIEF' AND 'GRANNY SMITH' APPLE CULTIVARS ON M9, SUPPORTER 4 PI 80, MM111, MM106 AND PAJAM CLONAL ROOTSTOCKS

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In Dibra region of Albania, there is growing trend of planting medium to high density orchards (1000 to 2000 trees/ha). This requires a good knowledge on the behaviour of apple cultivars on the respective clonal rootstocks. Optimal combination and use of quality planting material having limited vigour, promote early bearing, better adaptation of planting distances increasing crop efficiency. There is a lack of rootstock trials under the growing conditions of Dibra region which is slowing the adoption of high density plantings and the use of the new clonal rootstocks.

The scope of the research presented here was to study the behaviour of several apple cultivars, namely 'Starking', Golden Delicious', 'Red Chief', 'Granny Smith' on some clonal rootstocks (M9, Supporter, MM111, MM106 and Pajam 2. The study was conducted from 2010 to 2011 using scions of the above cultivars grafted on these rootstocks and observing the following parameters of the young saplings: height, diameter at 5 cm above the grafting point, percentage of successful unions, uniformity of the grafting point as well as some indicators of the canopy architecture of young trees: trunk circumference, annual shoot growth, shoot type (vegetative or reproductive), presence of suckers, and bearing. The results showed that MM106 and MM111 give quality trees when grafted with 'Golden Delicious', 'Starking' and 'Granny Smith'. The latest has good compatibility with all the rootstocks except for Pajam 2. Architectural elements for the induction of a quick fruiting are higher in 'Red Chief' and 'Granny Smith' on M9, P2 and Supporter.

Key words: *shoot growth, trunk circumference, fruit set, vegetative and reproductive growth.*

DISTRIBUTION OF ROOT SYSTEM OF APPLE TREES ON DIFFERENT DWARFING ROOTSTOCKS

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This paper considers analyses for comparing the distribution of root system of nine dwarf apple rootstocks (M.9 T 984, M.9 T 337, Jork 9, Mark 9, Budagowski 9, M.9 EMLA, Pajam 1, Pajam 2 and Supporter 4) grafted with apple cultivar Granny Smith. The study was performed at the end of 7th growing season in the experimental orchard established in the Prespa region (Resen, R. Macedonia). Experimental orchard has been established in 2004, with a planting distance 3.5 m x 1.5 m. Following characteristics were evaluated: length and weight of the fine (fibrous) and coarse roots, and depth distribution of the root system. Analyzing the computed data we conclude that among evaluated rootstocks there is no statistical differences in total length of the fine roots. Between different rootstock the results for total length of coarse roots showed more variability. In general even 89% of the total length of root system belonging to fine roots, and the highest percentage (35%) are located at depths of 20 to 40 cm. Trees grafted on Mark 9 rootstock have highest value for total root length wile smallest were registered on those grafted on Pajam 1. Trees grafted on Supporter 4 have greatest weight of the root system, while the smallest ones those on Budagowski 9.

Key words: *apple, rootstocks, root system, depth distribution*.

INFLUENCE OF M9 ROOTSTOCK ON THE REPRODUCTIVE BEHAVIOUR OF APPLE CULTIVARS UNDER DRY, SEMI-ARID GROWING CONDITIONS

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In the last decade, apple is being intensively cultivated in the western coast of Albania. The scope of this research was to study the influence of M9 rootstock on the reproductive behaviour of 'M. Gala', 'Golden Delicious', 'Starking', 'Fuji' and 'Pink Lady' cultivars. The trial was conducted from 2010 – 2011 on a 5-years old orchards, with 2250 trees/ha, grown as French axe and in full production located in Lushnja. The following indicators were measured: diameter of two main branches, number of fruits/branch, fruit growth dynamic and sugar content (%). Global radiation, temperature and humidity were recorded.

The reproduction behaviour is also measured by the fruiting spurs in the general structure of the canopy as well as the number of fruits formed for each cultivar. The results have shown that in terms of fruit set, cultivars are ranked as follows: 'M. Gala' with the highest number of fruits, then 'Golden Delicious', 'Fuji', 'Pink Lady' and 'Starking'. The dynamic of fruit dropping shows that 'Starking', having the lowest fruit set, after the June drop is more stable while 'M. Gala', with the highest fruit set, beside a abundant June drop, had a another drop in July. This is due to higher competition of fruits among each other and the failure of the rootstock to supply the adequate quantity of sap.

In terms of fruit growth dynamic, it was observed that for all the cultivars, intensive growth was measured during the end of July. Fruit growth then slows down and changes between cultivars are observed related to the maturation period of each cultivars, with 'M. Gala' maturing in 'August', 'Fuji' and 'Pink Lady' in October and November. 'Starking and 'Golden Delicious have a quicker maturation (20 September), accompanied with a higher sugar content which is far more related to climatic factor rather than M9 rootstock.

In conclusion, it was found that the cultivars under study have a different reproductive behaviour with M9 rootstock. It can also be stated that 'Starking' is not appropriate for this coastal region due to inadequate fruiting behaviour.

Key words: *rootstock, fruit set, fruit growth dynamics*.

ROOTSTOCK INFLUENCE ON APPLE CANOPY ARCHITECTURE UNDER HIGH RADIATION AND TEMPERATURE

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Beside its typical and optimal areal of cultivation in the Central and Northeast Albania, in the last decade, apple cultivation has been spread into the Western Plain, to benefit from the advantages of earliness and vicinity with the main markets. The scope of this research was to study the canopy architecture of five main cultivars grown in this region, 'M. Gala', 'Gold Delicious', 'Starking', 'Fuji' and 'Pink Lady' on M9 rootstock.

The study was carried out from 2010 - 2011 in a 6-years old orchard, located at an altitude of 3 m, with 3,7 x 1,2 m distances in French axe system. The following measurements were made in 5 trees per cultivar: diameter of the rootstock, scion and two main braches at 1.5 m height, number of spurs, bourses and shoots, length of woody shoots and fruit set. Global radiation, temperature and humidity were recorded.

The data shows a noticeable difference in rootstock/scion growth between the five cultivars tested. These differences are higher in the combination M9/'M. Gala' and 'M9/'Pink Lady', with an affinity index of 0.49 and 0.52 respectively (< 0.6). The same trend is observed also with the diameter of the main branch, with a partial incompatibility, which modifies also the other elements of the canopy architecture, vegetatition and reproductive growth. Changes are observed in 'M. Gala', with a small diameter of the main branch (14.7 mm), but with a higher number of fruiting shoots (18 fruiting shoots) and fruit set (45.3 fruits/twig). It is followed by 'Fuji' and 'Gold'. Although 'Starking' has a higher diameter (16.4 mm) of main branches, its forms more vegetation shoots and a small fruit set (20.8 fruits/twig). There is a significant correlation between the branch diameter and the fruit set per twig.

In conclusion we can state that these cultivars show a different behaviour towards M9 rootstock which has a significant effect on the elements of the canopy architecture and fruit set.

Key words: *affinity index, fruit set, vegetation growth, fruit growth, fruit set*.

EFFECT OF FOLIAR FERTILIZERS ON THINNING ON APPLES FRUITS

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Chemical thinning is common pomotechnical measure that can improve fruit quality and ensure high yields in the following year. Therefore chemical thinning of apples is done in order to maintain regular yields, as well as the balance between yield and fruit quality. Apple chemical bloom and post bloom thinning programs are intended to reduce the current season's crop load in pursuit of better differentiation of next-year generative buds and achieve regular fecundity in apple plantations. Fruit thinning can be performed manually, but it is very expensive and time consuming. For this reason hand thinning is usually used only in combination with chemical thinning. Hormonal preparations for chemical thinning currently used in the surrounding countries are not eco-toxicologically acceptable and as such are not applicable to the concept of integral and ecological fruit production. The aim of this study was to test the effect of natural foliar fertilizers GOËMAR BM 86 E and GOËMAR FOLICAL on fruit thinning, and thus on the quality of harvested apple fruits. The trial was set up in 2010 and 2011, with four apple varieties: Golden Delicious, Granny Smith, Idared and Breburn grafted on M9 rootstock, planted at spacing of 4x1 m, in orchard trained in Solaxe system. The trial was set up with ten repetitions, where each tree represents one repetition. Before the harvest from each tree a samples (10 fruits per sample) were taken from the top, middle and bottom of the tree canopy. After that, pomological fruit traits were measured. In both years, treated trees of cultivars Idared, Golden Delicious and Granny Smith acchieved greater fruit size, where the average fruit weight was about 20% higher in relation to the control. Only the cultivar Breburn in the first year of the trial did not show any differences in fruit size between control and treated trees, while the results from the folowing year showed that the average fruit weight of the treated trees was higher for about 20% in relation to the control.

Key words: *apple, cultivar, chemical thinning, foliar fertilizer.*

LENTICELS AS POMOLOGICAL CHARACTERISTICS OF PEAR FRUIT

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The lenticels on the fruits that are permanently covered with epidermis are the organs for ventilation of the intercelullars of the internal fruit tissue. This is the reason why pear fruits have not been the focus of the studies of genotype specificity of the function of lenticel. The presence of lenticels on fruits as an indicator of these processes have not beeen the focus on the mentioned studies, too. In this paper, we analyzed the morphological parameters and presence of lenticels on fruit epidermis with a view to determing whether the lenticels on fruits can be considered as a reliable cultivar characteristic under the given ecological and production conditions. The emhasis was put on the evaluation of the presence of lenticels on fruits, bearing in mind the complexity of cold pear storage. The evaluation of lenticels as a component of pomological description and the aesthetic value of pear fruits was an accompanying segment of this research.

The research was conducted on 10 pear cultivars in intesive fruit orchards (Abate Fetel, Alexander Lucas, Beurré Bosc, Red Williams, Vereins Dechantsbirne (Doyenné du Comice), Gellert's Butter, Conference, Packham's Triumph, Santa Maria and Williams) 4 cultivars from the old sortiment (Beurré d' Hardenpont, Belle de Berry, Passe Crassane and Starkrimson) and 5 autochthonous cultivars (Carevka, Citronka, Lubeničarka krupna, Sijerak and Višegradska) in the collection of the Genetic Resources Institute of the University of Banjaluka. The photodocumentation of the lenticels on fruits was done, and the analysis of the presence was made by means of image analysis software.

The average presence of the lenticels on fruits in the observed pear cultivars was 24.5 lenticels per 1 cm^2 of fruit epidermis. A considerable variation was not only determined between cultivars but also between individual fruits of the same cultivar. The lowest average number of lenticels per 1 cm^2 of epidermis was found for the cultivar Alexander Lucas (11,70), while the highest number was found for the Williams (37.50). The interval of the variation of the number of lenticels per 1cm^2 of fruit epidermis in the cultivars that had a coefficient of variation below 30% was 7 - 44 lenticels per 1 cm^2, while for the cultivars that had a coefficient of variation over 30%, the interval of variation ranged from 6-66 lenticels per 1 cm^2 of fruit epidermis.

The evaluation of lenticels as an aesthetic component of pear fruits show that the lenticels on the observed commercial cultivars generally have no aesthetic significance, while the lenticels on autochthonous pear cultivars (Carevka, Višegradska and Citronka) can be identified as an aesthetic component in fruit description.

Key words: *fruit description, commercial and autochthonous cultivars, aesthetic value.*

EVALUATION OF QUALITY CHARACTERISTICS OF SOME AUTUMN PEAR VARIETIES

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The pear is quality, fine fruit which is appreciated and requested by the consumers. With the permanent increase of the standard and increased purchasing power, the demand of quality pear fruits becomes larger. In Macedonia there is not enough production of pears and because of that a big part of the needs are supplied by import. The situation in the other Balkans countries is almost the same. In the plantation are cultivated a big number of pear varieties with different quality characteristics and ripening time.
In this paper the results from investigation of some quality characteristics of 8 pear varieties with autumn ripening time are presented. The researches are carried out at the follow varieties: Harrow Sweet, Honey Sweet, Abate Fetel, Packams Triumph, Conference, Magness, Highland and Kaiser. Research of the pear varieties was conducted during 2008-2010, and the fruit are produced in Skopje area. The researches comprise: ripening time of the fruits, yield per tree, weight and dimensions of the fruits, dimensions of the stalk, and firmness of the fruits, content of soluble solid matters, total sugars, total acids, and organoleptics evaluation of the fruits.

Key words: *pears, variety, fruit, quality*.

STRUCTURE OF THE PEAR (*Pyrus communis* L.) GENERATIVE TREE OF CULTIVAR ABBE FETEL

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Abbe Fetel is leading pear cultivar in Italy and is present in 60% of productive plantatnions. In Bosnia and Herzegovina this cultivar was mainly used as a pollinator. Regarding the market requests and high prices that this cultivar could reach in winter and spring seasons, it started to be leading cultivar. Producers in Bosnia and Herzegovina have certain obstacles related to the cultivation of Abbe Fetel, probably caused by inadequate pomo-technique applied and planting of incompatible pollinator cultivars. According to that in this work it has been done analysis of one year shoot at generative tree carriers. Experimental part of the work has been done in the plantation that is old 6 years located in Jablanica near Gradiška. Plantation is of 20 ha size and is within the ownership of company Agroimpex d.o.o. Banja Luka. Ten trees were chosen and carriers of generative trees were counted and their diameter and diameters of the trunk is measured. There have been studied 30 carriers of the generative tree in order to analyze characteristics of the apical buds within one year shoots. Ration between vegetative and generative shoots there have been determined number of the mixed shoots/buds upon carriers of generative tree and this is representing potential productivity of the studied cultivar.

Based on potential productivity and surface of the cross section of trunk there could be determined accurate pomotechnical treatment aiming to the optimal fruit loading per cm^2 of the cross section of the trunk.

Key words: *bud, generative tree carrier, generative shoots, generative potential*.

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PEAR POLLEN VIABILITY DETERMINATION BY SUSPENSION DROP METHOD

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Flowering, pollination and fruits setting i.e. fertilization are representing basic conditions for use of biological and productive potential of the fruits. Accurate chose of the cultivars compositions in the pear plantations is main precondition for achieving of the optimal yield. In modern fruit production beside knowledge of the mechanisms and processes of pollination and fertilization there must be present knowledge for successful management and setting the direction of these processes. For obtaining of the high and regular productivity of the pear it is important to study pollen viability and its functional abilities. Studies of the pollen viability could be done *in vivo* and *in vitro.* By *in vitro* methods, method of suspension drop and setting of the pollen to the agarose medium or gelatine are mainly used. Studies of the pollen viability was done on 5 cultivars (Junska lepotica, Starkrimson, Santa Marija, Vilijamovka and Butira) in the Laboratory for pomology at the Faculty of Agriculture Banja Luka. Results of the work of the studies of the pollen viabilty of the pear were presented by the percentages related to the tested cultivars with the standard error and variation coefficient related to the 12, 16 and 20 % solution of the sucrose. Testings of the significance of the diffference was done by application of the T-test.

Key words: *pollen, germination, fertilization, pollen tube*.

POMOLOGICAL AND CHEMICAL CHARACTERISTICS OF SOME PEARS FRUIT VARIETIES GROWN IN TERMS OF BRATUNAC

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This paper presents the results of studies of some of the pomological characteristics (mass, length and width, shape index, petiole length, number and mass of seeds) and chemical properties of fruit (soluble dry matter, total and invert sugar, sucrose, total acidity, pH of fruit) of pear for varieties Junska ljepotica, Santa Maria and Vilijamovka. The study was conducted in 2011 in the ecological conditions of Bratunac. Based on the following indicators, our intension was to estimate success of breeding of these varieties in mentioned area. According to obtained results the best economic and biological characteristics showed the variety Junska ljepotica and Vilijamovka since Santa Maria. Growth of these two varieties in terms of Bratunac is reasonable and economically feasible, with trend of production increase in mentioned area.

Key words: *pear, variety, pomological characteristics of fruit, chemical characteristics of the fruit*.

ANATOMICAL AND MORPHOLOGICAL SPECIFICITY IN DESCRIPTION OF FRUITS OF STONE FRUIT TREES

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Anatomical and morphological specificity of the fruit analysis of stone fruits are mainly directed at basic pomological parameters of the fruit. However, a detailed anatomical and morphological fruit analysis shows there are many particularities that are specific for species and cultivars of stone fruit trees. These particularities may be evaluated as anatomical and morphological specificities that have a strong influence on fruit quality in the production cycle as well as fruit viability during harvest and transport and at market stalls.

As part of the broader morphological, anatomical and histological analyses of the fruits of the apricot, peach and plum in the period 2008 to 2012, the following anatomical and morphological specificities of the fruits were identified and described (these are not listed in the available fruit descriptors, they are not an element of control in production and an element of market status of these fruits, as well):

- the epidermal sleeve around the base of fruit stalk;
- the status of the pistil scar at the fruit apex;
- the separation of the fruit meat from the seed during the process of the mesocarp growth in freestone;
- the cracking of the seed tip and base during the process of mesocarp growth;
- the vaxy coat in interaction with fruit ripening, lenticels and epidermis colour;
- the status of the exocarp cuticle as well as fruit furrow;
- placentation effects along the fruit furrow during the process of mesocarp growth;
- the reaction of the exocarp to different physical damages during the process of fruit growth (stings, touches, etc.).

The photo-documented and described anatomical and morhological specificities of these fruits were discussed in this paper related to generally accepted descriptors as well as their importance to the description itself and the evaluation of cultivars on the basis of their commercial value (the assessment of risk and fruit viability during transport and sell manipulation, the assessment of possible consequences depending on the length of time for implementation on the market, etc.)

The identified and described anatomical and motphological specificities of the fruits of stone fruit tress have to be studied in order to place them under control in terms of agro- and pomotechnics and select them for future creating of new cultivars.

Key words: *cultivar evaluation, descriptors, fruit epidermis.*

GENERATIVE BUDS BEARING POTENTIAL AT different GROWTH WAVES ON ONE-YEAR-OLD SHOOTS IN APRICOT

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The apricot is a fruit tree species with the expressed specificities in growth and development patterns, which in our production environment are reflected in the fact that the apricot is the first species to blossom in comparison to other fruit tree species. Also, for apricot as a fruit tree species (in general) there is no defined pomo-technical pruning treatment and tree training for intensive production plantations. As the flowering of the fruit trees depends on degree of differentiation of the generative buds and the pomo-technique in the fruit trees is based on creating certain balance between vegetative and generative buds on the different shoot categories on the trunk, this paper studies the degree of differentiation of the generative buds and their bearing potential depending on position at the various growth waves on one-year-old shoots. The growth waves on one-year-old shoots in apricot occur on the branches which had been subjected to restorative cuts (the shoots with prolonged vegetative growth) which as a consequence has the occurrence of two to four successive growth waves in average. The goal for putting the shoots with several growth waves under pomo-technical control is the establishment of the projected representation of generative buds on those shoots, i.e. the generative buds which have an appropriate bearing potential for regular fruit bearing.

In this article, we have studied the representation, arrangement, degree of differentiation and yielding of the generative buds at different growth waves of one-year-old shoots in apricot cultivars Madjarska najbolja (Hungarian Best) and Novosadska rana (Novi Sad's Early) during the years 2010 and 2011, on Riječani plantations, in Laktaši.

Based on the conducted research, the following general conclusions could be adopted:

- the representation of the generative buds, the degree of differentiation and its bearing potential depend on growth waves on one-year-old shoots;
- the degree of differentiation of the generative buds on those shoots is inversely proportional to the number of growth waves, i.e. the development of the generative buds decreases with increase of the number of growth waves;
- the difference in the degree of differentiations of the generative buds is expressed in spring development of the buds through blossoming dynamics and fruit set;
- the bearing potential of the generative buds is expressed through decreased degree of differentiation of the buds and it is the highest at the mid or latter growth wave of one-year-old shoots.

According to the degree of achievement of the bearing potential at the different growth waves, suggested is the pruning model for apricot for better yield which sums up to restorative cuts with goal to control the growth waves, i.e. control of bud differentiation at the induced growth waves and with that also the yield control.

Key words: *bud differentiation degree, pruning model, yield control.*

PROPERTIES OF SELECTED TYPES OF VINEYARD PEACH DESIGNED FOR JUICES AND COMPOTES

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Vineyard peach in Serbia shows a great genetic variability of the types of different usability. The selection of vineyard peach is carried out in three directions at the Faculty of Agriculture in Belgrade. The first direction is a selecting of the types which can serve for the production of generative rootstocks, the second one is a selecting of the types designed for table consumption and the third one is a selecting of the types designed for different ways of processing. In this paper, the three-year results (2006-2008) of the important properties of the two selected types of vineyard peach (II/8 and XIX/30) whose fruits are designed for the production of juices and compotes are shown. Both types possess a round fruit shape and a high degree of skin pubescence. Their skin ground colour is yellow, with the XIX/30 type not having a skin blush, whereas a partial presence of redness is noticed in the II/8 type. Both types have yellow flesh colour and belong to freestone peach type. The II/8 type averagely ripened in the first decade of September and was characterised by a higher yield (49.7 kg/tree) in comparison with the XIX/30 type which ripened in the third decade of September and achieved a yield of 34.2 kg/tree. Significant differences were not noticed among the investigated types regarding the physical (length, width, thickness and weight of the fruit, stone weight and randman) as well as chemical (soluble solids, total sugar content, inverted sugars and total acid content) properties of fruit. The II/8 type showed significantly better taste and aroma, which resulted in better total mark (27) in comparison with the XIX/30 type which was given a total mark (24) regarding the organoleptic assessment of fruit. Regarding the products (juice and compote) whose appearance, taste and aroma were organoleptically assessed, the II/8 type got better total marks (29 for juice; 28 for compote) compared with the XIX/30 type (27 for juice; 27 for compote). The obtained results show the advantage of both types for successful production of juices ad compotes, but the II/8 type can be recommended for mass production, mainly because of higher yield and better quality of the processed products.

Key words: *vineyard peach, selection, yield, fruit quality, juice, compote*.

MORPHOLOGICAL SPECIFICITIES OF PLUM LEAF IN POMOLOGICAL DESCRIPTION

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The morpho-physiological characteristics of the plum leaf in the pomological analyses for evaluating the adaptability of introduced cultivars have not been analyzed in detail. Also, the questions about the morphology and function of extra floral glands remained open.

In this article the morpho-physiological leaf characteristics of 11 plum cultivars (*Reine Claude d'Althan*, Elena, Hanita, Čačanska najbolja, Čačanska rana, Čačanska rodna, Čačanska lepotica, California Blue, Katinka, Top and Stanley), introduced in the agro-ecological conditions of the Banja Luka region, were analyzed. The study was conducted in the field collections in Prijedor and Banja Luka during 2009 and 2010 by means of the analysis of: the form and position of the leaf on the shoot, leaf surface area, specific leaf weight, leaf margin as well as the form and position of extra floral glands. The leaf samples (100 leaves per cultivar) were taken from the middle of the average length shoots in late July. The leaves were scanned for the leaf surface software analysis and then the stem and central leaf nerve were removed and the sections of Ø 10 mm were extracted from the both side of leaf blades. The specific leaf weight of leaf blades (dry leaf weight /cm2) was determined by drying the sections to constant mass. The edges of the leaf and extra floral glands were photo-documented for the analysis using image analysis software.

The results has shown that:

- the leaf form and position on the shoots are a cultivar specificity; ▪ the average leaf surface area ranges from 31.05 cm2 (Čačanska rana) to 47.01 cm2 (Stanley);
- the average specific leaf weight ranges from 0.0134 g/cm2 (Top) to 0.0176 g/cm2 (Čačanska lepotica);
- the leaf margin shows expressed cultivar differences and it can be evaluated as a cultivar specificity;
- the extra floral glands of the observed cultivars show differences in shape, mutual relatedness as well as the position on the edge of the leaf in the leaf blades base or leaf handle, so they can be evaluated as a cultivar specificity.

The cyto-histological structure of extra floral glands and leaves are part of the research of all 11 cultivars listed in this paper.

Key words: *leaf surface area, leaf margin, specific weight, extra floral glands*.

QUALITY OF CHERRY FRUIT VARIETIES GROWN IN PODGORICA REGION

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Proper selection of varieties is a basic prerequisite for the successful production of fruits, including cherries. Favorable growing conditions and proper application of agro and plantation pomotechnological measures are necessary preconditions to the genotype of the variety comes to the fore.

To meet the demand for these early, high-quality and delicious fruit, especially during the tourist season there is a need for varieties that innovated. Introduction and expansion of the production of new, higher quality and higher yielding varieties introduced different time of ripening cherries.

Basic this study was to evaluate the quality of the fruit cherry varieties introduced in specific agro-ecological conditions of Podgorica region, with the purpose of selecting the best varieties of fruit characteristics that would be recommended production practices for intensive cultivation.

Tests were conducted in the collective plantation of Biotechnical Faculty in Podgorica on the "Lješkopolje" during the 2005 - 2007. year. The research was more important during ripening and fruit quality parameters of the introduced varieties of cherries (Big Burlat, Moreau, Bing, Duron and Nero, Forlt, Giorgia, Sunbrust, Van, Ferovia, Duron Nero II, Lapins and Stella). All varieties are grafted on mahaleb background and training system has been improved pyramidal crown. Row spacing of fruit trees was 4.0 h 4.0 m.

The earliest growth stages ripening was recorded in cv Big Burlat (09.05.), But not later than the cultivar Stella (10.06.).

Fruit weight most of the varieties in the category of medium-large to large (6.50-10 g). The highest fruit weight was recorded in cv Sunbrust (11.80 g) and Lapins (10.70 g). Shape of the fruit in most varieties was oval, and flat elongated shape.

The highest content of soluble solids was recorded in cultivar Van (16.40%). Big Burlat varieties (11.30%) and Giorgio (11.60%) had the lowest value of all tested varieties. The content of total acids in the fruits of the cultivars studied ranged from (0.37%) in the fruit and Duron Nero (0.40%) in the variety and Van (0.60%) in cv Big Burlat.

Key words: *cherry, variety, ripening time, fruit weight, fruit quality.*

GRAFTING OF WALNUT (*Juglans regia* L.) WITH HOT CALLUSING METHOD IN ALBANIA CONDITIONS

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Walnut (*Juglans regia* L.) propagation is more difficult, compared to most fruit species.. In Albania walnut grafting is not performed and the new walnut orchards are established only by seedlings. This is the reason that we undertake the study of grafting with hot callusing method of walnut in the "Peza e Vogel" Multiplication Center.

In this experiment we put in the test three treatments of grafted plants during years 2010-2011: (i) without plastic band and without paraffin, (ii) with plastic band without paraffin (iii) with plastic band and paraffin. The grafting were performed in three different time : 13, 23 February and 03 March.

It is resulted that the percentage of plants increased significantly from first to second time of grafting and there are not difference significantly from second to third time of grafting.

According the three different treatments the best results are evident in the third treatment (with plastic band + paraffin). The percentage in this treatment, confirmed by Anova test (Tukey-Kramer, q = 1.71 LSD 0.05), were 92.7%.

Post-grafting growth was significantly better at the third treatment (with plastic band + paraffin) and the correlation coefficient r=0.88 indicate a positive and strong relationship between them.

Key words: *Walnut, grafting, paraffin, plastic band, callusing method*.

CHARACTERISTICS OF CHESTNUT MALE GAMETOPHYTE IN POTKOZARJE REGION*

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The specificities of the male chestnut gametophyte are shown in the morphology of anthers, i.e., the type of the male flower (*astamine, brachystamine,* mesostamine and longistamine), vitality and functional pollen ability. Anatomical - morphological structure of the male chestnut flower indicates positive correlation between the length of filaments, the intensity of the pollen production and the way of pollen dissemination from anthers. The chestnut breeding for the separation of genotypes with high yield potential for large-scale production must determine marked specificities of the male gametophyte as a necessary prerequisite for pollination and fruit set, as the chestnut is a cross-pollinating fruit species.

As the part of the study of chestnut population in the Potkozarje region during 2010 -2011, the analysis of length of filaments and pollen germination in 22 selectively chosen genotypes by expressed predisposition to high yielding was performed. By using cluster analysis, the genotypes grouping was performed according to these properties in order to focus the research on the genotypes with the best morphological and functional characteristics of the male gametophyte, which must be part of plantation production.

Based on the research results of the studied genotypes in both years of observations, the following conclusions can be drawn:

- the length of anther filaments on average ranges from 1.76 mm to 6. 68 mm;
- the maximum average pollen germination ranges from 23.34% to 83.41%;
- by means of cluster analysis, a group of genotypes as a promising pollinators was separated: "Bolte 3", "Bolte 1", "Slabinja 1", "Koturovi 3", "Vlaškovci 1"," Bolte 2" and "Parnice 2".
- by means of cluster analysis, group of genotypes that are not good pollinators was separated: "Koturovi 1", "Moštanica 3", "Parnice groblje 1", "Moštanica 2", "Vranovac 1" and "Slabinja 2".

Meeting all the requirements of a potential plantation production, a collected chestnut population in the region of Potkozarje is a good basis for chestnut breeding.

Key words: *filament length, pollen germiability, pollinator.*

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* This paper is part of the project "Microsporogenesis, Microgametogenesis and Pollen Germination of *Castanea sativa* Mill. in Associations of Fago-*castanetum* and *Querco-castanetum* in Potkozarje Region", which is implemented at the Genetic Resources Institute of University of Banja Luka and financed by the Ministry of Science and Technology of Republic of Srpska.

PHENOLOGICAL AND PRODUCTION CHARACTERISTICS OF SOME STRAWBERRY VARIETIES IN THE REGION OF SKOPJE

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The phenological and pomological characteristics have been studied within the following strawberry sorts (N^{o}-15): Idea, Comarosa, Belruby, Evita, Honeoye, Tethis, Onda, Chandler, Miranda, Paros, Elsanta, Eris, Madlen, Favette and Marmolada, and two standard varieties Senga Sengana and Pocahontas.

The experimental grove is raised with a certified frigo plant material in the half of September 2001, on the grounds of the UKIM Institute of Agriculture - Skopje at the Dolno Lisiche region.

The planting was conducted on a black polyethylene foil in parallel lines and banks 20 cm high and 1 meter wide. The planting distance is 40 x 30cm. The drip irrigation system has been applied. The studies were carried out during the years of 2002, 2003 and 2004.

The analysis of the phenological characteristics covers the period of blooming and ripening. The dimensions and weight of the fruit have been analysed. The crop from the sorts is presented through a yield per plant (g/per plant) and kg/ha.

The most early blooming varieties are Honeoye and Eris with an average date of bloom outset some time round the 05 April. The Onda sort has the latest bloom onset (13 April). The average bloom period lasts for as long as 37 days.

Sorts with early ripening time are Eris, Honeoye, Madlen and Onda (average onset of ripening from the 12th – 14th May).

Sorts with medium time of ripening (15th-16th May) are: Elsanta, Paros, Marmolada, Miranda, Chandler, Pocahontas, and Belruby.

Sorts characterised by a late date of ripening (17th-18th May): Evita, Tethis, Favette, Senga Sengana, Idea, and Comarosa.

The plants' ripening interval moves within the average 20 days with Camarosa, and 30 days with Onda.

The Belruby sort's fruit had the biggest fruit (36.2 mm in height and 39.1 thick), whereas Senga Sengana had the smallest (27.8 x 25.7 x 22.8 mm).

The average weight of the fruit ranges from 5.7g with Senga Sengana and to 11.1g Madlen with 11.3 g Belruby.

The biggest average yield per plant is noticed with the Pocahontas (575.1 g) and Evita (550. 7 g) sorts, and the smallest yield per plant was noticed with the Favette (297.9 g) sort.

During the experimental period the average yield per unit per surface ranges between 8276 kg/ha with Chandler, to 17770 kg/ha with Pocahontas, whereas Senga Sengana is has 13475 kg/ha.

Key words: *Fragaria ananassa Duch., introduced varieties, time of blooming, time of ripening, prodyctivity, weight of fruit, yield per plant, yield per ha.*

FRUIT WEIGHT AND SHOOT GROWTH OF CV WILLAMETTE IN THE NORTHERN PART OF MONTENEGRO

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Raspberry is the most profitable berry fruit in the northern part of Montenegro. Manufacture of raspberries is very safe, because high-quality fresh and frozen fruits and their products can be easily and under very favorable conditions placed on our market, and particulary on the world market. This contributes to the assessment that the daily intake of heavy metals (Pb, Ni, Cr and Cd) by consumption of fruits is below the daily intake that is recommended as acceptable by the FAO / WHO.

Recently, the investments for plantations are constantly getting bigger. In this production, people who grow raspberries are supported by Minstry of Agriculture and Rural Development, as the goal of this project is to follow vegetative growth of one year old (fruitful) shoots, to point out the agro-ecological values of the northern part of Montenegro for the cultivation of raspberry cv Willamette.

The increase in shoot and fruit size depends on variety, soil fertility, climatic conditions and applied systems. Ten examined plants were built at an altitude of 580 to 1030 m, on soils that are neutral, slightly to very sour, slightly lime very humic, with low to extremely high content of available phosphorus and medium to extremely high content of available potassium.

Soil in interaction with climatic conditions has caused significant differences in weight fruit and shoot growth.

For the modern production of raspberries it is necessary to apply the most modern irrigation technology and in some localities to set up and hail nets.

Key words: *raspberry fruit, shoot, soil, climate*.

INFLUENCE OF A NEW GROWING TECHNOLOGY ON SOME PRODUCTION CHARACTERISTICS OF BLACKBERRY CV. "ČAČANSKA BESTRNA"

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With annual production of about 30,000 t by the year 2008, Serbia is among the four leading blackberry producing countries in the world. Blackberry is grown in almost all parts of the country. Over the last three years the production was reduced to 10-15,000 t, and the acreage to 4,000 ha due to previous overproduction and uncertain placement on the market. Relatively lower fruit quality of the most common cultivars ('Čačnska bestrna' and 'Thornfree') contributed to poor sales, which can primarily be ascribed to lower brix content, loss of fruit color during freezing and significant presence of grey mould. In the period to come, renewal of blackberry production should be aimed in two directions: substitution of cultivars and introduction of new growing technologies. Introduction of new cultivars of better quality with firmer fruits suitable for transport, would contribute to easier placement of blackberry on domestic and foreign fresh markets. Introduction of new technologies such as altered planting densities and number of remaining canes per plant, as well as „rain-roof" setting to prevent fruit rot and enable continuous harvest regardless of the environmental (external) conditions should be promoted.

The aim of the paper was to investigate the impact of „rain-roof" on the achieved yield and development of grey mould of blackberry fruits of the 'Čačanska bestrna' cultivar. Factorial trial (I factor – presence or absence of „rain-roof" and II factor – use of chemical protection against grey mould or no chemical protection) was set as complete randomized block design in three replicates (9 canes each). Highly effective fungicide Switch (cyprodinil + fludioxoniol) was used for chemical protection.

Healthy and diseased fruits were counted at each of eight harvest times during the whole harvest period. Grey mould incidence was expressed as a percentage of diseased fruits compared to the total number of fruits per plot. In order to determined the average fruit weight and the marketable yield, twenty five healthy fruits in each replicate were randomly selected and measured. The obtained data were expressed in g/fruit and kg/m, respectively.

The results obtained in the first investigation year showed that reduced development of grey mould was a consequence of both tested factors, while the increase in yield intended for sale was affected only by chemical protection.

Key words: *Rubus fruticosus*, *Botrytis cinerea*, *grey mould, „rain-roof", yield.*

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ROOTING OF HARDWOOD CUTTINGS OF SMALL FRUITS AND SOME STONE FRUIT ROOTSTOCKS

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The influence of the plant hormones IBA 2% and NAA 0.2% on the rooting percentage and root development of hardwood cuttings from small fruits: raspberry (Rubus idaeus L.), blackberry (Rubus spp.), black currant (Ribes nigrum L.), red currant (Ribes rubrum L.) and gooseberry (Ribes grossularia L.) and 7 rootstocks of stone fruits (Prunus mirabolana, Prunus insititia L.St. Julien A, Prunus insititia L St. Julien INRA, Prunus insititia L St. Julien Orleans, Prunus mariana GF 8/1 and Prunus insititia L. GF 655/2) was evaluated.

The highest rooting percentages of the tested small fruits had black currant (76.7%) and gooseberry (72.7%). The most branched root system had the cuttings of red currant and black currant. The highest rooting percentage and the most developed root system of the small fruit cuttings had the control (40.1%) and the cuttings treated with IBA 2% (39.1%).

The rootstock Prunus mariana GF 8/1 , had the highest rooting percentage in all of the tested variants (50.8%) and the most developed root system (21.2cm in length and 13.2 of lateral roots). The average rooting percentage of all of the tested rootstocks is the highest in the variants treated with IBA 2% (35.97%). That was higher than in the variants treated with NAA 0.2% (21.9%) and the control (30.4).

Key words: *rooting, hardwood cuttings, small fruits, stone fruit rootstocks, plant hormones*.

THE REPUBLIC OF SERBIA VITICULTURE AND WINE PRODUCTION – CURRENT ISSUES AND DEVELOPMENTAL POTENTIAL

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Grape and wine production in Serbia has long-lasting and successful tradition. However, regardless of favourable agroecological conditions, disposable potentials have not been sufficiently used over the last few decades. Low lucrativeness of production, considerable investments in planting and the purchase of necessary mechanization and equipment, inadequte protection and technology of production, no adequate connection between iron and wine production are merely some of the matters in the need of a change. Over the period to come, one should make appropriate moves in order to make new grape and wine production techniques and technology accepted, especially when it comes to organic producion. In addition, the market imposes the need of introducing equalized production and quality control standards. If these deficiencies were eliminated, Serbian grape growers and wine merchants would have much bigger chance of placing their products on the world wine market, which is extremely demanding, well-organized and which encounter big competition. This would make a possibility of larger profit in wine production.

Key words: *viticulture, wine production, Serbia, condition, development.*

PHENOLOGICAL OBSERVATION OF RIESLING ITALICO GRAPE VARIETY IN WINE GROWING AREAS OF FRUŠKA GORA

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Riesling italico vine variety occupies the first place based on the area where it is grown in Vojvodina. This grape variety is late ripening and requires optimal climatic conditions for achieving good and stable wine quality. In the last two decades it has been noticed that the vine variety vegetation starts earlier and the vegetation period is shorter in the wine growing area of Fruška Gora. The analysis of the data gathered from the phenological observations of Riesling italico grape variety, for the period from 1997-2010, was conducted with the aim of examining the observed changes. The dates of the most important phenophase beginning were set on the experimental field in Sremski Karlovci which is in the property of the Faculty of Agriculture from Novi Sad. The most important phenophases are: bud burst, flowering, veraison, harvesting date and calculated vegetation period. Climatic parameters were analyzed simultaneously: sum of active temperatures for each phenophase and for the entire vegetation period, mean daily temperature during the vegetation period, maximum and minimum temperatures and precipitation sum during the vegetation period. Based on the data it can be concluded that the average length of the vegetation period of the Riesling italico is 165 days and average sum of active temperatures during the vegetation period is 3.221,5°C. Also, the possibility to shorten the vegetation period from average 180 days, for the period 1977-1990, to 162 days in the last 14 years has been proved. The average sum of active temperatures during the vegetation period of vine in the wine growing area of Fruška Gora has been 215°C higher in the last 20 years than the multi-annual average over the period from 1952-1991.

Key words: *resling italico, phenological observations*.

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DISCRIMINATIVE ANALYSIS OF PRODUCTIVE PROPERTIES OF PROMISING GRAPEVINE HYBRIDS (*Vitis vinifera* L.)

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A sexual hybridisation is one the most important methods in grapevine breeding. A lot of effort has been put in creating new grapevine varieties through intraspecies hybridisation at the Experimental estate "Radmilovac" of the Faculty of Agriculture in Belgrade as well as at the Experimental estate at the Centre of Viticulture and Enology in Niš for many years. In this paper, the three intervarietal hybrids, designed for wine production and developed by the method of sexual hybridisation were examined. The hybrid 8211 derives from the crossing combination of Prokupac x Tenturier of Župa, the hybrid 13283 from the crossing combination of Začinak x Prokupac, and the hybrid NI 11-92 from the crossing combination of Prokupac x Gamay Noir. All three hybrids possess black skin. The following properties were examined: yield (kg/vine), bunch weight (g), bunch length (cm), bunch width (cm), bunch stalk length (cm), berry length (mm), berry width (mm), berry weight (g) and sugar content in the must (%). The data were obtained from 10 vines for each hybrid, during the two-year period of research (years of 2007 and 2008). An average yield in all hybrids was 4.86 kg/vine, with the hybrid 13283 which had significantly higher yield on average (7.30 kg/vine) compared with the hybrid 8211 (2.38 kg/vine) and the hybrid NI 11-92 (4.90 kg/vine). The determined differences in yield show that this property was a significant discriminator in determining the type of hybrid. Canonical discriminant analysis of these data resulted in a model with two discriminative functions where in the first one the yield with the correlation coefficient of 0.476 dominates, whereas in the second one the equal correlation coefficients are present in: bunch length (0.273), berry width (-0.260), bunch stalk length (0.256) and sugar content (0.218). Both functions exceptionally well divide the groups of data which belong to individual hybrids (Wilks λ coefficients of 0.013 and 0.201), therefore, they ascertain a significant difference among the examined hybrids.

Key words: *canonical discriminant analysis, grapevine, hybrid, yield.*

INFLUENCE OF TRELLIS SYSTEM ON PRODUCTIVE AND TECHNOLOGICAL CHARACTERISTICS OF VARIETY VICTORIA IN STRUMICA VINE GROWING DISTRICT

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The dates of productive and technological characteristics of variety Victoria growing on two trellis systems, pergola and spalier, are shown in this paper. Mechanical composition of bunch and berry, chemical composition of must were analysed.

The results of investigation show that this variety has good results on both trellis systems, pergola and spalier, in strumica vine growing district, Republic of Macedonia. The Victoria's bunches from pergola has bigger weight, bigger length and width of bunch and berry, with uniformly characteristics of berries and colour of skin, in regard to bunches from spalier trellis system.

Key words: *table grape variety, Victoria, pergola, spalier, yield, quality of grapes.*

EFFECTS OF GRAPEVINE CULTIVAR AND WINE AGING ON THE ANTHOCYANIN COMPOSITION OF THE WINE

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Phenolic composition in red grapevine cultivars is specific because every grape cultivar has its own phenolic characteristics. Besides the difference in the total content of anthocyanins, there is also the difference in qualitative antocianins composition, that is in the percentage share of certain components.

Investigation results of the influence of grape wine cultivar (Merlot, Pinot Noir and Gamy Noir) and wine aging (six months and three years) on the anthocyanins composition of wine are presented in this paper.

The most dominant anthocyanin in young wines, detected by HPLC, was malvidin-3-glucosides varying from 40,5% (Merlot) to 61,5% (Pinot Noir), then peonidin-3-glucosides, varying from 14,2% (Gamy Noir) to 20,0% (Pinot Noir), except in the case of Merlot.

The least present anthocyanin is cyanin-3-glucosides, varying from 2,0% (Gamy Noir) to 3,0% (Merlot). Merlo has the highest content of acylated anthocyanins (23,0%), while Gamy Noir has the lowest (14,0%). Pinot Noir does not contain acylated anthocyanins.

Over the years, with the aging of wine, the content of acylated anthocyanins and anthocyanins substituted with OH substituent (cyanidin-3-glucosides and delphinidine-3-glucosides) decreases, while the content of peonidin-3-glucosides and malvinidin-3-glucosides increases. After a three-year aging period in investigated wines the most dominant anthocyanin was malvidin-3-glucosides: from 58,7% (Merlot) to 87,2% (Pinot Noir).

In the wine Pinot Noir only two anthocyanins are present: malvidin-3-glucosides and peonidin-3-glucosides, while the wine Gamy Noir contains four noacylated anthocyanins (malvidin-3-glucosides, peonidin-3-glucosides, petunidin-3-glucosides and delphinidine-3-glucosides). The wine Merlot contains all anthocyanins exept cyanidin-3-glucosides.

Key words: *grapevine cultivar, wine aging, anthocyanin content*.

INFLUENCE OF GRAPE CULTIVARS AND TECHNOLOGICAL TREATMENTS ON QUALITY OF GRAPE BRANDIES

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The research subject is studying of the influence and right choice of grape cultivar, and improvement and use of most favorable technological treatments in production of strong alcoholic beverages made of different grape cultivars and improvement of their quality. Grape cultivars like Vranec and Smederevka were researched. They are most grown in R. Macedonia and are suitable base for wine production. Table grape variety afus ali was also investigated for the grape brandy production. Different types of technologies for production of four types of grape brandies (vinovica, lozova, komova, drozdenka) were researched like: wine brandy, grape brandy, pomace brandy and wine lees brandy. The research subjects were: the presence of fine wine sediment during distillation on quality of wine brandy, the influence of stems and distillation time on quality of grape and pomace brandies, and cultivar influence on quality of wine lees brandies. Finally, the influence of used technological treatments on sensory characteristics of grape brandy were researched. In these series of studies on diferent grape varieties It can be concluded that the production of Wine brandy of the highest quality was produced from the Smederevka variety, in a process in which the wine is distilled with the fine lees. The proportion of wine lees in the process of distillation does not induce significant alterations in the chemical and gas chromatographic composition of this type of brandy. Wine brandies produced by distilling wine in the presence of wine lees have better sensory characteristics. Grape brandy of the highest quality, produced from the Afus Ali variety in a process in which the grape mash is double distilled without the stems, ten days after the completion of the alcoholic fermentation. With regard to the chemical composition, it can be concluded that the presence of stems during distillation in the production of grape brandy can influence the enhancement of methyl alcohol. The period of distillation has significant influence on the alterations in the chemical composition of grape brandies, and the distillation of grape mash preserved for a longer period leads to increased amount of acetaldehyde, acetic acid and methanol, and substantial loss of alcohol.

A conclusion has been made that a timely distillation of the grape mash, immediatelly after the completion of the fermentation, results in the production of grape brandies with improved sensory and quality characteristics. Pomace brandy of the highest quality, produced from the Vranec variety, in a process in which the distillation of pomace is performed ten days after the completion of the alcoholic fermentation. For the production of pomace brandy, apply timely distillation in the shortest possible period, due to the risk of spoiling and contamination With regard to the chemical composition, it can be concluded that the presence of stems during distillation in the production of pomace brandy can influence the enhancement of methyl alcohol, although in our research it has not shown significant influence, probably due to the fact that the stem was not damaged in the process of production, as opposed to industrial settings.

A conclusion has been made that a timely distillation of the pomace, immediatelly after the completion of the fermentation, results in the production of pomace brandies with improved sensory and quality characteristics.

Key words: *distillation time, brandy, gaschromatographyc analysis, sensory analysis.*

AGROBIOLOGICAL AND TECHNOLOGICAL CHARACTERISTIC OF SOME TABLE INTERSPECIES VARIETY GROWING IN SKOPJE VINEYARD AREA

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As a result of interspecies hybridization are created a number of grape varieties that are resistant to diseases and unfavorable environmental conditions. The selection of these varieties, as opposed to traditional, greatly reduces pesticide use in the prevention of major diseases and pests. In this way produces health safe grapes, protects the environment and ultimately reduce production costs.

Researches were conducted to determine some biological and technological characteristics of table interspecies varieties Muskat dnjestrovski, Vierul 59, Struguras, Ljana, SV 20473 and Lasta, growing in Skopje vineyard area. All studied species have a nice external appearance of the cluster. The content of sugar and total acids is satisfactory. Coefficients of fertility are high in all varieties, only variety Lasta showed low fertility. All varieties were highly resistant to downy mildew and powdery mildew, except Lasta variety that is sensitive to downy mildew. Examined varieties are resistant to low winter temperatures, with the exception of the variety Ljana.

Key words: *pesticide, table interspecies varieties*.

STUDYING THE CONTENT OF STARCH CORRELATED WITH RESISTANCE TO LOW WINTER TEMPERATURES IN SOME GRAPEVINE VARIETIES

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Cryoprotectants are known as substances that are used for protection of the biological tissue from freezing damage. Among the most important cryoprotectants are the carbohydrates such as glucose, fructose, sucrose raffinose, starch. Starch is the carbohydrate commonly found in the plant tissue, and its concentration is in close relationship with the other carbohydrates. This study is about determination of the starch concentration in four Vitis vinifera varieties: Vranec and Smederevka (subconvarietas balcanica Negr.) and Cabernet sauvignon and Chardonnay (subconvarietas gallica Negr.). The concentration of starch in the vines is in relationship with their point of cold hardiness. The study shows that the concentration of starch at balcanica varieties is lower than in the gallica varieties. Therefore the grapevine varieties Vranec and Smederevka are not resistant to low temperatures against varieties Cabernet sauvignon and Chardonnay which are tolerant.

Key words: *Vitis vinifera, cryoprotectants, starch, low winter temperatures*.

MALE GAMETOPHYTE OF FEMALE FLOWERS IN GRAPEVINE

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The issue about the pollination of grapevine cultivars with functionally female flowers represents a serious problem regarding the choice of a pollinator as well as having in mind all other open questions related to the ecological and functional aspects about fruit setting. Looking for the answer to this question has opened a question about male sterility with the autochthonous cultivar Blatina that has female flowers. The cyto-histological evaluation of male gametophyte of Blatina cultivar was conducted during 2009 and 2010 by making permanent histological preparations (by means of Navashin's fixation and dying with Delafield's hematoxylin). The samples were taken in the vineyard of Mostar Aluminium during the phenophase of shoot and florescence growth and phenophase of flowering and pollination each second day between 9.00 and 10.30 a.m. from 27th April to 8th June during 2009 and 2010.

The differentiation of anther primordia from the beginning of vegetation until flowering shows next: anther primordia during stillness have a round trapeze form without the signs of half-anthers differentiations and a visible tissue that represents clearly differentiated filaments; during May we noticed an intensive cell division within anther primordia when half anther form is clearly visible and thecae as well; when intensive mitotic divisions stops, in anther primordia, cytological differentiation of cells of thecae tissue into two visible layers starts: the parietal layer and inner part; until flowering the parietal layer is differentiated into two cell types: the outer layer of the cells gives exotecium i.e. fibrous layer and inner layer are differentiated into the tapetum which follows the development of sporogenous tissue; the sporogenous tissue undergoes the characteristic phases of meiotic division that is of simultaneous type; the release of microspores seems not be in correlation with the processes within the tapetum tissue; the formed pollen grains have typical cytogenetic constitution but at this level of observation we cannot observe if the pollen grains have formed colpi or pores for pollen germination.

Having in mind a normal cytogenetic constitution of pollen in anthers since formation until beginning of the flowering, it can clearly be concluded that cultivar Blatina has a morphologically sterile pollen because in the process of the formation of exine there is no formation of pores for pollen fertilization.

Key words: *microsporogenesis, anther, pollen, Vitis vinifera L.*

This paper is part of the project "Genotype Characterization of Male Sterility of the Blatina Cultivar", that was implemented at the Genetic Resources Institute University of Banja Luka and financed by the Ministry of Science and Technology of the Republic of Srpska

PRODUCTIVITY CHARACTERISTICS OF THE RESISTANT GRAPEVINE CULTIVARS Villard blanc, Villard noir, Chancellor and Nero

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Breeding of cultivars to be resistant to the fungal diseases is based on interspecies hybridization of European grapevine species to the Northamerican and Eastasian species and hybrids belonging to the subgenus *Euvitis* being the donors of the resistance. Further breeding is than related to the back crossings with the cultivars of european grapevine aiming to improve fruit quality i.e. vine.

Grapevine cultivars list of Bosnia and Herzegovina is containing no resistant cultivars and there are no data about their adaptation to the our ecological conditions.

Experimental part of this study is done on the four cultivars in the vineyard Sjeverovci near Kozarska Dubica. Vineyard is established during 2008. Training system is Guyot simple. Wine height was 100 cm. Prunning system is combined and planting distance was 3.0 × 1.0 m. The cultivars being studied in the researches were: Villard Blanc, Villard Noir, Chancellor and Nero. Cultivar characteristics were evaluted by analysing productivity elements, fruit characteristics and quality of berry and grapes. The best characteristics were detected within cultivar Villard noir (36 points), than Chancellor (36 points), Villard blanc (28 ponts) while Nero had 18 points.

Key words: *hybridization, cultivar, interspecies hybrid, resistance*.

PRODUCTIVE AND TECHNOLOGICAL CHARACTERISTICS OF PINOT NOIR CLONES

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This paper presents results of a two-year study on three Pinot Noir clones cultivated in the vine growing region of the town of Trstenik. The study was conducted in 2007-2008. It focused on a number of indicators, including cluster weight (gr), grape yield (t ha-1), sugar content (%) and total acids of grape must (g/l). The results revealed statistically significant and very significant differences in cluster weight and grape yield, respectively, between the tested clones. There was no statistically significant difference in sugar content and total acids of grape must between the clones.

Key words: *Pinot Noir, cluster weight, grape yield, grape must, sugar content, total acids*

CHARACTERISTICS OF PROMISING CLONES OF GRAPEVINE KREACA

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There are many grapevine varieties in Serbia which are considered autochthonous. One of them is Kreaca, an autochthonous cultivar of Banat. This cultivar characterized by moderate vigor, regular and high yield high-yielding capacity. Berries are medium large, egg-shaped, with thin yellow skin. Flesh is a colorless, juicy and neutral taste. Due to the limited number of the globally popular grape cultivars growing, germpasm in Serbia was endangered and exposed to rapid erosion, so that as a primary task investigation and preservation of local and autochthonous types arises. Except for the conservation of gene pool preservation of traditional cultivars allows the production of unique wines. Unfortunately, clonal selection of autochthonous cultivars has never been done and there is no planting material of adequate quality standards. In according with this objective of this study was to examine some important biological and technological characteristics in three promising clones of autochthonous cultivar Kreaca. In the first cycle of mass positive clonal selection, which was carried out on the plantation "Vrsac vineyards" in Gudurica like most promising clones 12/5/5, 56/11/7 and 69/11/7 were selected. In promising clones and randomly selected vines used as a control, following properties were examined: *Botrytis* resistant, bunch weight, yield per vine, sugar and total acids content in must and sugar/total acid ratio. In addition promising clones were tested for the presence of the most economically important viruses. Using ELISA test the presence of four economically important viruses: nepovirus grapevine fanleaf virus (GFLV), and tree clostero viruses: grapevine leafroll–associated virus 1 (GLRaV-1), grapevine leafroll–associated virus 2 (GLRaV-2) and grapevine leafroll–associated virus 3 (GLRaV-3) was not detected. All three perspective clones, in contrast to standards, showed high or very high resistance to *Botrytis cinerea*. In relation to the other studied biological and technological properties selected clones were better or at the level of standards. Regard to obtained results, all three clones can be recommended for recognition and spreading in production

Key words: *grapevine, cv. Kreaca, productivity, quality, disease resistance*.

THE OCCURRENCE AND ABUNDANCE OF THE LEAFHOPPER SCAPHOIDEUS TITANUS BALL AT THE KUTINA VINE-GROWING AREA

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Grapevine yellows disease or red fire disease is caused by phytoplasma, obligate parasites which live in phloem vessels of the plant and which are transmitted by vectors from one host to another. The only known natural vector of phytoplasma *Flavescence dorée*, which causes the grapevine yellows disease, is the leafhopper *Scaphoideus titanus* Ball. It is economically the most important pest of grapevines that has been present on the territory of Serbia since 2004. This North American species of leafhoppers was introduced in Europe in the middle of the twentieth century, and it is on the EPPO A2 list of quarantine diseases. Bearing in mind the damage caused by phytoplasmas to many vineyards in Europe, the control over their spread is of great importance for Serbia, and especially for the Nis vine-growing subregion. The aim of this study was to determine the occurrence and abundance of vectors of the disease at the Kutina vine-growing area, which belongs to the Nis vine-growing subregion. The first stage of examination showed the beginning of larva hatching from winter eggs, hatching dynamics and monitoring their abundance in all five larval stages, as well as the first emergence of imago. The second stage involved recording the number of imagoes at this site. In this way the intensity of infection was determined, and it was indicated that there was a correlation between the leafhopper as a vector and the emergence of disease whose epidemic threatens to destroy grape and wine production in the long term. The first L1 larva was caught 11.05.2009. With increasing temperature, the hatching larvae grew more intense, that reached its peak 10.06.2009 when he caught 165 leafhopper all stages in star. Tracking the number of caught adult leafhopper is done by placing yellow traps are coated with permanent adhesive entomological glue.Examinations were carried out every morning at the same time and traps were changed every 15 days to 30.09.2009. The first adult leafhopper was caught at 04.07. and the last 10.09. 2009. The largest number of caught adults (41) was recorded 15.08.2009.

Key words: *grapevine, phytoplasma, leafhopper, abundance*.

INFLUENCE OF THE TIME OF FIRST FRUIT COLOR CHANGE AND THE PERIOD OF RIPENING OF CHERRY VARIETIES ON THE INFESTATION BY R. CERASI

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The aim of this research was to analyze some characteristics of the cherry varieties which influence the infestation by the European cherry fruit fly (Rhagoletis cerasi L.) in the area around Skopje. The following variety characteristics were examined: the time of first fruit color change and the period of ripening. The analysis was conducted in 2008 and 2009 on 19 cherry varieties on a cherry collection field of the Institute of Agriculture, near Skopje. Correlation was determined between both of the examined characteristics and the infestation by the fly.

The infestation percentage grew proportionally depending of the time of first fruit color change from 3% for the varieties which start earlier with the fruit color change to 46.2% for the varieties which start later with the fruit color change for 2008, and from 0% to 65.7% for 2009, respectively. Also, this was proven statistically with a level of significance of 0.001.

For 2008/2009, the infestation percentage of the fly was proportional to the period of ripening of the cherry varieties. The infestation percentage grew proportionally from 10.3% for the varieties with short ripening period to 55.2% for the varieties with long ripening period. A statistically significant difference was observed between the infestation percentages of the varieties with short and with long ripening period with a significance level of 0.05.

Key words: *European cherry fruit fly, Rhagoletis cerasi L., cherry varieties, cherry characteristics, correlation.*

POPULATION DYNAMICS OF IMMATURE STAGES OF THE OLIVE FRUIT FLY *Bactrocera oleae* Gmel. (DIPTERA, TEPHRITIDAE) IN REGION OF BAR

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Most damage in the production of olives and olive oil is caused by olive fruit fly *Bactrocera oleae* Gmel .. The damage is reflected in lower yields due to premature fruit drop and low oil and olive products quality. There is a little data about biology of *B. oleae* in Montenegro. The knowledge of the developmental cycle of this pest would contribute to optimizing the time of application of insecticides, and thus better protection of the fruits, and reduction of harmful effects on the environment.

The three-year investigation was conducted in the olive grove of autochthon variety 'Žutica', in the agro ecological condition of Bar. Population dynamics of immature stages and fruit infestation levels were observed from early July until late October. Once a week, random samples of 40 fruits were taken from four trees and examined under a stereomicroscope in the laboratory. Number of: eggs, larvae (L1, L2 and L3), pupae, cocoons and abandoned galleries in the fruit were recorded.

The start of fruit infestation was recorded in late July in all three years of investigation. By the end of August, depending on environmental conditions (temperature and humidity), the infestation was low (5 - 20%). The infestation significantly increased in September and October, and it was the highest at the end of October (above 75%).

Till mid of September in the structure of infestation eggs and larvae (L1) were dominated. Since mid September to mid October, the presence of all developmental stages (egg, larva, a doll) of pest in fruits were equal, then prevail pupae, cocoons and abandoned galleries.

Key words: *Bactrocera oleae*, *olive fruit fly, immature stages, infestation.*

THE ROLE OF HONEY- BEE (*Apis mellifera* L.) IN THE POLINATION OF FRUIT SPECIES

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Starting with the scientific improwed truth we must have bees even thought we don't have its products (honey, wax, nectar, propolis, sour, and bees poison) so it can be concluded that indirect bee importance is bigger than the direct one.

The results that bees give of polinations agricultural plants (fruits) in 20 times bigger them the value all bees productions. It is scintifically proved that insects polinate 80 % plants, and honey-bee is mainly used. In fruit plantage the bee is used 90 %, which means that she is the main one.

In this paper are presented two-years examination (2010 and 2011) the role of honey-bee in polination of same cultivars plum, apple and pearin the Upper Polimlje region. Despite the results which we get of fruit polination, the bees also get good food for development of their companies on these areas.

Key words: *honey-bee, fruit species, polination, yield.*

MONILINIA SPP. CAUSAL AGENTS OF APPLE FRUIT ROT

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Apple production is affected by variuos phytopathogenic fungal species that occur not only during production, but also after harvest, during storage. One of the most important disease of pome fruits is fruit rot caused by phytopathogenic fungi from several genera, among which species of the genus *Monilinia* are distinguished. Species of this genus (*Monilinia fructigena*, *M. laxa*, *M. fructicola*) infect fruits during vegetation, after harvest, during storage and after fruits come out of the storage. The aim of the paper was to identify species of the genus *Monilina*, with respect that *M. fructicola* is on the list of quarantine organisms in Europe and in Serbia, as well as to investigate their occurence and frequency on stored apple fruits.

Out of 146 apple fruits with rotting symptoms, collected from storages at eight localities, 90 isolates of phytopathogenic fungi were obtained. Pathogenicity of all the isolates was tested by artificial inoculation of injured apple fruits. Only isolates with colonies similar to those formed by *Monilina* species were selected for identification to the species level. Identification of 13 selected isolates was done according to pathogenic and morphological properties and confirmed by polymerase chain reaction (PCR) using specific primer pairs. Morphological characteristics of the isolates were observed on potato dextrose agar (PDA) medium at 22°C.

All investigated isolates caused brown rot on inoculated apple fruits. On PDA medium all tested isolates were found to form slowly-growing, pale-yellow colonies with entire margin which at the temperature of 22°C do not fill petri dishes with diameter of 90 mm even after 14 days. All the isolates sporulated on PDA medium and concentric rings of aireal mycelium with conidia were observed. In 14 days old cultures black sclerotia were observed, staggered at colony margins. In culture, the fungus forms one-celled, transparent, oval conidia in chains.

Based on pathogenic and morphological characteristics studied, all the isolates were identified as *M. fructigena*. In Multiplex PCR reaction, expected fragment of 402-bp was amplified which confirmed that the isolates belong to the species *M. fructigena.*

This study revealed that *M. fructigena* is significant apple pathogen in storages. Its presence was estimated to 14.4% compared to the pathogens from other genera.

Key words: *fungal diseases, M. fructigena, storage*.

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PHYTOPHTHORA SPECIES ASSOCIATED WITH STRAWBERRY ROOT ROT IN HERZEGOVINA

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Phytophthora is a fungus-like genus in the *Oomycetes* recently placed in the new kingdom *Straminipila* (*Straminipiles*). The genus consists of more than 80 species of important plant pathogens. Up to 5 *Phytophthora* species have been recorded on strawberry in Europe: *P. fragariae* Hickman*, P. cactorum* (Leb. & Cohn) Schrö t.*, P. criticola* Sawada*, P. megasperma* Drechler., *P. ramorum* Werres.

During growing period 2011, the samples of strawberry variety: Arosa, Elsanta and Antea come from a single large 3 years old plantation near Mostar. Some affected plants had discoloured crowns typical of crown rot and rotted roots, while young leaves had yellow-green coloration.

All samples were tested by double-antibody sandwich enzyme–linked immunosorbent assay (DAS-ELISA) using AGRISCREEN-*Phytophthora* spp. (Neogen Europe Ltd., Scotland UK) kit, according to the manufacturer's instructions. An ELISA detection kits were used for detection directly from root tissue, also fragments of fungal culture disk on agar during isolation with root pieces. Absorbance at 630 nm was measured immediately and 30-90 minutes after adding stop solution. Samples with absorbency value two or more times higher than negative control were considered as positive for the presence of *Phytophthora* spp. Each tested sample consisted of at least 10 plants. From a total of 5 tested aggregate strawberries samples, two samples have positive results in the presence of the genus *Phytophthora*.

In the further work, molecular and phylogenetical analyses are going to be done.

Key words: *Phytophthora*, strawberry, *DAS-ELISA*.

MICROCLIMATIC CONDITIONS AND OCCURRENCE OF PHOMOPSIS CANE AND LEAF SPOT AND DOWNY MILDEW OF GRAPEVINE

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During 2011 at trial field of Biotechnical faculty in Podgorica, occurrence of Phomopsis cane and leaf spot (*Phomopsis viticola*) and downy mildew (*Plasmopara viticola*) was investigated in cultivar Vranac, on plots that were not treated with fungicides. At the same time meteorological conditions (temperature, air humidity, rainfalls and length of leaf wetness) were monitored by meteostation iMETOS®.

First symptoms of Phomopsis cane and leaf spot appeared on April 29th, after 27 days from beggining of vegetation and 15 days after first one-day lasting rain (45 mm/m^2), respectively. After this rain, sensor which simulates length of leaf wetness was moisturized 725 minutes. It is assumed that woody part of cane was moisturized for the same period, that is needed for pycnidia eruption and realising of pycnospores. In this period, temperature sum was 235,7°C.

On May 27th first symptoms of downy mildew was noticed after six rainy periods with one to six days. Rainfall sum in these periods was 7,4 - 48,6 mm/m^2, and leaf wetness length was 735-4360 min. Average daily temperature from the beginning of vegetation to symptoms appearance was 7,8-22,7°C. In this time, even after five rainy periods there was no downy mildew occurance because average daily temperature during rainfalls was 12,9-16,4°C. Symptoms of the disease were evident in conditions with less rainfalls (7,4 mm/m^2), but with average daily temperature of approximately 22°C, when length of leaf wetness was 735 min. Later on, 35 days expired from first symptoms appearance to beginning of ripening; 10 of them were with rainfalls in 5 rainy periods with total quantities of 0,6-16,6 mm/m^2. Length of leaf wetness in these periods was from 735 to1325 min. and average daily temperatures were in interval 20,2-27,1°C. In this time three secondary infections were realized.

For realization of infection in Phomopsis cane and leaf spot rainfalls are essensial and necessary. Temperature sum of 235,7°C is in accordance with values from previous years as well as with literature data. In case of downy mildew appearance, besides rainfalls and length of leaf wetness, temperature is more important for realization of infection. Average daily temperatures of 12-16°C in time of first five rainy periods were not favourable for realization of infection. Infections were realized only at temperature of 20-27°C.

These facts are important for more exact determination of time for treatment control of above mentioned grapevine diseases.

***Key words*:** *grapevine, Phomopsis cane and leaf spot, downy mildew, infections.*

GROWTH AND DEVELOPMENT OF SURFINIA ON ROCKWOOL UNDER BIOSTIMULANT TREATMENT

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Surfinia, one of the many types of petunia (*Petunia hybrida* Juss.) from the family Solanaceae, is among the group of seasonal annual flowers, which have an important place in the production and use. This type of flower for their normal growth and development requires a sunny position and moist soil. Mainly propagated by seed, and young seedlings are transplanted to a permanent place in a specially prepared substrate or a combination of peat and conventional substrates. High quality nursery features a well-developed root system. Previous studies have demonstrated the usefulness biostimulants in the production of which affect the development of better root system, and thus a better adaptation of young plants when transplanting, reducing abiotic stress of plants. The aim of this study was to determine the possibility of growth and development surfinia on rockwool and influenced biostimulants. Seedlings transplanted on rockwool cube, type Brinkmann, and treated with 0.25% sodium biostimulants Radifarm® or untreated (control). During the experiment, carried out the measurement of morphological parameters of growth and development: plant height, leaf number and number of flowers, and the end of the experiment was performed and the measurement of fresh and dry weight of above ground parts. Statistical analysis showed significant differences ($p \leq 0.05$) in treated plants compared to control plants. Research indicates a positive impact of biostimulants and the possibility of growing surfinia on rockwool, a substrate that is more intended in vegetable production.

Key words: *Radifarm, seosonal flowers, fresh and dry mass, morphological indicators*.

DIVERZIBILITET BIOLOGICAL AND TECHNOLOGICAL CHARACTERISTICS OF POPULATION MUSCAT HAMBURG

Vujović, D., Radojka Maletić

In the period 2007 - 2011 was carried out directly on obkektu Vrsac vineyards study population cultivar Muscat Hamburg in the growing phase yield.By examining included 193 indicators by the OIV method, Codes. This paper presents the indicators, among which there are significant number of surveyed the diferences.Some vines within the population deserves further monitoring.

Key words: *bunch weight, berry weight, number of berries / cluster, the mass of stems, a structural indicator of the cluster, populations, vine grape yield and quality*.

GRAPE YIELD AND QUALITY POPULATION MUSCAT HAMBURG

Vujović, D., Radojka Maletić

Environmental conditions for the production of table varieties in Serbia are favorable, it is possible to regular and high yield and good quality table grapes. This paper studied agro business and technological characteristics of the population muscat hamburg.Resultats tests show that in terms of the yield of grapes intended for the market and elements of quality grapes significant differences in the populations studied varieties.

Key words: *table cultivar, population, yield, grape quality*.

INFLUENCE OF DEFOLIATION ON QUALITY OF GRAPE AND WINE OF VARIETY RIESLING ITALIAN

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In this paper, influence of defoliation on quality of grape and wine of variety Riesling italian are investigated. Defoliation is done only on east site of row, in phase veraison. In phase of full maturity, harvesting of grape selection, in two variants, grape exposing on sun light, and grape under shadow, were done. Chemical content of must and wine were analysed.

Results of investigations show that there aren't statistical differences in chemical content of sugar and total acids in must between variants. Also there aren't statistical differences in alcohol, extract and total acids in wines between variants but there is difference in content of hydroxycinnamates. Wine from grape expose on sunlight has higher content of hydroxycinnamates then wine obtained from grape under shadow however this difference don't influence difference in sensorial characteristics of wines.

Key word: Riesling italian, deffoliation, wine, hydroxycinnamates.

4.2 Vegetable growing

INFLUENCE OF THE HERBICIDE *DIFLUFENIKAN* ON SOME BIOLOGICAL TRAITS OF BULGARIAN COMMON BEAN CULTIVAR PLOVDIV 15 M

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Three-year trials (2006-2008) were conducted in order to determine the influence of the herbicide *diflufenikan* (trade name – Pelikan 50 CK) on certain biological traits of Bulgarian common bean cultivar Plovdiv 15 M. The herbicide was applied in doses of 200, 250 and 300 ml/ha after the sowing and before the growth of the plants. It has been found that the traits related to the height of the plant, number of fruit-yielding branches, pods and seeds, mass of the seeds and average length of 10 pods per plant were influenced by different doses of the herbicide, by the year and the interaction between these two factors. Treatment in a dose of 300 ml/ha differs most from the other variants in the conducted clustering, as a result of his strong influence on the traits: number of seeds, fruit-yielding branches and mass of the seeds per plant. The highest stability indices have been obtained for the traits related to the mass of the pods per plant, which showed greater stability regarding the treatment with the herbicide.

Key words: *biological traits, diflufenikan, herbicides*, *Phaseolus vulgaris* L.

EFFECTIVENESS AND SELECTIVITY OF THE HERBICIDE DIFLUFENIKAN IN FIELD BEANS

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During the period from 2006 to 2008 we conducted a number of experiments at the experimental base of the Agricultural University – Plovdiv in order to establish the effectiveness and selectivity of the new herbicide *diflufenikan* (preparation Pelikan 50 CK). The prevailing types of weeds in the experimental fields were annual late-spring weeds. The herbicide preparation was selective for field beans of the sort Plovdiv (grade 1 on the scale of EWRS) in doses of 200, 250 and 300 ml/ha. The effect of the herbicide on the annual dicotyledonous weeds was the greatest for the variant Pelikan 50 CK – 300 ml/ha and during the three years of the experiment it reached 90-94% compared to the zero sample and when doses of 200 and 250 ml/ha were applied, the effectiveness reached 82%-84% respectively. In 2007 the effect of the herbicide was the lowest due to the severe drought in April and the high density of the annual gramineous weeds was not affected by the preparation.

Key words: *herbicide, diflufenikan, field beans, effectiveness, selectivity.*

ENERGY AND NUTRITIONAL VALUES OF RAW GRAIN OF DOMESTIC VARIETIES OF BEANS

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Beans are foods with high nutritional value. In the history of the human diet beans are found very early in use, and availability throughout the year makes it widely applicable. On the territory of Bosnia and Herzegovina beans are common ingredients which are an integral part of a meal, especially during winter period. The goal of this work is to contribute to the selection of local varieties of beans, stressing the energy and nutritional values of raw grains.

The tests in this study included three local varieties of beans: Bosna, Darko and Igman in which contents of carbohydrate, protein and fat (energy content) were determined as well as content of minerals (copper, iron, phosphorus, manganese and magnesium). The test results indicate that content of dry matter and water is not conditioned by varietal differences, but the total fat content varies from 0.84% (Bosna) to 1.73% (Darko), and total sugars vary fromo 2.4% (Bosna) to 3.36% (varieties Darko and Igman). Determined protein content is between 21.18% compared to the dry matter in the variety Darko to 25.28% in the variety Bosna. Starch content ranged from 65.78% (Igman) to 67.04% (Bosna). Examined varieties of beans contain significant amounts of trace elements, so 100g of raw grains can give human organism: up to 69.7% of magnesium, 59.2% of phosphorus and up to 79.8% of manganese, 42.2% of iron and 64.1% of copper calculated regarding RDA (Recommended Dietary Allowances - a total daily needs).

Key words: *beans, raw grain, energy content, minerals, RDA.*

CHARACTERISTICS OF COMMON BEAN MUTANT LINES AND CULTIVARS GROWN UNDER RAINFED AND IRRIGATED CONDITIONS

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Experiments were conducted in the field of Agricultural University in Plovdiv, Bulgaria. A standard method for cultivation in 5 replicates was applied. Biometric evaluation of common beans (*Phaseolus vulgaris* L.) 10 mutant lines and 10 varieties, grown under rainfed and irrigated conditions was conducted. Main traits, associated with productivity in common beans: plant height, mass of plants with pods, number of branches, height of betting on the first pod, number of fruit branches, number of pods per plant, weight of pods with seeds, number of seeds per plant, weight of seeds and average length per 10 pods, were haracterized. Stronger degree of variation, in studied traits, was observed in genotypes grown under irrigated conditions. It was found that the studied Bulgarian varieties are promising germoplasme for their introduction in hybridisation breeding schemes, as well as in application of mutagenesis and biotechnological practices. Mutant line D_2-0,0125 M EMS (6) has the best manifestation of the studiedtraits among other mutant lines and it may be included in breeding schemes for evaluation as a new cultivar. Cultivar BAT 477 (20) differs significantly by its traits from other genotypes, irrespective of the cultivation mode.

Key words: *biological traits, Phaseolus vulgaris* L., *rainfed and irrigated conditions*.

RISKY PERIODS OF PESTICIDE (INSECTICIDE AND FUNGICIDE) POLLUTION OF VEGETABLES GROWN IN GREENHOUSES

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Owing to the need of the population to consume vegetables in winter and spring (December-May), the production of vegetables grown in greenhouses is increasing, covering larger and larger areas.

In order to protect the vegetables from economically important pests, we often use a wide range of pesticides which are dangerous for the health of consumers.

In this connection were provided the observations in greenhouses with tomatoes and cucumbers in three regions of the country: in town of Rakovski, in town of Plovdiv and in town of Perustitsa. During the whole vegetation period, the phytosanitary status in the greenhouses was checked-up every week by reviewing of individual plants.

By growing-up of the tomatoes in glass greenhouses during the period from January to July the following diseases are reported as predominant: Botrytis cinerea Pers. and Alternaria porri f.sp.splani E et. M. and the pollution of the production is caused by fungicides. During the harvest significant problem are the pests: Myzodes persicae Sulz, Macrosiphum euphorbiae Thom., Liriomyza bryoniae Kalt. and the pollution is mainly by insecticides.

By the cucumbers, growing-up in steel- glass greenhouses during the period from January to July predominated the problems of phytopathological character: Fusarium, Erysiphe cichoracearum De Candolle, Pseudoperonospora cubensis Rostovzew. This imposed more often treatments and the pollution during that period is caused mainly by fungicides.

The obtained results can be used for various technological solutions for the purpose of reducing the risk posed by the residual quantities of pesticides in the grown vegetables.

Key words**:** *vegetables, pests, diseases, pesticides*.

ZENICA'S ONION - A NEW VARIETY OF BOSNIA AND HERZEGOVINA

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Onions are used as fresh (spring onion, bulbs), in the industry for drying (dehydration) and preserved, which requires appropriate cultivation technology and assortment. For each of the modes of consumption right choice of variety is required because only that ensures adequate yield and quality.

The aim of this paper is to show the characteristics of new line of onion (Zenica's onion), created at the Federal Institute of Agriculture and its suitability for cultivation in Bosnia and Herzegovina. Tests were carried out during three years (2008, 2009, 2010) at the site Sarajevo-Butmir. The experiments were conducted in a randomized block system in four replications. Production properties of onion were examined as follows: yield, weight, shape, tunic and color of bulbs, plant height and vegetation length. In the framework of qualitative characteristics content of dry matter and total sugars were determined. As a standard variety Stuttgarter was used. The new line is characterized by yellow-brown bulb, flat shape (index-0.68), the average weight of 109.85 g and vegetation length of 115 days. This variety is characterized by high quality, because of the dry matter content of 14%, total sugars of 8.87%, slightly bitter taste and good tunic of bulbs. During three-year experiment it achieved a yield of 26.40 t / ha, which is for 23% higher than the standard.

Key words: *onion, variety, yield, quality*.

YIELD AND QUALITY OF POTATO VARIETIES

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During two years (2009-2010.) four varieties (Desiree, Romano, Bistra and Kis Sora) of potatoes were examined. Experiments were conducted at Butmir region (about 500 m / asl) and Glamoč (approximately 900 m asl).

Characteristics of productive varieties of potatoes (yields, weight and number of tubers per box) were examined. In the frame of qualitative characteristics content of dry matter and starch were examined. Experiments were conducted by randomized block system in four replicates and the data was processed by analysis of variance. The soil on which the experiment was performed has acid reaction, content of humus and phosphorus is deficit but there is enough of potassium needed for normal development of crops. Climate conditions were favorable for the development of potatoes. Higher average yield was achieved by variety Romano for 8% compared to Desiree and Kis Sora. Dry matter content ranged from 21.80% at variety Romano to 22.20% at variety Desiree. Testing of varieties should continue in the upcoming period in order to find the most favorable conditions for breeding in the area of Bosnia and Herzegovina.

Key words: *potato, varieties, yield, quality.*

MORPHOMETRIC AND ANATOMICAL-HISTOMETRICAL CHARACTERISTICS OF TWO VARIETIES OF THE SPECIES *Solanum lycopersicum* L. INFECTEDBY CUCUMBER MOSAIC VIRUS

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Symptoms of viruses deceases are induced by changes which a virus creates in a plant cell: the infected cell changes physiologically, which may be seen in the histological and the morphological substance of plants. Viruses bring about *outward* symptoms, visible by the naked eye, as well as *internal* symptoms, visible in the cell, at the level of the tissue and the organs of the plant. The generally accepted opinion among virusologists is that majority of symptoms may be specific for the given virus and its plant host. In the conducted investigations, two varieties of the species *Solanum lycopersicum* L., that is, var. Saint Pierre, and var. Novosadski jabucar, are infected by the same virus, the Cucumber mosaic virus, isolate 746-07 CMV, belonging to subgroup I A. Different reactions on the infection are expected. The investigations show differences in some morphometric parameters (the length of internodes, the length of the whole stem, and the area and the weight of leaves) and, also, in some anatomical-histometrical parameters (the thickness of the laminas, the thickness of the upper and the lower epidermis, the thickness of the palisade parenhim, thickness of the spongy parenhim, the thickness of the mesofile, the areas of cells of the upper and the lower epidermis, the areas of cells of the palisade and the spongy parenhim, the height and the width of the main nerve, the width and the area of the vascular vessels of the main nerve). From the results of the investigation we may conclude that differences in the analyzed morphometric and anatomical-histometrical parameters are connected with a specifical relationship between the virus and the host. The applied protocol in this investigation may be used for the confirmation as well as for the choosing plants less sensible on viruses, that is, more tolerant plants and their sorts for the growth of economically important plants, and thus, to avoid or to lessen the losses caused by viruses.

Key words: *varietie, Solanum lycopersicum* L., *cucumber mosaic virus, morphometric characteristics, anatomical-histometrical characteristics*.

THE EFFECT OF GRAFTING, MULCHING, ARGO-TEXTILE AND LOW TUNNELS ON THE FRUIT WEIGHT OF WATERMELON

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In the technology of watermelon over the last ten years there have been significant changes, such as much bigger selection of varieties in the market, the application mulch and only recently agro textile and low tunnels. Grafting as an agro-technical measure has been known for a long time in the production of cucurbits, but it, as the other mentioned agro-tehnical measures is used to produce a greater number of large fruits, which directly affects the achievement of higher yields per unit area.

The three-year study (2007-2009) set the experiment in a randomized block design. which has the aim to determine the impact of these measures on fruit weight in watermelon. Throughout three years of experimenting, it was confirmed that, by grafting, larger fruits are provided. Regardles of the substrate types used. Based on the basic long-term average of the weight of the fruit, it can be seen that the maximum for all the observed years was in treatment of agro-textile and mulch.

Key words: *watermelon, grafting, agro textile, low tunnels, weight of the fruit.*

APPLICATION OF BIOSTIMULANTS IN WATERMELON PRODUCTION

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This study examined the effect of biostimulants on yield and quality of watermelon in relation to the standard fertilization. Biostimulants Nextra, applied through fertigation at a dose of 20 l/ha, Basic Power, Fixer and Brixer in concentration of 0.25% applied foliar were used in the experiment. The research referred to dry matter content, total sugar content and yield of watermelon.

The investigations indicated that the application of biostimulants increased yield and improved fruit quality of watermelon.

Key words: *biostimulants, watermelon*.

RELATIONSHIPE BETWEEN K_C AND LAI FOR MULCHED AND NON-MULCH CULTIVATED MELON GROWN UNDER MEDITERRANEAN CLIMATE CONDITIONS

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A melon crop was cultivated under mulch and non-mulch conditions during spring summer period in 1999. The experiment on melon (cv. Campero) evapotranspiration has been done in Southern Italy, Policoro, experimental station "E. Pantenelli" of Bari University and CNR-Bari in 1999.

The measurements of the main weather parameters and crop growing data of melon for 1999 were collected from the meteorological station at Policoro. The crop evapotranspiration (ET_c) was measured by weighing lysimeter while ET_o (reference evapotranspiration) was estimated using Penman-Monteith equation (FAO 56) with input data from the neighbouring meteorological station. Crop coefficients were determined as the ratio of ET_c to ET_o.

The main purpose of this study was to test the relationship between crop coefficient and leaf area index measured and estimated with and without mulching.

Due to mulch management practices, the relation between LAI (leaf area index) and K_c (crop coefficient) was different. Total growing season for mulched melon was of 69 days, which was shorter than for non-mulched melon by 15 days. A good relationship between the LAI and K_c was found.

Key words: *melon, crop coefficient, leaf area index, Mediterranean*.

SUITABILITY OF NEW VARIETIES OF POTATO (*SOLANUM TUBEROSUM* L.) IN WESTERN PART OF ALBANIA (BASSURA)

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After the political transition, Albania started to be competitive and to reduce the productive gap with the other Occidental countries: it was necessary to replace the local potato (*Solanum tuberosum* L.) varieties with new more performing one in terms of quantity and quality. From 1995 to 1997 eight potato varieties (Agata, Junior, Prior, Premier, Impala, Ausonia, Arinda and Liseta) coming from the Netherlands were tested in Albania (Divjaka, (N40°00'; E19°29') to evaluate their adaptation and the productive potentiality. The phenology and several morphogenetic parameters for each variety were observed during the plant growing (height of plants, number of stems, mean size and mean weight of tubers) together with tuber yield. The eight varieties were divided in two main precocity classes according to the harvest period: early varieties (Agata, Junior, Prior, Premier) that were harvested when about 600 Growing Degrees Day (GDD) were accumulated and the late varieties (Impala, Liseta, Arinda and Ausonia) when about 900 GDD were accumulated. Agata was the most productive of the first class (44.1 t ha-) and Arinda and Liseta of the second one (48.6 and 45.1 t ha-1, respectively). The economic output of each variety was evaluated: Arinda, Agata and Liseta were the most cost-effective with a net income of about 7.500 € ha-1. In addition it is necessary to consider the low cost of labour and land lease which have a remarkable influence on the net income as well as the breaking up of land into small plots. In conclusion, for most of the varieties the profit increased with the yield because of fixed management costs.

Key words: *adaptability, growth, precocity, tuber yield, Divjaka.*

INFLUENCE OF TEMPERATURE ON YIELD AND EARLINESS OF LETTUCE GROWN IN THE WINTER PERIOD

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Lettuce as a vegetable species has moderate demands on the growing conditions. According to that the aim of this study was to determine the effect of covering plants by agrotextile on earliness and yield of lettuce grown in a greenhouse without heating. Experiment was conducted on four varieties (Devonia, Nizzi, Boreale and Robinson) that have different resistance to low temperatures. The lowest average temperature during the growing cycle period in the greenhouse was 4.0°C while maximum temperature was 13.5°C. In the same time, average minimum temperature under agrotextile was 6.1°C while maximum temperature was 19.0°C.

In the open field, these temperatures were 0.2°C and 9.2°C. This confirms the fact that the use of agrotextile in greenhouse in winter period can increase the temperature in relation to the open field up to 10°C. Regarding the sum of active temperatures, it was found that the Devonia is the earliest variety, and it needs the sum of temperatures of 764°C to reach technological maturity. The longest vegetation has variety Robinson and it requires sum of temperatures of 890°C till harvest period. Beside that, Robinson variety had a biggest head (411.5 g) and has achieved the highest yield per unit area (8.22 kg m^{-2}). The lowest yield (4.95 kg m^{-2}) was obtained in the variety Nizzi, which has the smallest head (249.5 g).

Key words: *lettuce, temperature, earliness, yield.*

EFFECT OF FERTILIZATION WITH UREA AND UREA WITH INHIBITOR OF UREASE ON YIELD AND CONTENT OF NITRATE IN POTATO TUBERS

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Field experiment was carried out on two locations – Žabčice (lowland) and Valečov (highland). In experiment were used two nitrogen fertilizers - classical Urea and urea with inhibitor of urease (UreaStabil®) and two varieties of potatoes with different length of vegetation - early Karin and semi-early Red Anna. At both locations was based six variants of fertilization in four repetitions. Variants were 100 % Urea, 80 % Urea, 60 % Urea, 100 % UreaStabil®, 80 % UreaStabil® and 60 % UreaStabil®, when 100 % of each fertilizer was 90 kg.ha-1 decreased according to content of Nmin in soil before planting. The obtained results can be stated that from variants of fertilization it was achieved the highest average yield by variant 100 % of urea (44.7 t.ha-1). This variant was statistically significant higher ($P<0.05$) against all other variants. From locations a higher average yield of potatoes was achieved at the location Valečov (44.7 t.ha-1). From varieties it was achieved of higher average yield by variety Red Anna (41.7 t.ha-1). Differences between locations and varieties were statistically significant ($P<0.05$). As far as the monitoring of nitrate content in potatoes tubers which represent health risk for consumers is concerned we found that effect variants of fertilization on the content of nitrate was not statistically significant ($P>0.05$). From locations the lowest average content of nitrate was achieved at the location Žabčice (159.6 mg.kg-1 fresh mass). From varieties it was achieved the smallest average content of nitrates by variety Red Anna (141.9 mg.kg-1 fresh mass). The differences in the content of nitrate between locations and varieties were statistically significant ($P<0.05$).

Key words*: *potatoes, urea, UreaStabil®, nitrate, yield.

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SURVEY OF ROOT-KNOT NEMATODES IN NEVESINJE MUNICIPALITY

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Farmers of Nevesinje municipality have each year on some fields 100 % yield loos of potato and carrot crops. The loos is mainly in marketing value of products. The symptoms have suggested presence of root-knot nematodes – *Meloidogne*. To support this hypothesis 13 soil samples were colected in autumn of 2011. Nematode extraction was done by Oostenbrink elutriator. Nematode identification was done by morphological characters on binocular magnification 25 – 60 times. Root-knot nematodes were found in all samples. The number of infective juveniles per 100 ml of soil varied from 7.5 to 360. Percentage of root-knot nematodes among all extracted nematodes varied form 3 to 41 %. In the samples next genera were identified too: *Pratylenchus, Paratylenchus, Tylenchorinchus, Rotylenchus, Aphelenchus, Tylenchus, Criconemoides, Trichodorus* i *Xiphinema*. Soil extraction on presence of *Globodera* cyst was done by Seinhorst elutriator. No cyst were found. These results reviled that root-knot nematodes are wide spread in the agricultural fields of Nevesinje municipality. There is a need for further study to prevent or decrease damage that farmers continuously suffer.

Key words: *sampling, plant-parasitic nematodes, population density*.

POSSIBILITIES OF USE OF *Bacillus subtilis* (QST 713) AGAINST SOIL PATHOGENS OF PEPPER

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Pathogenic fungi and pseudofungi from the genera *Rhizoctonia*, *Pythium* and *Fusarium* are an important problem for pepper growing in greenhouses. Until recently, systemic fungicide benomyl (benzimidazoles) was used for control of soil pathogens belonging to the true fungi. When directive EU 91/414 came into force, due to its adverse toxicological properties, benomyl was placed on the list of fungicides which were no longer allowed to be used in plant protection. For this reason, possibilities of use of other fungicides and biofungicides as an alternative to benomyl, are being intensively studied worldwide.

With an aim to investigate the possibilities of control of the mentioned pathogens, efficacy of the biofungicide (*Bacillus subtilis* QST 713) was evaluated. As a standard for efficacy comparison, fungicides on the basis of iprodione (*Rhizoctonia sp.*), captan (*Fusarium sp.*) and propamocarb-hydrochloride (*Pythium sp.*) were used, and inoculated, untreated pepper plants served as a control treatment. The absolute control treatment were non-inoculated, untreated plants. Based on the obtained results, the tested biofungicide did not show satisfactory efficacy against *Pythium* sp. (22.5%) and *Rhizoctonia sp.* (47.4%), and therefore can not be recommended for pepper protection at the rates applied in this experiment. However, efficacy against *Fusarium* sp. was satisfactory (77.8%). Efficacy of the tested commercial fungicides ranged from 72.5 to 95.8% and statistically significantly differed from the efficacy of Serenade against *Rhizoctonia* sp. and *Pythium* sp. Concerning that laboratory tests indicate antagonostic or fungicidal activity of the biofungicide tested, there is a possibility to achieve satisfactory efficacy through adjustment of application rate, timing and mode of application.

Key words: *biofungicides, soil pathogens, grenhouses*.

ESSENTIAL AND TRACE HEAVY METAL LOADS IN CONVENTIONALY PRODUCED FRESH ONION AND POTATO

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Vegetables play a very important role in human nutrition due to their composition in vitamins, minerals, proteins, carbohydrates and trace elements. Besides essential, vegetables may contain toxic elements, in a very wide range of concentrations. Heavy metals are one of many pollutants that can be found on the surface and in tissues of fresh vegetables. The accumulation of metals may seriously jeopardize quality of vegetables and even pose a direct threat to the health of consumers. Therefore, the aim of this work was to assess and analyze concentrations of essential (Cu and Zn) and trace (Pb and Cd) heavy metals in onion (Allium cepa L.) and potato (Solanum tuberosum L.) produced in Vojvodina. Onion and potato are important in the diet of the population and their consumable parts develop in the soil.

The concentration of Cu, Zn, Pb and Cd was determined in edible plant parts, onion bulbs and potato tubers, in two consecutive years, by atomic absorption spectrophotometry.

Of 32 samples of onion (belonging to 16 cultivars) in only two concentration of Cd was above the limit set both by regulations of the Republic of Serbia and EU. In potato, of 28 samples (belonging to 10 cultivars) in 4 concentration of Cd was above the limits set by Serbian regulations and it was above the limit in only one of these according to EU regulations. None of the onion and potato samples had concentration of Pb above the limit set by regulations of the Republic of Serbia. Nevertheless, according to EU standards, in 25 onion and in 22 potato samples it was above the limit. Since Cu and Zn in vegetables have food and feed but not public health significance, there are no limits set for concentrations of those elements by regulations. There were statistically significant differences between both onion and potato cultivars with respect to concentrations of Cu, Zn, Pb and Cd, but differences between Zn/Cd ratio were not significant.

Key words: *onion, potato, copper, zinc, lead, cadmium.*

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INVESTIGATION OF ORGANIC AND MINERAL FERTILIZERS ON THE YIELD AND QUALITY OF POTATO VARIETY KENEBEK

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This paper presents the results of the effects of organic and mineral fertilizers on the yield and quality of potato tubers of the variety "Kenebek" on a production plot in Nedakusi, the Municipality of Bijelo Polje (Montenegro). It was also done the analysis of heavy metals content in the tubers. The experiment was conducted during 2011 year with randomized block design. We used eight different varieties of fertilizers: manure (40 t ha^{-1}), NPK 15:15:15 (1600 kg ha^{-1}), manure + NPK 15:15:15, NPK 8:16:24 (1400 kg ha^{-1}), 8:16:24 NPK + manure, NPK 8:16:24 + KAN (300 kg ha^{-1}) and NPK 8:16:24 + manure + KAN) in three replications.

The average tuber yield was 5.97 kg m^{-2}, number of tubers 38.65 m^{-2}. The highest yield was found in variants where the fertilizer was applied in the following relation 8:16:24 NPK + manure + KAN (6.69 kg m^{-2}). The same variant also had the highest starch content (18.75%). The lowest yield was observed in the control treatment (4.75 kg m^{-2}), while the lowest content of starch in the tubers has the variant NPK 15:15:15. The content of heavy metals (Cd, Co, Cr and Pb) was approximately the same in all experimental variants, only different Ni content, which was the highest in the control treatment, 0.83 mg kg^{-1}.

Key words: *potato, fertilizer, weight, number of tubers, starch, heavy metals*.

ONION FLY (*Hylemia antiqua* Meigen) ON ONION IN THE BANJA LUKA REGION

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Onion fly - *Hylemyia antiqua* Meigen (Diptera, Anthomyiidae) is a cosmopolitan species that is present on plants of the *Allium* genus (Alliaceae). It occurs regularly, especially during the years with wet spring, when a massive attack can cause significant damage. It requires control in all areas where it appears.

In the Banja Luka region, at the localities of Vakuf, Šargovac, Petrovo Selo and Kosjerovo, *Hylemyia antiqua* distribution, its abundance and intensity of attack on the onion were observed during 2006 and 2007. Experiment was performed by visual examination of the plants and collecting adults using sweep net, insect aspirator and yellow water traps. Sweep net was used to collect insects at 5 randomly selected sites on the plot, with 20 swings, while specimens from the sweep net were collected by the insect aspirator. Yellow water traps were placed at plot and were changed at intervals of 7-10 days during the growing season. When the growing season was completed, removing bulbs were reviewed to detect the presence of *Hylemyia antiqua* larvae and their damage.

Total of 36 adults were captured in 2006 by using yellow water traps and sweep net, while 102 adults were captured in 2007. In 2006 the intensity of the attack of *Hylemyia antiqua* was estimated as low for the localities Vakuf 1, Vakuf 5 and Šargovac, medium for the localities Vakuf 2 and Vakuf 3 and strong for the locality Vakuf 4. In 2007 the intensity of the attacks was estimated as low for the locality Vakuf 3a, medium for the localities Vakuf 1a and Kosjerovo and strong for the localities Vakuf 2a, Vakuf 4a, Vakuf 5a and Šargovac 1.

***Key words*: *onion fly, Hylemyia antiqua, Banja Luka, onion, intensity of attack*.**

4.3 Animal Husbandry

THE EFFECT OF BULL SIRES ON PARAMETERS OF BIOLOGICAL TESTING OF SIMMENTAL CALVES

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Exceptionally important aspect in cattle breeding, from the point of view of production and economy, is to ensure normal and regular fertility, i.e. providing as many as possible healthy calves without any anomalies either of hereditary or non-hereditary character. Use of artificial insemination has enabled that single breeding bull is sire to several tens of thousands of progeny. However, if sires are carriers of lethal or semi-lethal genes, this can cause huge losses of calves. In order to reduce these undesirable incidences to minimum, testing of bull sires i.e. their progeny in regard to difficult births and losses of calves due to genetic anomalies - biological test, has been included in breeding and selection work. This test is done in Republic of Serbia uniformly for whole population of Simmental cattle, through exchange of data between main breeding organizations. For each tested bull, it is necessary to have data for at least 50 randomly selected calves. Visual examination of calves is done at the latest 65 days after the birth of the calf. In this study, results of the biological testing of 35 Simmental bulls, sires of total of 3573 calves on the territory of Central Serbia, in the period from 2008 to 2009. In this study, the effect of bull sires on parameters of the biological test was investigated: body mass at birth, calf scoring, scoring of calving ease and anomalies. Also, bull sires were ranked based on these parameters, also male to female calves ratio was determined, percentage of twins and percentage of still born calves for each bull. Results show that the effect of bull sire was significantly high $p<0,001$ for all three parameters in biological test, also that the number of still born calves for all sires was within allowed limits, except in case of bulls Zahlo (HB 1497) and Woz (HB 1433), where it was over 5.

Key words: *biological test, bulls, Simmental breed.*

THE INFLUENCE OF EARLY AND LATE STAGE OF LACTATION ON MILK PROCESSING CHARACTERISTICS AT CZECH FLECKVIEH-SIMMENTAL CATTLE

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The aim of the paper was to evaluate the influence of stage of lactation on milk processing characteristics at Czech Fleckvieh-Simmental dairy cows. There was collected an individual milk samples from 138 cows during morning and evening milking. Milk from both milking was mixed and analyzed in laboratory. According to stage of lactation, cows were divided in two groups: early lactation (EL) n = 69 represented by cows up to 110 day in milk (DIM), and late lactation (LL) n = 69 where the cows which had more than 220 day in milk were placed. It has been found the following results for EL resp. LL: protein content 3.24 % resp. 3.67 %; fat content 3.48 % resp. 4.57 %; lactose content 4.78 % resp. 4.94 %; rennet coagulation time 196 sec. resp. 229 sec.; curd quality class 1.53 resp. 1.45 and titrable acidity 6.84 °SH resp. 6.90 °SH. We found statistically significant ($p<0.01$) differences in protein, fat and lactose content. Also rennet coagulation time was significantly longer on late stage of lactation. The rest of analyzed parameters weren´t statistically significant ($p>0.05$), assesed by Statistica 9.0 software.

All evaluated milk processing characteristics are very important for cheesemaking. The results demonstrate how stage of lactation can influence not only milk composition but also its properties.

Key words: *milk, stage of lactation, Czech Fleckvieh Simmental Cattle*.

Acknowledgments: This research was supported by grant project AF MENDELU, IGA TP 1/2012.

THE USE OF YEAST CULTURE IN THE DIET OF DAIRY COWS

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The goal of this study was to determine the effect of yeast culture (Saccharomyces cerevisiae SC 47) addition in the diet of dairy cows on their rumen fermentation and milk production. Animals received a diet TMR based of good maize silage with a higher dry matter content (14 kg), 14 kg of lucerne-grass haylage, 5 kg of crushed ears of maize, 5 kg of beet pulp silage, 3 kg of crimped wheat, 2 kg of meadow hay of average quality, and 7.0 kg feed mixture. The yeast culture (5 g/day) was added to the premix of mixture. The supplementation of yeast culture showed a positive effect on ruminal VFA production by the experimental group of Holstein cows in comparison with the control, higher production ($P< 0.05$) on sampling day 30 and 60 (114 ± 25.44a vs. 125 ± 26.49b, resp. 146 ± 32.47b vs. 149 ± 36.64d). The average concentration of ammonia was higher by cows in the control group, and the difference vs. the treated group was significant. Yeast culture has led to better utlization ammonia in the rumen fluid of experimental cows.The difference in the number of protozoa of cows in the control and experimental groups was significantly ($P< 0.01$) different (353± 6.97A vs. 386± 3.91C ths /1 ml of rumen fluid), resp. 343± 4.77B vs 398± 6.51D. Average daily FCM milk production was higher in the experimental group (38±3.33b vs 33±1.64a).

***Key words*:** *dairy cows, rumen fermentation, rumen fluid, yeast culture*.

EVALUATION OF COW ENERGY STATUS CHANGES DURING EARLY LACTATION BASED ON THE CONCENTRATIONS OF ORGANIC MILK INGREDIENTS

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The aim of study was to assess the energy status of cows (n = 132) based on the concentration of organic milk constituents during the early lactation period. Cows were divided into three groups according to stage of lactation (group A, n = 43, 15-30 days, group B, n = 33, 31-45 days, group C, n = 56, 46-60 days of lactation). Concentrations of milk fat and protein and milk fat ratio: proteins tended to decrease and the concentration of urea had increasing tendency towards the end of the study period. Statistically significant differences were found in concentrations of milk fat (41.58 ± 5:35 versus 37.15 ± 3.63, and 36.11±4:57 g / L, respectively), urea (2.86 ± 0.50 versus 0.69 ± 3:48 and 0:56 ± 3.61 mmol / L, respectively) and in milk fat : protein ratio in the first vs. other two groups, as in lactose concentration between the first and second groups of cows (47.14 ± 1.29 versus 47.71 ± 1.04). The ratio of the concentration of milk fat and protein, as well as the relationship of urea and protein showed that all tested cows were in a strong energy deficit, with more or less pronounced deficit or relative surplus of proteins. This situation is affecting the health and milk production of tested cows, as well as to their reproductive characteristics.

Key words: *cows, lactation, milk, energy status*.

THE EFFECT OF CALF SEX ON MILK PRODUCTION OF CZECH FLECKVIEH – SIMENTAL DAIRY COWS IN CONDITIONS OF THE CZECH REPUBLIC

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The effect of calf sex on milk production of dairy cows was evaluated in this experiment. The database (provided by Association of Czech Fleckvieh – Simental breeders) of 56,906 parturitions (only live single calves) observed between years 2005 – 2008 was used. All cows were Czech Fleckvieh - Simental breed (pure breed) originated in Czech Republic, it means no animal were imported. Dairy cows were divided into three groups according to number of lactation (1st, 2nd, 3rd). Records of the subsequent milk production of dairy cows (amount of milk per standard lactation - 305 days and milk yield per whole lactation) were used for evaluation. Observed milk production on standard resp. whole lactation was 5,984 kg resp. 6,232 kg post partum with bull calf and 5,981 kg resp. 6,222 kg with heifers, for cows on the 1st lactation. As far as the production on 2nd lactation is concerned the milk yield was 6,907 kg resp. 7,093 kg post partum with bull calf and 6,884 kg resp.7,065 kg with heifers. We found 7,054 kg resp. 7,218 kg with male calves and 7,054 kg resp. 7,206 kg with female calves. The defined hypothesis assumed that the cows post partum with male calves will be higher in milk production (in compare with cows post partum with female calves) – on all three observed lactations. Statistical data evaluation was performed by software STATISTICA 9.0 using the analysis of variance (Tukey test). No statistically significant effect ($P > 0.05$) of calf sex on the milk production was found on any observed lactations.

Key words: *dairy cow, sex of calves, milk production.*

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THE EFFECT OF MILK PRODUCTION OF CZECH FLECKVIEH-SIMMENTAL COWS ON ALL DAY PREFERENCE OF CUBICLE-ROW IN SUMMER MONTHS

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The aim of study was analyze effect of milk production cows on preference cubicle-row. Experiment conducted in farm GenAgro Ricany a. s. (49°12´30.370´´N, 16°23´43.092´´E). The objective of monitoring was one section - one quarter of stable (n = 98 cows), where 103 cubicles are arranged in three rows (32 cubicles in 1st row – close to feed alley; 33 cubicles in 2nd row – in the middle; and 38 cubicles in 3rd row - at the edge). Dairy cows was divided by milk production in to three groups: 1st group with low production (> 30 kg milk); 2nd group with average production (30 – 34 kg milk); 3rd group with high production (34 < kg milk). Observation was carried out at weekly intervals in months June, July, August 2011 (12 observation). Experiment began always in 10:00 a.m. and continued in 1 hours intervals up to 7:00 p.m.

As far as the low productive dairy cows (> 30 kg) are concerned they mostly used 2nd (middle) row (in average 25.42%). First (means close to feed alley) row of cubicles was the mostly used by cows with average production (30 – 34 kg) in 23.47% cases. High productive cows (34 < kg) prefered 3rd cubicle-row, furthest from feed alley in average 25.38%. The presented results were not statistically significant (p> 0.05), but there was a evident trend in the preferences of the individual using the cubicle-rows. It can be stated that high productive dairy cows prefered the edge-row of cubicles, where is the best replacement of air. High productive cows has higher metabolism which requires a higher oxygen consumption. This should be considered as criterion for voluntary choice of resting place.

Key words: *Czech fleckvieh-simmental cows, preference, cubicle-row, milk production.*

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INFLUENCE OF SEASON AND CURRENT PERFORMANCE ON SOMATIC CELL COUNTS IN MILK OF CZECH FLECKVIEH-SIMmENTAL DAIRY COWS

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The aim of this study was to determine the effect of season and current performance on the number of somatic cell count in milk. Monitoring was carried out on the file of the Czech Fleckvieh-Simmental dairy cows (n= 95), on private farm GENAgro, which is located in the South-Moravian Region, Czech Republic (GPS 49°12'32.319"N, 16°23'42.666"E) within the period from March 29th 2010 to March 30th 2011 where were collected individual milk samples one per month.

The samples represented a mixture of milk from morning and evening milking. The average barn airspace temperature was measured the day before milk sampling. Next day after sampling was analyzed following parameters: number of somatic cell count-SCC (thousands / 1 ml) - and its logarithm, milk performance (kg/day), fat (%), lactose (%) and protein content (%). According to the current milk yield, cows were divided into three groups: 1st. up to 20 kg/day; 2nd. from 20.1 to 30 kg/day; 3rd. group from 30.1 kg/day and more. Records were divided into four categories, according to season: spring - (March, April, May), summer - (June, July, August), autumn - (September, October, November) and winter - (December, January, February).

The year season had statistically high significant ($p \leq 0.01$) effect on milk production (milk yield, fat, protein and lactose content) and on number of somatic cell counts. The current milk performance had statistically high significant ($p \leq 0.01$) effect on number of SCC, where the highest content of SCC was found in 1st. group and the lowest was in 3rd. group. In this study was reported conclusive interaction between year seasons and the number of SCC in milk resp. logarithm its number.

Key words: *Czech Fleckvieh-Simmental Cattle, milk performance, somatic cell count*.

Acknowledgments: This research was supported by grant project AF MENDELU, IGA TP 1/2012

EFFECT OF GLYCEROL BASED ENERGY SUPPLEMENT FEED ON METABOLIC STATUS AND PRODUCTION RESULTS OF HIGH-YIELDING DAIRY COWS

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The objective of the investigations presented in this study was to establish the effects of a glycerol-based energy supplement in the diet of high-yield dairy cows on their metabolic status and production results during the early stage of lactation. Eighty cows were selected 2 weeks before, and they were divided into two groups: controls (n=40) and experimental (n=40). Cows of the experimental group orally received glycerol based energy supplement in a quantity of 250 mL daily during the final two weeks of the dry period and 300 mL daily until the day 60 of lactation. The body condition score (BCS) of all cows was determined 10 days before calving, and on days 15 and 60 after calving. Blood samples were taken 10 days before and 15 days after calving, and concentrations of glucose and beta hydroxi-butyric acid (BHBA) and total bilirubin were determined in all samples. Average daily milk production of all cows was measured on days 30 and 60 of lactation. The results showed that the differences in BCS between the dry period and puerperium, or the dry period and the 60th day of lactation, were within physiological values in the experimental group of cows, and higher than physiological values in the control group. Glucose concentration was statistically significantly higher in the experimental group than in the control group of cows 10 days before calving ($p<0.05$) and 15 days after calving ($p<0.01$). Fifteen days after calving, the BHBA concentration in the control group of cows was significantly higher ($p<0.01$) than in the experimental group. Total bilirubin concentrations were lower, although not significantly, in experimental group of cows. On days 30 and 60 of lactation, the milk yield of experimental cows was higher than of those in the control group, but the difference was statistically significant only at day 60 of lactation. The obtained results indicate that energy supplements should be used as an integral part of the feed ration during the peripartal period in order to prevent uncontrolled lipomobilisation that may leads to significant changes in the body condition score of cows and fatty liver syndrome.

Key words: *energy supplement, high-yield dairy cows, body condition, performance*.

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DELAYED *POSTPARTUM* ANESTRUS AND REPRODUCTIVE PERFORMANCE IN DAIRY COWS (a Review)

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During the past few decades, continued genetic progress for milk production, coupled with new reproductive technologies performed in high-producing dairy cows, has led to significant decreasing of dairy cows fertility all over the world. Delayed postpartum anoestrus is one of the major causes of fertility decreasing and economic losses in intensive milk production. The aim of these paper is to review the causes and possibility for reducing its impact on subsequent reproductive performance in dairy cows.

Key words: *ovarian aktivity, anestrus, post partum, dairy cow*.

ORGANIC PIG PRODUCTION - HARMONIZATION OF LEGISLATION IN REGION WITH THE EUROPEAN UNION

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Legislation set up high standards which determine requirements for farming pigs in self-sustaining systems. Having in mind importance of organic food production in the overall agricultural policy of the European Union, the European Council of Ministers of Agriculture issued a Council Regulation, EC No 834/2007 which clearly defines the objectives and principles of organic production rules. On the basis of this regulation, the European Commission in Brussels in 2008 adopted two new Regulation Commission, EC No 1235/2008 and EC No 1235/2008, which more detailed define organic production, imports from third countries, labeling and distribution of organic products.

In most countries of West Balkans, it made a legal framework for organic pig production on the model of mentioned regulations in the European Union. In Serbia, keeping pigs in organic production is regulated by the Rules on the control and certification of organic production and organic production methods ("Off. Gazette of the Republic of Serbia", no. 48/11). In Croatia, this field is defined by the Regulation on ecological production of animal products (NN 13/2002) and the Regulations on amendments to the rules on organic production of animal products (NN 10/2007). On the other side, within the Bosnia and Herzegovina is the only Republic of Srpska adopted the Law on organic food production ("Off. Rep. of Srpska Gazette" No. 75/04) and the Law on Amendments to Law on organic food production ("Off. Rep. of Srpska Gazette ", No. 01-1133/09). In Montenegro, this matter is defined by the Regulations on methods of organic livestock production ("Off. Gazette of RM" no. 38/05 of 24.06.2005, 45/05 of 28.07.2005).

In relation to mentioned legal framework and de facto situation in organic pig production in the region, the paper presents different aspects and comparison of these regulations. Mentioned are baseline data about calls for proposals for funding in the European Union, but also examples of projects on pig organic production, which had previously granted for co-financing by the European Commission in Brussels. Given is also the outline view of possible project between partners in West Balkan region. The aim of this project will be improvement of pig production in organic agriculture, and planned activities from the beginning of screening situation, legislation, networking of organizations, through training of trainers and the realization of the pig production for the target groups on market.

Key words: *pig, organic farming, legislation, West Balkan, EU.*

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REPRODUCTIVE PERFORMANCES AND MORPHOMETRY OF REPRODUCTIVE ORGANS IN GILTS

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This paper presents the results of reproductive performances of total of 34 gilts. The study started when gilts had an average weight of 82.3 kg and age of 175 days and ended when they reached an average weight of 128.0 kg and the age of 241 days. The following parameters were examined: percentage of estrus, the percentage of pregnancy, the average number of piglets per litter and number of piglets born alive. Gilts with no external signs of estrus showed in examined period (n = 20), were sacrificed in order to determine the status of the reproductive tract. Morphometric evaluation was made by the following parameters: weight of ovaries (g), length (cm) and weight (g) of the fallopian tubes, uterus weight (g) and length of both uterine horns (cm). Gilts were categorized as sexually active and inactive by type of ovarian structures found. As sexually active gilts were considered those in which the ovaries had some of the following structures: follicles up to 10 mm, corpora hemorrhagica, corpora lutea or corpora albicantia. Percentage of estrus and pregnancy rate was 44.12% (n = 15), and 41.18% (n = 14), respectively. The average number of total born and live born piglets per litter was 10.13, and 9.25, respectively. By analyzing a total of 20 gilts sacrificed, it was found that 25.00% (n = 5) gilts had active ovaries. These results indicate failures in the management of farms, which are mostly related to poor organization of estrus detection.

Key words: *gilts, estrous response, pregnancy, ovarian structures*.

IMPORTANCE OF DEFINING OF VETERINARY STANDARDS IN ORGANIC PIG PRODUCTION

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Compared with conventional pig production, compliance of standards and regulations in implementation of each phase of the production cycle, which are defined in organic pig production, not only contributes to the production of safe pig meat, but also the environmental protection and rural development of the country in general.

In Serbia, the production of organic foods is regulated by the Law on organic farming and organic products, and a series of rules, which are generally in compliance with EU directives, but not in fields such as the veterinary activities.

In EU countries the legal framework for organic animal production that is pig production, and veterinary measures represent "the EU Regulation 834/2007", provided that each country shall further regulate the rules in this area. For the conversion period from conventional to organic production of pigs has been prescribed period of at least 6 months (according to Regulation 834/2007). The experiences of some countries (Denmark, Sweden, Greece) indicate that most common health and production problems in organic pig farming are: growth retardation, piglet mortality, increased susceptibility to parasitic infections and leg problems (lameness).

This paper presents the experience and ordinance of Regulations of the veterinary service in Austria, as an example of a country with the largest percentage share of bio-farms (8%) in agricultural production. Among the preventive and therapeutic measures, priority is given to complementary and alternative medicine such as homeopathy, phytotherapy, acupuncture etc. As a last measure is recommended "traditional" medicine, and each year responsible Ministry of Health issued the so-called positive list of drugs, allowing the application by a licensed veterinarian, farmer and/or "trained person". For example, treatment of “bio-pigs” in certain stage of the production cycle: breeding pigs or in fattening pigs shall be permitted only once. Regarding the sows and boars that are in exploitation for longer than one year, they allowed be treated up to three times for 12 months. One treatment also includes therapy the several days until cure. The treatment does not include planned or emergency vaccination and giving antiparasitics, which in turn allowed only with previous diagnosis. All preventive and therapeutic measures can be carried out only by veterinarian, but there are some exceptions. Thus, castration of young piglets is permitted by "trained person", since it is not necessary to give an anesthetic.

Because the obligation to adapt the regulations with the European Union, primarily in order to increase competitiveness of organic products consists of Serbia, it is our opinion that the mentioned regulations and standards can be used for the preparation of our subordinate legislation, having in mind the key role of veterinarians in this.

Key words: *pig, organic production, prevention, therapy*.

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THE EFFECT OF CHROMIUM SUPPLEMENT TO FEEDS FOR BOARS ON CHANGES IN LABORATORY EVALUATION OF THE EJACULATE

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The experiment was based on feeding the organic form of chromium (picolinate) and the assessment of its influence on changes in the laboratory values of the ejaculate (sperm motility, ejaculate volume, sperm concentration and per cent of pathological sperm) in breeding boars. The experiment involved 40 boars divided into two equal groups. Boars of the experimental group (n = 21) received 181.81 µg of chromium per kg of feed ration (FR) administered per orally, in the control group (n = 19) chromium intake was not increased. Changes in laboratory values of the ejaculate were evaluated at 4th periods (0, 28, 56 and 84 day) and no significant differences were discovered in any of the parameters. During the experiment the sperm concentration and motility were absolutely the same in boars of both groups; it can therefore be concluded that increasing the level of chromium in the feed ration of boars of the experimental group had no direct effect on these parameters. It was the same in the case of the ejaculate volume which gradually decreased between periods 1 and 4, in boars receiving chromium by 12.8 % and in the control group by 8.1 %. The beneficial effect of chromium was seen in the reduced count of pathological sperm in boars in periods 3 and 4 of tests as against boars of the control group. In spite of the considerable 26.3 % difference between the groups this decrease was not statistically significant. Data evaluation revealed a significant correlation ($P<0.01$) between the number of samplings per boar and sperm concentration. A correlation ($P<0.05$) was also detected between the ejaculate volume and sperm concentration. Acknowledgement: This project was funded by grant IGA TP 2/2011

Key words: *boar, ejaculate, chromium, picolinate, sperm concentration*.

THE EFFECT OF GUADINO ACETIC ACID AS GROWTH PROMOTER IN FATTENING OF BROILER CHICKENS

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Replacement of the feed of animal origin, primarily the fishmeal and meat meal of high purity and good quality, in poultry diets leads to a decrease of level of high quality animal protein in animal feed. Plant feedstuffs do not represent the primary source of creatine which is transported through the blood and taken up by tissues with high energy demands, such as the brain and skeletal muscle, through an active transport system. Variable temperature and pressure during pelleting process can destroy the structure of creatine and this compound should be added in a more stable form. Guadino acetic acid as a creatine precursor and a synthetic analog provides an increased content of creatine in the blood and skeletal muscle. The increasing levels of creatine in the body improve feed efficiency and increase daily weight gain, and the yield of breast muscles in broiler carcasses. At the end of the trial which was carried out at the experimental facilities of Faculty of Agriculture in Novi Sad, the use of synthetic analogues of creatine resulted in increase in final body weight of group which fed experimental feed with addition of guadino acetic acid (2620.12 g) compared to control group (2601.10 g), the reduction in mortality (2.14% compared to 3.68%) and better conversion rate (1.77 to 1.79 compared with a control group), but the results weren't statisticaly significant. EPEF (European Production Efficiency Factor) was higher (345) in the experimental groups, compared with a control group (333 index points), indicating the benefit of use of guadino acetic acid in poultry diet. A very high value of EPEF indicates the good production results and high nutritive value of fed mixture.

Key words: *guadino acetic acid, creatine, broiler chickens, conversion rate, EPEF.*

CONSUMERS' ATTITUDES TOWARD DIFFERENT HOUSING SYSTEMS AND BROILER WELFARE[2]

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Due to its high level of industrialization, broiler production is one of the fastest and the cheapest ways of obtaining high quality meat for the human diet today. Moreover, the productivity of poultry meat production has dramatically increased during the last century (the time required to reach 1.500g live weight was reduced from 120 days in 1925 to 30 days in 2005), while, conversely, some aspects of health and welfare of broilers have decreased. All the mentionend facts, as well as growing consumers' concerns about animal welfare, have resulted in a larger attention towards the welfare of broilers. This development has lead to new standards of poultry production which require management adjustments from producers. In May 2007 the European Commission agreed on a new directive covering the welfare of broilers, which came into force on 30th of June 2010. The Republic of Serbia, following the example of many European countries, enacted the Animal Welfare Directive in 2009, which set the legal groundwork to different, qualitatively improved behavior of man towards animals.

In this article, the authors analyze the consumers' attitudes toward different housing systems in which broilers are reared as well as the factors influencing the purchase decision making process of consumers toward poultry meat and their perception of broiler welfare. The results of the quantitative research, which was carried by interviewing 300 poultry meat consumers from Novi Sad and the rural area near-by has shown that consumers in Serbia care about the systems in which broilers are reared. Further, they believe that poultry meat from extensive housing systems which provides more natural environment to broilers is more tasteful and healthier. However, the aspect of broiler welfare is on the last position among 10 possibilities when it comes to a decision making process for buying poultry meat.

Key words*: *broilers, poultry meat, welfare, consumers' perception.

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THE INFLUENCE OF ENZYMES ON THE PERFOMANCES OF FATTENING CHICKENS DURING THE FIRST THREE WEEKS OF FATTENING

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Two hundred Coob 500 chickens were used as a material in the study that lasted three weeks. Animals were divided into four groups of 50 chickens, control and three experimental groups fed with three different levels of enzyme cocktail (A-0,05%, B-0,10% and C-0,15%). Enzymatic supplement, used in the experiment, represents a mix of protease, cellulase, pentosanase, α-galactosidase, and amylase. Corn soybean diets (22% CP) were formulated to meet nutrient requirements of this chicken category with no differences regarding the content of energy and proteins.

At the end of the experiment body weight, weight gain, feed consumption and conversion were determined. Data of body weights and weight gains have been proccessed by analysis of variance using statistical software GraphPad Instat.

Body mass of chickens in the control group was lowest and amounted 728 grams, while in experimental groups amounted 732 (A), 742 (B) and 735,4 grams (C). Daily weight gain in the control group amounted 32,52 grams, group A, 32,70, group B 33,2 and in the group C, 32,86 grams. Obtained differences were statistically insignificant (P>0,05). In the control group feed conversion amounted 1,92 kg, in A group 1,88 kg, in B group 1,86 kg and in group C 1,87 kg.

It can be concluded that there exists a slightly positive effect of enzyme usage in diets based on corn and soybean meal, but with its level increasing there is no further improvement of the production results. Enzyme dietary level for fattening chickens, during the first three weeks of life that is recommended, is 0,1%.

Key words: *broiler, enzymes, body weight, weight gain, feed consumption, feed conversion.*

THE EFFECT OF ORGANIC SELENIUM DIETARY SUPPLEMENTATION ON THE PRODUCTION RESULTS OF GROWING PULLETS

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Selenium is an essential trace element, an important factor in the glutathione peroxidase enzyme system which protects intracellular structures against oxidative damage. However, selenium is very toxic at a higher level and there is a small difference between essentiality and toxicity. Thus, it is important to find less toxic source of selenium in a diet of animals. Possible alternative is organic form of selenium which is considered as less toxic and more effective.

An experiment was designed to investigate and compare the effect of organic and standard inorganic selenium in a diet on weight gains and food utilization of growing pullets.

Pullets of hybrid Shaver 579, nine weeks old, were divided into 2 groups of 200 chicks each, which were additionally divided in 4 separated groups with 50 chickens. First group fed diet mixture with standard inorganic form of selenium, where selenium concentration amounted 0,2 mg/kg and was control for the second group whose diet contained organic form of selenium providing the same amount of selenium as the diet of the control group.

The trial lasted until 18 weeks of life, accordingly 9 weeks, whereby measuring the body weights of marked animals, as well as feed consumption per group, were recorded every three weeks. The data obtained were processed by variance analysis and testing the difference among treatments was done by the T test.

Obtained results have shown that production parameters observed during the trial were better in experimental pullet group received organic form of selenium, where weight gain was higher for 7% (879 vs. 941 g), and feed conversion ratio for 5,8% (4,82 vs. 5,10 kg). The differences were not statistically significant (P>0,05). It can be derived a conclusion that an application of organic selenium positively influence the parameters of growth and food utilization.

Key words: *growing pullets, organic selenium, body mass, weight gain, feed conversion ratio.*

THE EFFECT OF SELENIUM SUPPLEMENTATION IN A DIET AND ITS INFLUENCE ON SHELL PROPERTIES OF EGGS FOR THE REPRODUCTION

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Egg shell represents and makes mechanical protection, and with its hardness and structure affects egg quality and embryo development. For that reason there is an increased interest of actors in poultry production for egg shell quality improvement, especially those used for incubation. In order to determine an influence of microelement selenium on egg shell quality, an experiment has been performed with parents of heavy hybrid line COBB 500 during 64 feeding days.

The basis of an analysis of data obtained, a difference of egg mass between control and experimental group has been determined, where it was higher in the control group for 1,84 g ($P<0,05$). By weighing egg shell a difference determined of 0,70 g in favor of experimental group that consumed food with addition of selenium, shows significance at the level of 1%.

Moreover, high significance level has been determined for strong negative phenotypic correlation among shell distortion and the power of shell breakage. All the rest phenotypic correlations of shell distortion and other remaining investigated traits are negative and very weak up to weak.

In this investigation hybrid COBB 500 has gotten satisfying results and showed significant diference due to application of selenium in broiler parents nutrition.

Key words: *chicken eggs, selenium, moulting, egg shell, parent flock.*

EFFECT OF PROTEASE ENZYME SUPPLEMENTATION ON THE WEIGHT AND PROPORTION OF EDIBLE SLAUGHTER BY-PRODUCTS OF BROILER CHICKENS

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There has been relatively little research on protease enzyme supplementation of broiler feeds having a reduced crude protein level. The available literature suggests that reduced amounts of protein feedstuffs, primarily soybean meal, in complete broiler feeds coupled with protease enzyme supplementation produce a number of positive results such as increased feed conversion efficiency, enhanced digestibility of certain feed ingredients, reduced environmental pollution due to lower excretion of nitrogen-containing substances into the environment, reduced feeding costs, improved health, etc. The objective of this study was to evaluate the effect of protease enzyme supplementation of complete feeds for broiler fattening (at a rate of 0.2% and 0.3%) as compared to the control group (without protease enzyme supplementation) on the weight of edible slaughter by-products (liver, proventriculus, heart and abdominal fat) and their proportion in bird weight before slaughter. Cobb 500 hybrid was used in the trial. Length of fattening period was 49 days and it included three stages: starter (days 1-21), grover (days 22-42) and finisher (days 43-49).

Key words: *chickens, enzym protease, edible slaughter by-products*.

NATURAL FOOD DYNAMICS IN BOTTOM FAUNA AND ITS CORRELATION WITH CARP GROWTH RATE IN SEMIINTENSIVE PRODUCTION SYSTEM

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In the semiintensive production system, natural food from the fish pond and supplementary feed present major components of carp diet. Natural production in the pond (amount and composition of natural food such as bottom fauna and zooplankton) largely determines the amount and the composition of suplementary feed, fish health, as well as fish growth rate.

In order to determine how bottom fauna organisms affects the growth rate of cultured carp, and what kind of relatioship there is between bottom fauna and ichthyofauna in carp ponds, a two-year study (May to October 2008 and 2009) was conducted in three fish ponds at the experimental fish farm of the Center for Fishery and Applied Hydrobiology, Faculty of Agriculture, University of Belgrade. During the research, in 15-day intervals, zoobenthos samples were collected with modified Ekman-Birge's grab adapted for use in carp farms, while the fish were collected with a dragnet. Based on the collected samples and the dimensions of the fish pond, the total number and biomass of macrozoobenthos were determined. Ichthyomass was calculated by multiplying the fish average weight attained from samples with the total number of fish stocked in the pond.

The obtained values for the total number and biomass of macrozoobenthos showed a decreasing trend from the beginning till the end of the season, with two deviations in both years (short-term growth phase). The results of the statistical analysis indicate a negative correlation between fish growth and total number of bottom fauna organisms ($r=-0.480$, $p=0.032$) and their biomass ($r=-0.448$, $p=0.048$). This was expected, since the bottom fauna represents a very important component of carp diet. Occasional short-term increase of bottom fauna abundance and biomass during the season are possibly a consequence of lowered pressure of carp on macrozoobenthos due to their decrease. Reduced pressure of fish on bottom fauna allows their periodical short-term recovery

Key words: *bottom fauna, natural food, carp, semiintensive production system.*

THE SIGNIFICANCE OF EGGSHELL COLOR ON THE PHEASANT HATCHING PRODUCTION RESULTS

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Researches on pheasant egg's color and shell quality and their influence on the eggs production results in providing us an argument, for all Pheasant eggs that differ from the typical color of the shell (brown, dark-picking, green, and blue-green), not to put in incubators (but also if the eggs are with lime and skim lime spots on the shell). It was found that 50% to 85% of those eggs had to be thrown away. Obtained data confirmed that most of the discarded eggs (85%) are with shell lime skim, while the 50% of the discarded eggs have green coloration shell and lime spots on shell.

Of the four analyzed pheasant hens groups it was shown that only one group (D) had a lower capacity than other groups, in which the average lie production was larger than 50%. Pheasant eggs fertilization was highest in group B (92.1%), and lowest in group A (70.2%). The average egg mass for all four groups was 30.48 g, in the way that the groups A and C had less mass than the average, while groups B and D had a larger mass than the average.

Based on the color of the pheasant egg shells can be concluded that, according to this criteria can be expected some indirect reflections on production success. Also, regarding production it is likely that nutrition can affect the color and quality of the shell, therefore the fertilization, and thus the overall hatching result. On the other hand, it would have very little effect on egg mass and number of eggs that pheasant hen will lie down for the same period of holding the parent flock (March 1 - May 31).

Key words: *pheasant, pheasant egg, egg shell color, egg fertility*.

POTENTIAL EFFECTS OF USING SELECTED LINES OF COMMON CARP (*Cyprinus carpio L.*) AND RAINBOW TROUT (*Oncorhynchus mykiss*, Walbaum) ON FISH PRODUCTION AT SERBIA

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Negligible portion of total world aquaculture production comes from selected animals. In Serbia, fingerlings used in the production of carp come from genetically uncontrolled intersections, while rainbow trout fry originating from imports is from selected lines. Selective breeding of carp in Serbia started in 2007 at the Center for Fisheries and Applied hydrobiology, Agricultural faculty of Belgrade University, broodfish were obtained from local fish farms and from the rivers. So far, 70 families of common carp were produced, with the aim to increas the number of families to over 100 during the 2012. Based on previous results in the selective breeding of common carp we expect increase in growth rate of 10 to 15% per generation. After three generations of selective breeding, families with the best production characteristics (increased growth rate over 30%) and the highest disease resistance, will be used for fingerlings production for stocking ponds in Serbia. In this manner production of common carp in Serbia could be increased by 10 to 30%, depending on other factors that influence common carp production.

Selective breeding of rainbow trout began in 2010, the rainbow trout broodfish were obtained from different ponds all over Serbia. The main criterion for collecting broodfish was that rainbow trout farms did not imported fish in last 5 years and that the fish was free of disease. The main objectives of the selective breeding of rainbow trout were growth rate and disease resistance. Creating a parent flock of rainbow trout with good production properties (growth rate over 10% per generation) and high disease resistant will provide a basis for efficient production of genetically improved and healthy rainbow trout fry.

Key words: *selective breeding, common carp, rainbow trout*.

EFFECT OF ORIGIN AND LEVELS OF PROTEINS IN FEED MIXTURES ON WEIGHT GAIN OF CARP YEARLINGS

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As the main building blocks, proteins are essential for body growth and a number of physiological processes. Their origin and quantity in feed mixtures is of crucial importance for feed utilization and growth rate of cultured fish. The most desirable component of feed that provides proteins in feed for carnivorous, but also for omnivorous fish in intensive production is fishmeal. Due to the deficit of this very important nutrient at the world market and its high price, fishmeal and other feed of animal origin are combined or replaced with alternative sources of plant proteins. While optimizing the amount of proteins in the meal there is a constant tendency towards decreasing the share of fishmeal in feed.

The aim of the research was to examine the effect of mixtures with different shares of total proteins and their origin on growth rate and feed utilization on carp yearlings. The experiment was carried out in the Laboratory for Fish Nutrition, at the University of Belgrade, Faculty of Agriculture. Feed mixtures with total protein content of 38.1%, 38.5%, 41.5% and 43.7%, originating from different sources: fishmeal, full fat soybean meal and yeast were used.

Statistical analysis of data obtained through control measurements in 30 day intervals, showed differences in measured parameters between treatments. Fish fed a diet dominated by fishmeal and the total protein content of 43.7%, achieved the greatest growth rate and improved feed utilization. Fish fed diets with 41.5% protein and an equal proportion of fishmeal and full fat soybean meal in the mixture, had better feed utilization and greater growth rate than fish fed mixtures with the highest amount of soybean meal and lower content of total proteins.

The obtained results indicate that in addition to protein levels, their origin and the share in mixtures significantly affect the utilization of feed and growth rate of cultured fish. Full fat soybean meal, that has similar protein content, amino acid composition and approximate digestibility as in fishmeal, if present in higher amount in mixtures with lower share of total proteins, result in poorer feed efficiency and lower growth rate of cultured fish.

Key words: *carp yearlings, proteins, feed utilization, weight gain.*

BODY AND ROE MASS CORRELATION OF BROWN TROUT FEMALES - *Salmo trutta* m. *fario* L., 1758. (SALMONID HATCHERY KLAŠNIK - BANJA LUKA)

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This paper aims to present data on the mass of roe obtained from females of different ages, used in controlled spawning brown trout (*Salmo trutta* m. *fario* L., 1758), and to analyze their mass relative to body mass of sexually mature females that spawning in salmonid hatchery Klašnik - Banja Luka. Controlled spawning of brown trout was applied 4/12/2011. Before spawning, sexually mature individuals were transferred from the outer parent pool to the inner rotary spawning pools, and based upon pronounced sexual dimorphism the males and the females were divided into separate pools. During spawning females of age 3+, 4+ and 5+ and males of age 2+ and 3+ in a 2:1 ratio in favor of females were used. The body length of females ranged from 430 mm (3+) to 620 mm (5+), and body mass prior to extrusion of roe ranged from 1.250 g (3+) to 3.600 g. (5+). The mass of roe was expressed as a percentage value in relation to body weight and ranged from 16,67% (5+) to 23,08% (4+). Total body mass of sexually mature females (10) was 19.885 g while the total mass of roe was 3.920 g or 19,71%. This roe mass ratio is close to the theoretical values, indicating that the average weight of roe is about 20% of the individual body mass of sexually mature females.

Key words: *body mass, the mass of roe, brown trout, spawn, hatchery Klašnik - Banja Luka.*

EFFECT OF AGE ON BODY WEIGHT AT TROPHY VALUE OF ANTLERS IN ROE DEER (Capreolus Capreolus L.)

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Having into account entire game resources roe deer is the most representative numerous of big game in Serbia. Hunting of roe deer represents a significant offer in hunting tourism in our country. Determining the impact of age and body mass on the trophy value antlers was carried out on the shot roe deer in Homolje.

The shot deer were observed during three hunting seasons, 2006/07., 2007/08. and 2008/09. The courts LU "John Šerbanović" in Žagubica. Total is the shot 66 roe deer (*Capreolus capreolus L.*) as follows: the first season of the observed 16, second 23 and third 27. Each specimen was measured, after evisceration, in order to determine the mass of the body, then a certain age and according to the Rules for the evaluation was done evaluating the trophy value of antlers. Data from three hunting seasons were statistically analyzed by calculating the correlation coefficient and t-test. The effect of age on the trophy value of antlers and body weight influence the trophy value.

Based on the mathematical and statistical analysis of data on weight and age of shot roe deer, during the analyzed period, we can conclude that body mass does not affect the quality of antlers in roe deer, and age at the time of shooting has a statistically significant effect.

Key words: *roe deer, antlers, age, body mass, trophy value*.

FASCIOLOSIS OF DEER IN HUNTING GROUND OF SPECIAL NATURE RESERVE „GORNJE PODUNAVLJE“

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Fasciolosis of deer in two hunting land of special nature reserves "Upper Danube" has become a very big problem. The cause of the disease are parasitic from the group of flat worms (*Phylum Platyhelminthes)* and these are large fluke (*Fasciola hepatica, Linnaeus, 1758*), American liver fluke (*Fasciola magna, Cobbold, 1855*) and a small liver fluke (*Dicrocoelium dendriticum, Rudolphi, 1819*). According to data from the literature fasciolosis in deer cause in the the wetland areas of Serbia, in most cases by the American liver fluke, while a small fluke usually diagnosed in mouflon (*Marinkovic, 2008*). The configuration of the terrain on which there are grounds, which were flooded, and wetlands, creating favorable conditions for the development of American liver fluke. In hunted deer heads on the basis of pathomorphological findings and appearance of the liver, it seems the hair, mucous membranes and the general condition of individuals, is set on suspected to fasciolosis. When the external inspection of hunted animals, it is observed that the animals are in poor condition, with poorly developed skeletal muscle structure and low body fat reserves. Tan, the coat was of poor quality, and perianal region was observed diarrhea. Mucous membranes were pale. With more than 50% of cases could be macroscopically observed changes in the liver. The liver was enlarged, dirty gray with cystic formations. Consistency was mostly rubbery. Cysts were filled with slimy brown liquid from which the pressure coming out parasites.Also in hunted animals was markedly reduced trofy values of antlers due to illness and delays in physical development.

Based on the results obtained so far, it is evident that there is a suspicion of metiljavost the deer. Patoanatmoski findings indicate invadiranost American fluke, but an accurate determination of the parasite and the final diagnosis would be postavilia Coprological examination, so that on the basis of previous results can not speak with certainty about the exact cause of type metiljavosti in this area.

Key words: *Fasciolosis, hunting, deer, trophy value*.

BODY FORMAT OF THE TURKISH SHEPHERD DOG KANGAL

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With the aim of definite zootechnic-kennel standardizing of the Kangal as an indigenous Turkish breed, the Turkish Cynology Federation (KIF) has taken some serious steps since 2008. During May that year, the first expedition was organised on terrain around the city of Sivas. In order to discuss the exterior parameters scientifically, the analysis of another Kangal population was done, this time in the surroundings of Ankara during 2010. During the 2011. the Turkish shepherd dog – Kangal is standardized and officially recognized at the national level by the Cynology Federation of Turkey.

Zootechnical was analysed 126 dogs, 77 males and 49 females from two populations. Among other exterior parameters is very important to specify the format of the body for this race. By measuring the height of dog at withers and body length from the shoulder joint (*Articulatio humeri*) to point of buttocks (*Tuber ischi*) we obtained data which was statistically analyzed.

The average height of Kangal males was 72.80 cm, a body length was 81.20. The average height of females was 69.20 cm and 77.60 cm of body length. Index of body size is 111 for males and 112 for females. Differences in height at the withers between males and females was statistically significant ($P < 0.05$), while the differences of the body length between the sexes was not statistically significant ($P > 0.05$).

At the sample of 126 Turkish shepherd dog dogs-kangal was found that the body has a rectangular shape or the length of the body exceeds the height at the withers by 11% in males and 12% in females. This is completely consistent with the general principles of structure shepherd dogs.

Key words: *kangal, standardization, format of the body, shepherd dog.*

4.4 Agroecology and Organic Agriculture

INSPECTION OF THE MACHINES FOR PESTICIDES APPLICATION IN ORDER TO ACHIEVE GLOBALGAP STANDARD IN REPUBLIC OF SRPSKA

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The invention and application of pesticides has led to a real revolution in plant production, and fall into one of the greatest inventions. Proper use of plant protection technology provides the application of both the efficiency and the economical use of pesticides. Modern agriculture involves the production of certain standards in particular from the point of application of pesticides, meaning production of safe food.

The aim of this study was to determine the condition of the machines for the application of pesticides in the Republic of Serbian and to find out do they meet the requirements compulsory by the GlobalGAP standard. With the appropriate equipment, in accordance with the above standards, the examination of pumps, nozzles, pressure gauge, RPM of PTO and visual control were performed.

The results show that only a well-tuned and calibrated device can be eligible for GlobalGAP standards. Another problem is the equipment on the farms that are older than the eighth years, which are in 77.70% cases. This is confirmed by the results and recorded defects in many cases of which the effectiveness of treatment largely depends.

Regular inspection of the machines for pesticide application is required measure in agricultural production because of high use of pesticides.

Key words: *pesticides, controlled applications, standard, safe food.*

TESTING THE EFFICIENCY OF PRE. EM. I POST. EM. HERBICIDES ON ANNUAL WEEDS POPULATION IN CORN CROP

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Among the grains that in Republic of Srpska occupy more than 65% of arable land, maize is of the utmost strategic importance. Taking into account the factors that lead to reducing yields of maize, infestation of weed species is of primary importance. As agricultural practices on production areas are often late and poor, manufacturers are increasingly turning to the application of chemical measures as an alternative solution to the infestation weed problems. Considering the above, as well as that effectiveness of most herbicides are directed at a annual weeds population, the main aim of this study is analyzing the efficiency of pre. em. and post. em. herbicides on annual mono-and dicotyledonous weed species.

Experiment of herbicide efficiency in corn crop was performed in a randomized block design, according to a standard EPPO/OEPP method with elementary plots of 20 m^2 with 4 replications, on the experimental field of the Agricultural Institute of RS, Banja Luka. Applications of five herbicides were performed on two occasions. Pre. em. herbicide S-metalohlor + mezotrion + benoxakor (Camix) was applied at a dose of 3.75 l/ha. Post. em. herbicide S-metalohlor + mezotrion + benoxakor (Camix) + neioni copolymer surfactant: polyether trisiloxan propanol (Etalfix Pro) was applied in two doses of 3.75 l/ha + 0.2 l/ha and double dose, nicosulfuron (Motivell) + dicamba and bentazon (Cambio) + methylated rapeseed and 22% phosphate adjuvant (Dash) was applied at a dose of 0.6 l/ha + 2 l/ha + 0.15 l/ha and diflufenzopir Na-salt and dicamba- salt (Distinct) + methylated rapeseed and 22% phosphate adjuvant (Dash) + nicosulfuron (Motivell) was applied at a dose of 0.2 kg/ha + 0.15 l/ha + 0.6 l/ha.

Determination of presence weed flora in the untreated variant showed a significant infestation of annual species with mean values of 130 and 130.25 plants/m^2 during the first and second evaluation of efficiency, with domination of dicotyledonous weed species. The highest number was recorded for *Amaranthus retroflexus* (25.00 and 24.50 individuals/m^2), *Ambrosia artemisifolia* (35.75 and 38.50 individuals/m^2) and *Veronica arvensis* (20.25 and 22.50 individuals/m^2). Applied herbicides exhibited a high overall efficiency on the present annual weeds (Ke> 90%), and significantly influenced the yield, as in the control yield was 5198 kg/ha, which is significantly lower than the average yield of 8726,5 kg/ha in the treated variants.

Key words: *maize, infestation of annual weeds, pre. em. and post. em. applications*.

COMPARATIVE REVIEW OF FLORA AND VEGETATION MAČVA ROW CROP

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Floristic and phytocoenological study of Mačva weed flora and vegetation in row crops was conducted during the vegetation period of 2005., 2006., 2007, at 49 sites.

Mačva region has quite different soil types, altitude and weed vegetation, and we have it for these reasons into three district: northeastern, central and southwestern Mačva. The results showed that in Mačva region the present 148 species of vascular plants.

The number of plant species in the northeastern region of the 101, and the central Mačva 59, in the southwestern region of 105th.

At present the region Mačva and two associations, namely: Cynodono-Sorghetum halepensae, (Laban 1974., Kojić 1979.) in its typical form and as subassociation calystegiezosum spiae – Vera Milošević 2008., and association Panico-Ambosietum artemisifoliae- Vera Milosevic 2008th year.

Key words: *flora, vegetation, Mačva, row crops, the association.*

INVESTIGATION THE EFFICIENCY AND SELECTIVITY OF SOME HERBICIDES APPLIED IN CAPE GOOSEBERRY (*PHYSALIS PERUVIANA* L.)

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Cape gooseberry is a new vegetable crop for Bulgaria, but with very good perspectives for growing. It is particularly suitable for growing in small scale farms.

The main goal of the present study was to study the possibilities for application the herbicides during vegetation of cape gooseberry. The experiment carried out in the experimental fields of Agricultural University, Plovdiv, Bulgaria, in 2009-2011 with variety Plovdiv. Herbicide Afalon in concentration 100 ml/da and 150 ml/da and herbicide Agility in concentration 85 ml/da and 150 ml/da were applied. The control variant was non treated and non hoeing of the weeds. The herbicides have been applied during the vegetation at the moment of the beginning of but formation. Twenty days latter the species of the weed; weight of the weed plants; number of dead cape gooseberry plants; number, weight diameter and length of fruits were investigated. Productivity and chemical components of the cape gooseberry also were determinated.

The application of the Afalon and Agility decreased the weed plants. The total weeds weight decreased mainly for Agility. The highest percentage of dead plants was established after application of 150 ml/da agility. The investigated herbicides afalon and agility did not present the satisfactory selectivity in cape gooseberry.

Key words: *cape gooseberry, herbicides, fruit, selectivity, yield.*

WEED OF VINEYARD IN BOSNIA AND HERZEGOVINA

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Floristical and phytocoenological research weed flora of vineyards in Bosnia and Herzegovina performed in the period since 2006. for 2008, on 51 locality, as result of this research it was found 133 species of vascular plants covered with: 112 genera, 39 families, 4 class and 2 divisions. The analysis of the biological spectrum showed 5 life forms with predominant presence of terophytes (45.86%), hemicryptophytes (39.85%) and geophytes (9.77%). Phytogeography analysis has been allocated 9 floristic groups, and the most common are: cosmopolitan, Eurasian, Mediterranean, Boreal, adventive and sub-Mediterranean, and together comprise 125 species (93.98%). It is very significant participation of 14 adventive species, and some species have taken invasive character, for example *Ambrosia artemisiifolia* L. Weed flora of vineyard in Bosnia and Herzegovina is rich in flora due to the existence of continental and sub-Mediterranean wine-growing region. Considerable diversity is caused by the specifics of the study area, which are reflected in different climatic, edaphic and orographic characteristics, plant-geography, and different intensities of anthropogenic influences, traditions and the cultivation of grapevine. On the other hand it is important a presence of cosmopolitan and adventive species that are more or less extensively spread, and beside of typical weed and weed-ruderal species in weed flora of vineyards in Bosnia and Herzegovina it was determined a significant number of ruderal and meadow species.

Key words: *weed flora, vineyard, Bosnia and Herzegovina.*

PRODUCTION – TECHNOLOGICAL PROPERTIES OF PINOT NOIR VARIETY CULTIVATED IN CONDITIONS OF ECOLOGICAL PRODUCTION

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Ecological viticulture is getting more prominent in leading grape growing countries around the world. Basic principles of ecological viticulture are: correct selection of varieties and rootstock that are appropriate to specific climate conditions, cultivation of soil, variety agricultural engineering, weed, disease and pest control, all for the purpose of growing high quality grapes for wine production. When selecting varieties for ecological growing, their characteristics and market prospects are very important. This paper shows results of growing Pinot Noir variety in transition stage from conventional to ecological growing at the Experimental estate "Radmilovac" of the Faculty of Agricultute in Belgrade. At the experimental vineyard covering 1 ha, during year 2008, conventional production was carried out with standard technology of cultivation, and it was used as control in analysis. Grape growing according to principles of ecological viticulture was carried out in years 2009 and 2010. The following properties were examined: yield (kg/m^2), bunch number per vine, bunch weight (g), sugar content in the must (%) and total acid content in the must (g/l). Conventional production, in 2008, yielded in average somewhat more (0,74 kg/m^2) compared to period of conversion (0,62 kg/m^2 in 2009 and 0,63 kg/m^2 in 2010). Larger bunch number per vine was in 2008 (26,27 bunches) compared to 2009 (21,35 bunches) and 2010 (17,38 bunches). Average bunch weight in 2008 was 89 g, while in 2009 it was 110,50 g and 119,50 g in 2010. From variance analysis no statistically significant difference was found for grape yield. Although there are differences in bunch number and bunch weight in the examined years, variance analysis again showed that these differences are not statistically significant. Data of examined properties is presented through maps created in GIS framework by inverse distance weight (IDW) method. Based on the results of the study it can be concluded that there was no major deviation in production – technological properties of Pinot Noir variety cultivated in conventional compared to ecological production.

Key words: *ecological viticulture, conventional production, conversion.*

EFFECT OF LOCALITY AND VARIETY ON YIELD OF ECOLOGICAL PRODUCTION OF BUCKWHEAT (*Fagopyrum esculentum*)

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The paper presents the results for grain yield of buckwheat varieties grown in two locations (Pašića Polje and Laholo) in the Municipality of Bijelo Polje, Montenegro. The study was conducted in plot trials, which were performed in a randomized block design with four replications in 2010 year. Buckwheat is grown according to the principles of organic production. The trials included 11 varieties (Novosadjanka, Buckwheat 2, Bamby, Czech, Darja, Prekmurska, Čebelica, France, Buckwheat 1, Spacinska and Godijevo). The type Godijevo used as a standard variety. Statistically significant differences in yield between the cultivars studied and localities were found. At the site, "Pašića Polje" average yield was 511.86 kg ha^{-1}, which was 54.14 kg lower than the standard-type Godijevo. In this experimental field the highest yield was obtained by variety Buckwheat 2 (619.25 kg ha^{-1}) to 53.25 kg higher than the standard variety Godijevo (566.00 kg ha^{-1}). The lowest yield was obtained by a variety Buckwheat (308.75 kg ha^{-1}), which was 257.25 kg lower than standard variety. In this experimental field ("Pašića Polje") achieved significantly lower yield compared to the experimental field "Laholo". At the location "Laholo" average yield was 784.70 kg ha^{-1}, which was 134.30 kg lower than the standard-type Godijevo. In this experimental field the highest yield was obtained by French variety (964.75 kg ha^{-1}), which was 45.75 kg higher than the standard variety Godijevo (919.00 kg ha^{-1}). The lowest yield was obtained by a variety of Buckwheat 1 (455.25 kg ha^{-1}), which was lower for 463.75 kg than standard variety. In this experimental field ("Laholo") achieved significantly higher yields compared with the experimental field "Pašića Polje". It was found significant differences in grain yield between investigated localities. The greatest difference was found in cultivars France, Prekmurska and Godijevo, and the lowest in Buckwheat 1 variety.

Key words: *buckwheat, variety, yield, location, organic production.*

VOLATILE INTERACTION BETWEEN UNDAMAGED PLANTS IN INTERCROPPING SYSTEM AND THEIR EFFECT ON APHIDS*

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Maize is one of the most important crop in Bosnia and Herzegovina. Usually it is grown together with bean in intercropping system. Both components of such system are subject to aphid attack which cause yield reduction by direct feeding on plants and indirect by distribution of plant viruses. Until now we know a great deal about the benefits of intercropping for plants that are grown together, but very little is known about the mechanisms in information exchange by volatiles that influence plant phenotypic plasticity and their acceptance for aphids. Recently it has been shown in field and laboratory experiments that volatile interaction between undamaged plants can affect aphid plant acceptance. It means that plants exposed to the volatiles from neighboring undamaged plants can change their physiological status and became less acceptable to aphids.

Therefore the main aim of this research was to investigate volatile interaction between undamaged maize and bean plants and to explain influence on aphids feeding on maize. For this purpose aphid settling test and olfactory test was done with Rhopalosiphum padi aphids. Results obtainned from this experiment shows that exposure to the volatiles from one plant species may affect physiological activity of receiving plants of another species causing changes in their volatile profile reduceding thier acceptance by aphids (Tukey test $p = 0.0004$). In other words maize plants exposed to bean volatiles may change thier volatile profile that has been detected by aphid R. padi (Wilcoxon test $p = 0.030$ and $p = 0.026$). However volatile mixure may influence searching behavior of R.padi indicating olfactory preferances towards maize monoculture (Wilcoxon test $p = 0.042$). One of the main advantages of such cultural pest management in plant protection lies in the relatively low investments in defense that do not have any negative environmental impact.

Key words: *changes in volatile profile, plant-insect interaction, aphid plant acceptance.*

*This research has been done under framework of project "Volatile interaction between undamaged maize and bean plants and their influence on aphids" which was financed by Ministery of Science and Technology and coordinated by University of Banja Luka Genetic Resource Institute.

CADMIUM SPECIATION ASSESSMENT IN SALINISED ENVIRONMENTAL CONDITIONS

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Increasing of topsoils salinity and trace elements content over inappropriate land management practices (fertirrigation, soil amendments application) represent some of the most widespread threats to food safety and security in modern agriculture. Phytodeposition, as the most important entry pathway for biotoxic and nonessential trace element cadmium (Cd) into the human foodstuffs, corresponds positively with rhizosphere salinity. By chemical speciation computational approach (Visual MINTEQ) was evaluated the biogeochemistry of Cd-contaminated (1μM) solution with different levels (low-high) some of the most abundant naturally-occurring salt minerals (Na^+15-150, Cl^- 12-90 and SO_4^{2-} 1.5-30 mM) in a wide pH (3.5-9.5) range and low presence of dissolved organic C (1 mg/L). According to the modelling results, concentration of free Cd^{2+} predominated in most of tested pH range under low salinity, whereas in medium to high salinity environments prevailed concentrations of Cd-Cl- and Cd-SO_4-complexed pool. The NICA-Donnan modelling confirmed the importance of Cd-organically-complexed only under higher pHs (>8.0) and low salinity conditions. These results confirm that as a consequence of diminished dissolved organic pool under excessive salinity (e.g. naturally salt-affected soils, waters used in irrigated agriculture) Cd biogeochemistry in the rhizosphere can be affected in a way that would enhance Cd mobility and thus phytoextraction by food crops.

Key words: *rhizosphere salinity, trace elements, geochemical modelling.*

CONTENTS OF NICKEL, ZINC, COPPER AND LEAD IN THE AGRICULTURAL SOILS OF THE PLAINS IN THE NORTHWESTERN PART OF THE REPUBLIC OF SRPSKA

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This paper presents the results and methodology of a research conducted on the agricultural soils of the plains in the northwest of the Republic of Srpska, with the aim to determine the extent of heavy metals contamination: nickel (Ni), zinc (Zn), copper (Cu), and lead (Pb). The research included 140 soil samples from 14 sites, where the soil samples were taken at 5 locations, from two layers (depths): arable (0-25 cm), and subarable (25-50 cm). The total contents of the metals were determined by a method of atomic spectrophotometry after acid digestion (HNO_3+H_2O_2). Organic matter content, CEC and pH were determined by standard agrochemical methods. The total contents of nickel in 78.5% of the examined soil samples were higher than the maximum allowed in the unpolluted soils (50 mg/kg). In 22.86% of the analyzed samples the content of zinc was determined to be higher than the maximum allowed in the unpolluted soils (100 mg/kg), whereas the content of copper and lead was higher than the allowed maximum in a small number of samples. Acidic soil reaction (pH<5.5) which increases bioavailability of metals, was determined in 38.6% of the examined samples. The higher degree of a correlation between the total content of the certain metals (Cu and Ni, Cu and Zn) was thus determined, pointing to their common origin in the examined area. The average contents of the examined metals of different layers (depths) are slightly different, and with the determined higher concentrations of Ni and Cu in the sub arable layer indicating the dominance of natural, geochemical sources of these metals in the very soils. Territorial distribution of samples with high content of Ni and Zn corresponds to geological substrates, which include the minerals-natural carriers of Ni and Zn. This also indicates the probable geochemical origin of these elements in the examined soils. High content of the metals and acid soil reaction indicate the necessity of continuing with the investigation in order to determine the risk of increased transfer of heavy metals from soil to growing cultures.

Key words: *heavy metals, soil, total content of metals*.

EFFECT OF FEEDING MYCOTOXIN-CONTAMINATED TRITICALE FOR HEALTH, GROWTH AND PRODUCTION PROPERTIES OF LABORATORY RATS

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The aim of this project was to test the effects of low levels of mycotoxins and naturally moldy feed in the experimental compound feed. The focus of observation was monitoring the health of experimental animals and their production indicators. The ration balancer mycotoxins were included as verification of nutritional method of protection during this feeding contaminated food. Feed mixtures were mixed with naturally contaminated triticale. Three final compounds were mixed on mycotoxin Zearalenone first contained 65 µg/kg and Vomitotoxin 411 µg/kg (TM 0), the second contained a compound Zearalenone 292 µg/kg and Vomitotoxin 856 µg/kg (TM 50) and the third contained a compound Zearalenone 726 µg/kg and Vomitotoxin 986 µg/kg (TM 100). For this compound feed was created 6 and the final mixture to 3 with no added adsorbent and 3 with the addition of the adsorbent "Mykosorb" at a dose 3g/kg compound. During this experiment, the experiment was monitored by consumption of feed and increases weight of rats. Additions balancer groups were compared against groups without adsorbent. Best results overall gain from this study was reached in triticale 0 (total increase amounted to 248.99 ± 33,24 g) followed by a group of TM 50 + adsorbent. The total increase during an attempt in this group was 242,41 ± 29,78 g lowest total increase (218.44 ± 12,82 g) was recorded in a group of Triticale 0 + V. Statistically significant difference was confirmed in weight gains of groups fed a mixture of TM 0 and TM 0 + Adsorbent, where the group fed triticale 0 reached an average of 31.12 grams per individual. In the remaining groups as TM 50+Adsorbent and TM 100+Adsorbent was not statistically significant difference in weight increments. Also been demonstrated statistically significant difference between the groups fed mycotoxin-containing mixtures and mixtures of enriched adsorbent. For further inquiries would be necessary to repeat the experiment whether the difference in weight of groups fed TM 0 and TM 0+Adsorbent just a coincidence or low levels of mycotoxins can affect the amount of increment..

Key words: *laboratory rats, Zerealon, Vomitotoxin (DON), adsorbent.*

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ECOLOGICAL APPRAISAL FOR THE CONDITION OF THE VELEKA RIVER, BULGARIA

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Ecological monitoring of water of the Veleka River was performed using macrozoobenthos, freshwater fishes and their parasites as a bioindicators. The Veleka River is one of the biggest rivers in the Black Sea Water Basin. The analysis was made in the region after the town of Akhtopol (only 4 km south of Akhtopol and at the very northern end of the village of Sinemorets) in the last part of the river. For an ecological evaluation of the situation of the analyzed freshwater ecosystems, principal biotic indexes were fixed. The analysis of the dominant structure of the found taxons was presented to the level of the component communities. These researches would allow making a characterization of the situation and a prognostication of the changes in the studied freshwater biocenoses under the influence of the anthropogenic effects (tourism, constructions, motor boats, logging, poaching, etc.). The researches were carried out in the following three seasons (spring, summer and autumn). During 2009 and 2010, 30 samples of water and sediments, 229 specimens of macrozoobenthos and 97 specimens of freshwater fishes were examined with standard techniques. The water ecosystem of the Veleka are rich in flora and fauna, with more than 30 species of freshwater fish being present, the most frequent one being the chub (*Squalius cephalus* (Linnaeus, 1758)). Five endangered animal species inhabit the river, as well as important regional plants. Nine species (97 specimens) of fishes were examined for parasites. *Rutilus frisii* and *Chalcalburnus chalcoides* are protected species. Six species of examined fishes (*Sq. cephalus*, *C. gibelio*, *C. carpio*, *R. amarus*, *Alb. bipunctatus*) were without parasites. In three species of fishes (*R. frisii*,*V. tenella*, *Ch. chalcoides*) three species of parasites (*P. cuticola* (13.3%; 0%; %)), *C. fennica* (13.3%; 60.0%; 0%), *E. excisus* (3.8%; 0%; 10%)) were fixed. Examined water ecosystem was with decreasing biodiversity of fish and fish parasites. These researches would allow making recommendations for preservation of the biodiversity, to plan possibilities for preservation of the natural water resources in connection with the total decreasing of the water resources, transborder impact, etc.

Key words: *biodiversity, bioindication, freshwater fish parasites, Veleka River, South Bulgaria.*

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4.5 Agricultural Economics and Rural development

SOLUTIONS FOR DESTINATION MANAGEMENT ON AGRI-TOURISM FARM

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Farm tourism can be an alternative to agricultural jobs in rural communities with real agri-tourism potential. To improve destination management, we need to implement a type of management based on knowledge management. A second type of management that is a must in farm tourism is the integrated management of agri-tourism destination quality based on a code of good practices in the integrated management of quality. In order to improve agri-tourism management quality, we need to apply best management practices, i.e. 15 basic principles that contribute to the improvement of farm tourism management. These three types of management, if implemented on any agri-tourism farm, can contribute to the improvement of destination management.

Key words: *management, agri-tourism farm, solutions, improvement*.

ORGANIC PRODUCTION IN THE FUTURE EU COMMON AGRICULTURAL POLICY (2014-2020)

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In the coming period from 2014 to 2020, more than 386 billion euros will be allocated for agriculture and rural development in the EU. The Common Agricultural Policy will be based on further development of research and innovations, the production of ecological products, ensuring food safety and creating employment. Unlike the present situation there will be some key budget principles. For the first time, the new EU budget is proposing separate funds for agricultural research. This will finance consortiums and joint ventures between laboratories and research institutes, as well as farmers and professional organisations, and professional organisation and consulting services.

By means of direct payments, organic production will become the focus of the future Common Agricultural Policy. Thirty percent (30%) of direct payments, i.e. 16.5 billion euros per year will be allocated for „greening", e.g. for crop diversification or the protection of permanent green areas. The ″greening″ component in the Commission's draft, i.e. the measures defined by the term ″greening″, are a set of regulations which have been known for years in organic production. These regulations will come into force in 2014 as the best way to stimulate further popularization of organic production and the practices already adopted by organic farmers. The new Common Agricultural Policy provides for the support to young farmers and encourages a more dynamic participation of young farmers and new entrants to agri-business. In that respect, it provides for tax reductions for them, and simplified and more flexible procedures, until they adapt to the market. Innovations, organic farming and the young, as the three cornerstones of the future EU Common Agricultural Policy will also be the field of activity of Serbian agriculture which has recognized organic production as one of the top priorities in the future strategy for agriculture and rural development.

Key words: *organic production, Common Agricultural Policy, European Union, Serbia.*

THE SUSTAINABLE DEVELOPMENT OF THE RURAL MUNICIPALITIES IN BULGARIA AND THE OPPORTUNITIES TO BECOME A TOURIST DESTINATION

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The purpose of this article is based on analysis of existing practices, to assess the prospects for tourism development and the formation of tourist destinations in rural communities.

Sustainable destination management is crucial for tourism development, especially through effective spatial planning and land use control through construction and investment decisions on infrastructure services.

Firstly, the definition of tourist destination is given and outlined the major characteristics, in order to put into practice the task. Secondly, a review of the status, the role and importance of tourism from his position factor for sustainable rural development in Bulgaria are made. Based on empirical data collected in the third place are outlined the main problems facing entrepreneurs engaged in tourism business in rural communities and assessed the prospects for development.

Key words: *Rural municipality, touristt destination, sustainable development, planning, alternative employment*.

TRENDS IN PRODUCTION AND PROCESSING OF MEAT IN THE REPUBLIC OF SRPSKA

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One of the strategic objectives of economic policy of each country is to improve food production, in order to attain the higher level of self-sufficiency in food needs. On this basis, it follows that meat production is a very important resource for food production, so that production is given adequate attention both legal and institutional. In the RS, livestock, especially cattle and sheep, have a long tradition. The potential for the development of animal husbandry is a major, taking into account the available land capacity. Research in this paper includes the analysis of meat and meat products in the RS for the period 2006-2010. Also, the collection of livestock has been monitored, the installed annual capacities for meat processing, their degree of utilization, as well as import and export of meat and meat products.

Key words: *livestock production, meat industry, trends*.

IDENTIFICATION AND ANALYSIS POTENTIAL OF REGIONAL CHARACTERISTIC NON-FOOD PRODUCTS IN RURAL REGIONS OF SERBIA

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Rural development has been in the focus of many researches nowadays. As industrial development in last decades experienced more than flywheel, with all its advantages and disadvantages, today we are witnesses of returning to the old values. This research has a focus on old handcrafts and non-food products as a part of rural heritage in Serbia. Through methodology and statistical data processing, products were selected and the identification of characteristic non-food and handcraft products was made and the analysis of potentials of the product was performed. The methodology for data collection was developed defining the number and the structure of the examinees in the target groups on the field, the instructions for conduction of the questionnaire and the instruction for data processing. Based on obtained results the conclusions concerning identification of the products and the selection of the most important products were drawn. The results from the field were directed to identification of most frequent and most attractive products. Traditional and regional products and craft markets were selected, described and included in the analysis emphasizing the products which are the best known, the most important and with the highest potential for rural development. The most important non-food and handcraft products in Serbia from collected data on the field are: national handcraft, natural stone, broom production handcraft, textile production handcraft, traditional rug from Pirot and pottery handcraft. Non-food products and handcrafts are unavoidable part of every rural community, and have significant influence on development of rural touristic offer. The most influential problems occur because the lack of organized production and distribution channels. Also problems with all handcraft products are extinction of products as well as extinction of craftsman.

Key words: *Rural region, non-food products, handcrafts*.

CONDITIONS AND PROBLEMS OF HYGIENE AND MANUFACTURING PRACTICE IN PRODUCTION OF TRADITIONAL AND REGIONAL PRODUCTS OF PLANT ORGIN ON FARMS IN SERBIA

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Good hygiene and manufacturing practice are one of the first demands that have to be fulfilled by food producers. For small producers, farms and households involved in production and marketing of traditional and regional products, need to fulfill this demand in accordance with upcoming regulations may be one of the obstacles to qualify for commercialization of these products which are, without any doubt, one of the flywheels of diversification of rural devlopmentWith the aim to find out the facts concerning the weaknesses which have to be overridden in order to harmonize ther operatins with contemporary demands of good hygiene and manufacturing practice the surway concerning this issue was conducted among targeted producers group.

Selected small producers, farms and households involved in the production of key regional products were surveyed regarding the existing technical and personnel conditions in the production of traditional and regional food products of plant origin. The survey has covered the following areas: status of the facility, knowledge of the principles of good hygiene and manufacturing practices, applied processes and production. The survey covered 63 producers of typical food products from plant (fruit and vegetable) origin. Based on statistical analysis of the examined producers of traditional products of plant origin in terms of condition of facilities, we can conclude the need for investment of higher value or a small investment for renovation of facilities and reconstructions. Investment in small cooling storage capacities related to production is needed too. According to results obtained on the basic of research conducted among small producers most producers have clear recognition of need for permanent hygiene maintenance, but in recorded cases where hygiene is not part of daily activities knowledge of producers has to be upgraded. It can be concluded that producers do not have relevant knowledge to distinguish high quality raw materials neither from the aspect of safety nor from the aspect of technological and sensory properties. Producers also do not have relevant knowledge and right attitudes relating contemporary methods for food safety management based on complete traceability and permanent record keeping practice.

Key words: *tradicional and regional typical plant products, problems of hygiene and GMP.*

POLICY MEASURES FOR DEVELOPMENT OF RURAL ENTREPRENEURSHIP: EN EXAMPLE OF EU FINANCIAL SUPPORT FOR LOCAL INFRASTRUCTURAL INVESTMENTS IN POLAND

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Implementing the objective of convergence, the European Union actively participates in the economic development process of individual countries and regions. This participation is expressed in the formation of the principles of the structural and regional policy, as well as the cohesion policy, which cover the offer of a wide range of instruments to support the development of business activity. The European Union policy in business activity development, particularly that of small and medium-sized enterprises, is undergoing a certain evolution. The assumed solutions drive towards extending the influence period of public funds. The direct financial instruments of support are diversified in order to limit the funds intended for grants for ventures, which in turn allows an increase in the involvement of financial engineering instruments. Furthermore, significant funds are designated for indirect support instruments associated with the creation of business environment. They include the broadly-understood technical and social infrastructure, covering the infrastructure of local significance, the development of which continues to be highly important to the competitiveness of enterprises located within the rural areas of Poland. The disproportions between rural and urban areas in infrastructural equipment are still present, even growing.

Due to the above, this study aimed to define the scope of instruments used by the policy oriented towards the support of business activity development and to create a classification of the said instruments according to their mode of influence. The created classification also included infrastructure as one of the main factors in business activity development. Furthermore, the relationships between communal infrastructural investments and the changes in the number of business entities were subjected to evaluation. This approach aimed to answer the question of whether the distribution of public funds planned for communal investments affects the equalisation of the conditions of competition in both the rural-urban system and within rural areas. The implementation of the said objectives also included the following research methods: studies of professional literature, descriptive analysis, comparative analysis and correlation analysis. The data of the Central Statistical Office, Bank of Regional Data, were used as empirical material. The research was conducted for the period 2006-2010.

The conducted research indicates that the support for infrastructural development will not stop the process of the growing difference between rural and urban areas in terms of economic development. However, the subsidisation of the infrastructural investments with Union funds somewhat affects the levelling of the economic development differences among rural communes resulting from the changes occurring in the non-agricultural sectors of the economy. Utilisation of EU funds has led to a higher growth of the number of business entities, as well as own budget revenues. The infrastructural investments implemented within the scope of RDP 2007-2013 measure "Basic services for the economy and rural population" created a better business environment for approximately 5 million inhabitants of rural communes. Such situation leads to the conclusion that financial support for communal infrastructural investment is very effective measure of business development.

Key-words: *Entrepreneurship, Small and Medium Enterprises, EU policy measures, Infrastructural ivestments, Public support, Rural economic development*

THE AGRI-FOOD SECTOR IN POLAND – AN ANALYSIS AND ASSESSMENT OF THE CAP RESULTS IN THE YEARS 2000-2010

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Explaining the main reasons for interventionism in the world's agriculture, J.E. Stiglitz points to a high level of risk and ineffectiveness in preventing this risk. This results from variable weather conditions, the lack of sufficient information and the underdevelopment of agribusiness structures. Interventionism is also justified by the existence of public goods with which the market is unable to deal due to its imperfection.

In Poland the proportion of agriculture in generating gross value added decreased from approximately 5% in 1990 to 3.5% in 2010. The value of the food sector production in Poland (approx. EUR 67 billion) amounts to approximately 7% of the value of the food and beverage production in the EU-27. The food sector is one of the most important components in the country's general economic potential. In 2010 the value of exports in this sector exceeded EUR 11 billion (i.e. approximately ¼ of the production value) membership of the EU changed the conditions of the food economy's functioning. Agriculture and rural areas received financial support within the CAP in the amount of approximately EUR 30 billion. The possibility of benefitting from the direct payment system (used by approximately 1.4 million farmers) ensured an increase in income by 40% and an improvement in living conditions in rural areas. CAP instruments made it possible to accelerate agricultural farms' modernisation processes (nearly 300 thousand investment projects) and enterprises (approximately 3.5 thousand projects), to increase their competitiveness, and work and production safety. Structural funds contributed to the diversification of production, and an improvement in the technical infrastructure supply.

The study will present a short analysis of the production and economic situation of the agri-food sector in Poland in the years 2000-2010. The assumptions of state intervention policy will be described, together with a presentation of some areas of the market's fallibility and their influence on the effectiveness. The study will also discuss the results of implementing CAP policy in agriculture, the food industry and rural areas, after Poland's accession to the EU.

Key-words: *agri-food sector, food industry, rural development program, common agricultural policy, intervention policy, public support, market's failure*.

EU IPA FUND - AN OPPORTUNITY TO DEVELOPMENT OF AGRO - TOURISM IN BRČKO DISTRICT

Maksimović A.

The European Union in different ways and through the structural funds helps developing countries to west Balkan. One of the priority measures under IPA Cros-border coopertion (CBC) (cross border) is the development of tourism. However, the basic problem is how and in what way can a person access and become a user of one of these help programs? Cross-border projects shall include, require regional cooperation and financial resources in the project preparation. Trained personnel are needed for this job ...

The purpose of this paper is to draw attention to the possibility of a joint promotion of agro-tourism potential region of Bosnia-ENG-ESP, and a joint approach by the EU funds. The aim is to link the three countries in a single unit. When a tourist boarding the cruise ship, for example in Vienna, sees on his mobile phone the tourist cadastre region of CRO-BiH-SRB (Posavina, Srem region, Sirmium) and already knows and has the information that, for example, in Ilok he will be able to drink good wine, to eat *Mangulica* meat in Sremska Mitrovica, drink good brandy (*rakija*) in Brcko, etc. Along the way, if a person gets to see the various additional tourist facilities in the region, is greeted properly and stays in town for a couple of days, that means that we have achieved something good in the tourist offer that we have made. Then we will finally have the financial benefit of our widely acclaimed and various analyses substantiated tourism resources and capacity ....

Key words: *IPA cross-border cooperation (CBC) project, agro-tourism, Brcko*.

DETERMING THE EFFECTIVENESS OF APPLE PRODUCTION USING ANALYTICAL CALCULATION

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Cost determination represents the basis of economical production, or the basis for determining the economic efficiency of the production performance. With the development of methods of organizing, planning and business analysis, cost determination assumes a special importance when it comes to bringing business decisions on farms. The topic of this paper is to show the transformation of their involvement in gross revenue and expenses, starting from basic factors of the production process. The procedure of calculation of the amount and the structure of expenses and their allocation to specific products is a process of calculating (calculation) their cost.

Analytical calculations are one of the methods which provide for the costs and effects of made products and agricultural services. This paper uses the method of analytical calculation, combined with the method of interviewing.

For practical application of the method of analytical calculation in fruit production, we took the example of apple production on a farming area of 2 hectares. The used data represents real data obtained from an *apple producer* from Gradina near Omarska, which is based on the results of apple production in 2009. and the historical data of the cost of raising the same plants, which at the time of analysis were in the ninth year of growth. It was determined that there was total value (revenue) of production of 23.179,50€, compared to the total costs of 12.115,60€. This manufacturer has achieved, with 2 ha of planted apple trees, annual profit of 11.058,70€ . The prime cost of 1 kg of class I apples was 0,19€ /kg, and of class II apples 0,07€ / kg.

Key words: *apple, analytic calculations, profit.*

TWENTY YEARS' DEVELOPMENT OF MACEDONIAN AGRICULTURE (1991-2010)

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The data of Macedonian agricultural development in period from 1991 to 2010 are shown in this paper. Twenty years are not too long period in order to occur changes in overall performances of one state, but it is quite enough period, some serious economical activities to change overall perception of state's economics situation.

Agricultural production has important contribution for development of overall economy of Republic of Macedonia, considering through relevant indicators as, real value of expanded gross domestic product, expanded export, expanded of yields on capacity units etc, however, important parameters indicate for dissatisfied realization like reducing of basic production capacities, enhanced growth of import in regard to growth of export , specially food.

Key words: *agriculture, Republic of Macedonia, period 1991 – 2010.*

CORRELATION BETWEEN VEGETABLE PRODUCER PRICES AND CROPPED LAND IN THE REPUBILIC OF SRPSKA

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Vegetable crops have a significant place in agricultural production in the Republic of Srpska. In the Republic of Srpska, major crops include potato, pepper, tomato, cabbage and onion. Fluctuation regarding vegetable crops is also considerably influenced by producer prices from the previous year. The prices of agricultural products are one of the factors that determine farmers' status.

Producer prices and cropped land used for vegetable production and their correlation were analyzed in this paper. Vegetable crops that include potato, pepper, tomato, cabbage and onion, which were the major crops in the crop structure from 2006 to 2011, were researched. Regression and correlation analysis as well as descriptive measures (measures of central tendency and variability) and average annual growth rate of the said cultures were applied in the paper.

Based on the adequate indicators obtained through regression and correlation analysis, the impact of prices of selected vegetables on cropped land in the observed period was quantified (whereby cropped land of the current year is coupled with average producer prices from the previous year). One of the goals of regression and correlation analysis is to determine the degree and form of dependence between particular features that are being observed. Analyzed data show high degree of linear connection between producer prices and cropped land as regards pepper and cabbage, whereas in the case of onion no degree of dependence was shown regarding the observed occurrences.

Key words: *producer prices, cropped land, correlation coefficient.*

ECONOMIC ANALYSIS OF FRUIT TREE NURSERIES IN ALBANIA

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Production of healthy and certified nursery trees is one of the primary conditions for an intensive and stable development of fruit tree sector. In the last decade, fruit tree production in Albania has drastically increased, with more than a thousand hectares per year. The nursery production has attempted to follow with the same pace with about 150 nurseries in the country and more than 2 million nursery trees planted and only 9 per cent imported. The purpose of this research, conducted from 2008 - 2009 was to undertake an economic analysis of these nurseries in view of potential subsidies offered by the government.

Thirty-six nurseries were interviewed having quite an intensive production of nursery trees located in Vlora, Fier, Durrës and Tirana regions. Twenty nurseries were specialized, producing only one species of fruit trees, 8 nurseries producing two species and other 8 producing three or four species. The data showed that all the nurseries studied are profitable. On average their net income is 20000 EUR/farm. The ratio between incomes and costs is 1:0.45. Furthermore, farms producing nursery trees of up to two species have better financial indicators than those producing 3 to 4 species. Moreover, the specialised nurseries had lower costs of more than 3 percent for all the categories of nursery trees

Key words: *fruit trees, nursery, profitability, costs.*

CHANGING THE ALBANIAN SUBSIDY POLICY IN THE CONTEXT OF LOW-PROFIT FARMS

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Since 2005, the Government of Albania is providing subsidies for competitive sectors of the agriculture, mostly fruit growing. However, there is a general lack of data regarding farm revenues, profitability and competitiveness and the criteria are not very restrictive in terms of orchard size or capital. The purpose of this research was to study the competitiveness of fruit tree farms. The study was conducted from 2009 – 2011 in Vlora region collecting financial information from 70 fruit tree farms, distributed in different levels of altitude and slopes, both features which has an impact on the choice of crops, cultural practices and market access. The average income of rural families in Vlora region (proxy for the Reproduction Threshold) acted as a reference against which the economic viability of farming systems was evaluated.

In general, despite the farm typology, location and differences in net incomes, the farms under study have low net incomes, were 95 percent are under the reproduction threshold. This is mainly due to their small farm surface and consequently low productivity. Therefore, there is an incapability to accumulate capital and intensify the production, maintaining the extensive type of fruit growing. Under these conditions, 60 per cent of the farmers interviewed are involved in other secondary agricultural activities to increase their sustainability, making these farms more competitive than the specialised ones.

Although the orientation of subsidises to small fruit farms will offer a better guarantee to low-income categories, it will also delay the restructuring of the Albanian agriculture. It may also have a negative effect on the competiveness of the agricultural sector in general, because the lack of readiness to sell the land will make it difficult for the other farms to grow, in order to reach the reproduction threshold and to take advantage of the economics of scale.

In conclusion of the above results, the Government of Albania should set some criteria for the beneficiaries of subsidies, in terms of farm size and capital to be invested. This would require a set of policies to create some attractive alternatives for farmers selling the land.

Key words: *subsidy, competitiveness, agricultural policy, fruit tree farms*.

ROMANIAN BORDEI ‘PIT-HOUSE’: A DIACHRONIC APPROACH

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The Romanian word "bordei" (‘pit-house’) has a debatable, but less obscure than one may think origin. If the main denotations of the Romanian "bordei" are ‘semi- or fully recessed shelter covered with earth or dry vegetation (straw, water reed, sedge)’ and ‘cabin’, additional connotations are ‘small, rudimentary, shabby dwelling’, ‘shabby, neglected, semi-recessed little house’, and the slangy ‘prison’. A pre-historic type of building in the Carpathian area, it was a permanent presence during the Roman and Byzantium periods all over the territory of modern Romania. After World War II, members of different ethnic groups and anti-communist activists were forced to move and live in such dwellings in the Bărăgan Plain (southern Romania). The linguistic evolution of the term "bordei" speaks itself about rural development in Romania

Key words: *pit-house, rural development, Romania*.

4.6 Genetic resources

PRINCIPAL COMPONENT ANALYSIS OF A CANNING DETERMINATE TOMATO COLLECTION IN THE IPGR, SADOVO – BULGARIA

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The success of the tomato breeding program depends largely on the study of an initial material and the maximum involvement in the selection process of all potential productivity, disease resistance and other valuable characteristics, and also depends on the symptoms studied and manifestations of dependence between them.

The study was conducted during the period 2008-2011 at the IPGR, Bulgaria. Objects of study were 37 determinant tomato accessions with oval shaped of the fruit for canning. The collection includes 19 accessions with a foreign origin (Serbia, Israel, Armenia, The Netherlands and USA) and 18 local accessions collected by expeditions in different regions of the country. The mean values and variation range, limited by min and max, were calculated for each of 15 morphological and biochemical traits.

Using of Principal component analysis were identified four factors influencing the total change in mass of the fruit in the studied collection. About dependency model was applied multivariate linear regression analysis. The biggest direct influence on the fruit mass is a factor F2, including the characteristics: plant height, length and shape of the fruit.

Key words: *tomato collection, morphological and economical traits, evaluation, PCA*.

PRESERVATION OF LOCAL GENETIC RESOURCES OF SOME VEGETABLES FROM SOLANACEAE IN BULGARIA

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The preservation and conservation of the plant biodiversity from the cultural and wild flora is a prior activity of the Institute of Plant Genetic Resources, Sadovo. This is the first scientific center in Bulgaria, established 130 years ago, where they were collected and conserved the richest species and varietal diversity from foreign and local germplasm. IPGR is a national coordinator of all activities related to the plant genetic resources.

The rich variety of the vegetable plant resources is a prerequisite for making of right selection of sources and successful selection.

During the periods 2007 – 2009 and 2010 – 2012 within two bilateral projects between IPGR "K. Malkov" - Sadovo and the National Agrobiocenter in the R. Korea the vegetable collections were enriched with local accessions, collected from different parts of Bulgaria.

475 accessions from vegetable cultures, collected from different regions of Bulgaria were an object of exploration – 148 tomatoes and 327 pepper accessions.

They were made analysis of some morphological, phenological and economical characteristics according to the accepted descriptors of (IBPGR, 1982; IPGRI, 1996).

The national collections from tomatoes and peppers were enriched with 475 local accessions.

In these collections they were selected accessions with high content of dry matter, vitamin C, saccharide, acidity and resistance to some important economic diseases.

The examined accessions were multiplied and conserved in the National Genebank – guaranty for preservation of the national richness of the country.

***Key words*: *expedition, collection, evaluation, conservation, tomatoes, pepper*.**

CULTIVATION AND CONSUMPTION VALUE OF PROSO MILLET (*PANICUM MILIACEUM* L.) IN RESEARCHES OF BIOTECHNICAL FACULTY IN LJUBLJANA

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Proso (common) millet (*Panicum miliaceum* L.) used to be a very important cereal in the past, used on the territory of Slovenia for human nutrition and for animal feed. Statistical data for the production of millet in the year 2010 show that millet was sown on less than 200 ha of fields, meaning that it is practically no longer produced on Slovene farms. This also limits the possibility of knowledge transfer between generations of farmers passing the knowledge of agro-technical characteristics and best cultivation practices from one generation to another. Since the potential producers no longer have a tradition of growing millet we have studied the production practices and some agrotechnical characteristics of the autochtonious domestic cultivar of millet 'Sonček' in block field trials at the Biotechnical faculty in Ljubljana. The average yield of grains in the years 2009-2011 showed no statistically significant differences ($p \leq 0.05$) between the three sowing densities of the trial (250, 370 and 500 germinating seeds/m^2); the highest average yield of 2253 kg/ha has been produced at the sowing density of 500 seeds/m^2, which is 522 kg/ha more than the yield obtained from the lowest sowing density of 250 seeds/m^2 (1731 kg/ha). We can advise to the farmers that the optimum sowing time for millet in Slovenia is least from the beginning of June till the end of the first decade in July, since the yields obtained from the third sowing term (17. 7. 2009, 20. 7. 2010 and 12. 7. 2011) were statistically lower compared to the yields from first sowing term (3. 6. 2009, 4. 6. 2010, 3. 6. 2011) and the second sowing term (1. 7. 2009, 5. 7. 2010, 1. 7. 2011). The highest yield of grains (4273 kg/ha) has been recorded in 2011 at the sowing density of 500 germinating seeds/m^2 for the crop of the first sowing term. From the questionnaires completed by 90 potential producers (organic farmers) and 100 potential consumers (patients and medical staff in the general practice at the Community health care centre) we could discover that the possibilities for the reintroduction of millet and increased production in the future first depend on the demand for its products and popularity of millet dishes, for example proso milk porridge. With lectures, workshops, presentations and degustation of millet dishes we should try and show the consumers the connection and possible links between the tradition and a new healthy life style. We believe that the reintroduction of millet on to our fields and into our diet could also contribute to preserve the settlement of rural areas, keep alive ethnological tradition, enrich the offer of traditional foods at local markets and enable higher self-sufficiency with domestic products.

Key words: *proso (common) millet, Panicum miliaceum, yield, questionnaire, tradition, autochtonious cultivar 'Sonček', Slovenia.*

THE NATIONAL INFORMATION SHARING MECHANISM ON PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE IN SERBIA

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The project "Support to the National Programme for Plant Genetic Resources for Food and Agriculture in Serbia" is funded by the United Nations Food and Agriculture Organization (UN FAO) and implemented by the Ministry of Agriculture, Trade, Forestry and Water Management of Serbia, Directorate for National Reference Laboratories – Plant Gene Bank.

The immediate objectives are: to assess the needs and opportunities for conservation and sustainable use plant genetic resources for food and agriculture (PGRFA) in Serbia, to draft the National Programme for PGRFA, to strengthen institutional capacities for the conservation and sustainable use of PGRFA, to develop public and political awareness of the PGRFA importance, to improve national collection's infrastructure and to provide Plant Gene Bank equipment in order to ensure long term preservation of a national PGRFA collection.

One of the most important goals of this project is to establish a National information sharing mechanism for PGRFA, necessary for implementation of Global Plan of Action (GPA), which will be available on the Internet. This Mechanism will assist in planning, setting priorities and mobilizing financial resources in order to support the National PGRFA Programme, improving the quality of information on the PGRFA status in the country, accessing and exchange information on BGRHP at national, regional and global levels, and increasing the capacity of the country to meet international obligations.

Through the support to development of National programme and system in Serbia for the conservation and sustainable use of plant genetic resources for food and agriculture, the project will contribute to the national development, food security, sustainable agriculture and conservation of agrobiodiversity, through the efficient use of national plant genetic resources in plant breeding and seed production.

Key words: *National mechanism, sharing of information, plant genetic resources*.

DIVERSITY OF *HYPERICUM PERFORATUM* L. IN KORABI MOUNTAIN AND LURA NATIONAL PARK IN ALBANIA

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Hypericum perforatum L. (St. John's wort) is an endagerend species growing wild in Albania with interesting pharmacological and biological properties.

It is one of the most important medicinal plants, used as a medical herb and also represent an important asset to the livelihoods of many people in Albania.

In order to evaluate the diversity of different population of *Hypericum perforatum* L. based on morphological and biometric data, 10 population were collected from differrent area of Korabi Mountain and Lura National Park in Albania.

Using R to study the variability of *Hypericum perforatum* L., provide a very interesting example for further morphologic and biometric research on less known MAP resources of the European Flora and Protect Biodiversity.

Key words: *Hypericum perforatum*, *Morpho-biometric data, Statistical Analysis*.

HERBE YIELD AND CONTENT OF ESSENTIAL OIL OF PANNONIAN THYME (Thymus panonicus All. Lamiaceae) DEPENDING ON THE INVESTIGATED YEAR, GENOTYPE AND SOIL TYPE

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Production of seedlings was carried out in the first week of July in the cold bed. For sowing 1m^2 of bed were used 3 grams of seed. Sowing depth was 0.5 cm. Seedlings was planted in October 2009 in field trials at locations Pančevo (hydromorphic black soil) and Starčevo (chernozem), the model of completely random block method in four replications. Inter-row distance was 50 cm and the distance between plants in row 30 cm. Studied in two genotypes of the Pannonian thyme: smooth leaf and a list of which is covered with hairs.

Thyme was harvested twice during the growing season. The first harvesting was in the early flowering stage in May, second harvesting was in the first decade of September. Harvesting height was 7-10 cm above ground. Above-ground biomass is dried in a dryer at a temperature up to 40^{0}C. The essential oil is destilled from dried plant material thyme, distilled with water vapor in the apparatus Clevenger-type, according to the regulation Ph. Jug. IV, procedure 1. The results were analyzed using the model analysis of variance for factorial experiments.

Based on the analysis of variance showed that there were highly significant ($p \geq 1\%$) differences in yield of herb thyme, depending on the year, the soil type and tested genotypes. The highest yield of herb thyme Pannonian was achieved with the genotype with the list covered with hair in 2011 on the soil type chernozem. Very significantly higher ($p \geq 1\%$) content of essential thyme oil was obtained in 2011 compared to 2010. For all other examined factors were no significant differences in the content of essential oil.

Key words: *Pannonian thyme, herb, essential oil, genotype, year, type of soil.*

VALUE CHAIN ANALYSIS OF MEDICINAL PLANTS FROM VLORA REGION IN SOUTHERNWEST OF ALBANIA

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Albania is considered as a developing country where 46.3% of population (Instat 2011), live in rural areas. In these areas the pressure of population on natural resources is high causing their degradation and natural habitat loss. The challenge of earning their living has forced the people to work also with medicinal plants collection as a potential source for providing money. Albania is distinguished for a rich biodiversity with about 3200 plant species (30% of European flora), where 300 plant species belongs to medicinal plants. The Vlora region is one of the most riches with medicinal plants. During last year Albania has exported 10501 tonne of medicinal plants, while 971 tonne were collected from Vlora region. The aim of the study was the value chain analysis of medicinal plants from Vlora region based on data provided from face to face interviews with all stakeholders of this chain. Based on the SWOT analysis we identified that value chain analysis needs to take steps for improvement in order to add the value of such products. The present situation showed that medicinal plants from Vlora region are subjected to primary processing and then are exported in Germany, Italy, Spain and France and sold with low prices. The value chain analysis of medicinal plant in this region showed that this chain is very long affecting the cash reduction for primary collectors. On the other hand a long value chain will affect the transparency decline. The lack of relationships among exporters and primary collectors cause obstacles with plant supply and their price. The vertical integration of all actors in this chain is the core for a successful business in medicinal plant trading. All the stakeholders have lack of information in prices of medicinal plants, thus the primary collectors provide the lowest cash incomes in the medicinal plants chain. Although the medicinal plants are wild they must meet standards of ISO and HACCP in order to find easily the international market with optimal benefits.

Key words: *value chain, medicinal plants, Vlora, benefits*.

GEOGRAFIC DISTRIBUTION OF PRUNUS SPECIES IN ALABANIA

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A study on geographic distribution of fruit trees species and especially on distribution and diversity of *Prunus species* in Albania was carried out using collection data from nine districts of Albania. The geo-referenced observations result in a total of 515 collection sites, including all 7 currently known *Prunus* species. A grid of 25 x 25 km cells was used to asses' diversity and richness of Prunus species. To include all species at least once, 23 grid cells were selected.

Prunus species were distributed in all nine districts, but GIS analysis shows that high species richness occurs in central part of Albania: Berat, Elbasan and Tirana districts. For all grid cells selected the summarized results on diversity and estimators were: Richness (S) 7, Margalef index 1,147; Menhinick 0,512; Shannon 1,439; Simpson 0,707, Brillouin 1,376.

Combination of species occurrence data with climatic data delimitates the potential distribution of each *Prunus* species and allows the modeling of potential richness at the district level. Based on these modeled richness maps, Berat and Elbasan appears to be the districts with the highest potential *Prunus* diversity. In these districts it seems to be grid cells with the most potential priority areas for in situ conservation of *Prunus* species. GIS analysis shows new alleles were contributed by additional cells: two alleles from Dibra and one other allele from Shkodra district.

Key words: *GIS; geographic information system; species richness, diversity, Prunus species*.

OLD APPLE VARIETIES IN CENTRAL PART OF MONTENERGO

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During two years, 2008-2009, old apple varieties were investigated 'in situ' in the Central part of Montenegro. The most important biological and pomological properties of 15 old apple varieties from this area were presented in the paper. The aim of the paper was to point out which of old varieties due to their biological and economic properties are of interest for the production on larger scale.

In the observed apple varieties maturation happen during the mid of July and the mid of October. The biggest fruit size was in Ilinjača (167.50 g), Dunjka (170.15 g) and Moračka krstovača krupna (182.34 g). Majority of varieties had round-flatted and round-conical shape. Green, green-yellow and yellow was the main fruit skin colors in observed varieties, while additional color (red or pink) was present in different percentage.

As good material for processing industry, the varieties with high content of soluble matters in fruit, can be recommended: Aleksandrija (16.0 %), Rebrača (15.5 %), Jolovača (14.6 %) and Dunjka (14.5%).

***Key words*: *apple, old varieties, properties, Central Montenegro*.**

INITIAL GENETIC CHARACTERIZATION OF RYE ACCESSIONS (*Secale cereale* L.) IN GENE BANK OF REPUBLIC OF SRPSKA*

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The Gene Bank of the Republic of Srpska (the Genetic Resources Institute of the University of Banjaluka) was established in 2009. The characterization of the accessions by means of genetic markers started in 2010. This paper shows the initial results of the genetic characterization of 5 rye accessions. These results are the starting material for the evaluation in the Plant Gene Bank of the Republic of Srpska for the purpose of introducing variability and interrelatedness of genotypes.

The analysis of the accessions was performed by means of RAPD markers (Randomly Amplified Polymorphic DNA). Decanucleotide primers OPA01, OPA02 and OPA04 were used. The isolated and quantified DNA was used for polymerase chain reaction, while the visualization of amplified DNA fragments (loci) was done by agarose electrophoresis with ethidium bromide added. The obtained electrophoregrams were used to determine the presence or absence of amplified loci.

The number of amplified loci obtained by cyclic polymerase reaction was 13. Of the 13 amplified loci 7 were polymorphic (a total of 54%). The most distinct fragments of DNA were amplified by primer OPA04, while the most informative primer was OPA02 indicating a degree of polymorphism of 67%. *Genetic similarity coefficients* (according to Jaccard) ranged from 0.68 for the accession 3 (cultivar Nanid) to 0.73 for the accession 4 (name unknown) and the accession 5 (name unknown). The similarity coefficient between the accession 4 and accession 5 was 1, which means that these two accessions have identical allelic profiles for the analyzed loci, in other words, there is no *expression polymorphism* between the accession 4 and the accession 5. The accessions 1 (cultivar Albedo), 2 (cultivar Selgo) and 3 (cultivar Nanid) have unique genotypes for the analyzed loci and they differ from duplicated accessions as well as from each other. Genetically the most similar are cultivar Albedo and duplicated accessions, while cultivar Nanid is the least similar with the rest of the analyzed accessions.

The genetic characterization of the rye collection have to he broaden with more primers for all rye accessions in order to eliminate the duplicates in the collection.

Key words: *RAPD markers, duplicated accessions, genetic similarity.*

* The Plant Gene Bank of the Republic of Srpska is located in the Genetic Resources Institute of the University of Banjaluka, which is coordinating institution for implementation of the Programme for Conservation of Plant Genetic Resources in Republic of Srpska (Official Gazette of Republic of Srpska 59/08).

COMPARATIVE ANALYSIS OF MORPHOLOGICAL CHARACTERISTICS IN DEFINING THE LEVEL OF DOMESTICATION OF CORNELIAN CHERRY (CORNUS MAS L.) IN THE AREA OF THE DRVAR VALLEY

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In the area of Drvar Valley there is significant diversity of Cornelian cherry populations which is traditionally used for food and medicinal purposes. In the area Cornelian cherry is found in the form of wild populations and often also in the form of individual trees in the gardens and managed (cultivated) populations of mostly unknown origin. The present cultivated populations are managed in traditional manner and are intensively used. The research is conducted with goal to compare those two kinds of populations, i.e. the natural (wild) and the cultivated ones, in order to establish the level of domestication of the cultivated populations so that the existing genetic material could be appropriately assessed and used in further work for selection and growing.

During the research studied were 90 trees from six populations of the Cornelian cherry in the area of the Drvar Valley. Three of those six populations were wild, with no human influence, and three were cultivated populations. Those populations were compared according to method described by Casas and associates (2007). Measured were morphological characteristics of plants which were then processed by Principal Components Analysis.

Observed was almost complete separation of the studied two types of populations in characteristics of generative organs, especially dimensions and mass of fruit, and also major similarity in characteristics of vegetative organs without clear separation of the wild and cultivated populations. The comparative analysis indicated that the cultivated populations of Cornelian cherry are domesticated to the large extent.

Cultivated populations of Cornelian cherry in which the improvement of certain characteristics had been observed, such as fruit size or yield, is the material for further selection and process of creating cultivars. Result is also relevant for determination of early domestication processes and detailed understanding of diversity and in-situ conservation of Cornelian cherry. The research should continue in the way that through further work and observations the best genotypes with desirable agronomic traits are extracted from the populations and hence vegetatively propagated and further on selected as cultivars.

Key words: *Cornelian cherry, Cornus mas* L., *domestication, Principal Components Analysis (PCA), morphology, biodiversity*.

MORPHOLOGICAL CHARACTERIZATION OF SERVICE TREE (*SORBUS DOMESTICA* L.) IN BANJALUKA REGION*

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Service Tree (*Sorbus domestica* L.) is a native species of the Western, Central and Southern Europe as well as Southwest Asia. It was identified as an endangered species at the end of last century. Thus, it was put on the list of European priority species for conservation (EUFORGEN, ECPGR). The previous research has shown that the population of the Service Tree in the northwestern part of Bosnia and Herzegovina was significantly reduced. On account of this, this species inventory and collection has been initiated as well as the basic characterization of Service Tree in the territory of Banjaluka region.

The paper presents the results of the analysis of six trees, selectively chosen by the dynamics and extent of fruiting, which are located at altitudes of 264 to 495 m. The following features of the chosen trees were analyzed: trunk circumference, the height and width of the canopy (tree height was measured by altimeter, while canopy width and trunk circumference by tapeline); the number of individual leaflets, the surface area of the individual leaflets in a leaf, the total surface area of a compound leaf (by means of photometric analysis); the weight, size, shape and color of fruit epidermis; the number, weight and size of the seeds in each fruit, and phenological development stages of vegetative and generative organs (by means of phenological observations of the dynamics of the occurrence of certain phenophases).

The height of the chosen trees ranged from 12 to 15.5 m. The average fruit weight of the selected trees ranged from 7.85 g to 10.45 g. The average surface area of a compound leaf ranged from 79.25 cm^2 to 99.87 cm^2. The maximum number of seeds in the mature fruits of the selected trees was 3. The paper presents the analyzed phenophases graphically by means of their dynamics algorithm.

Service Tree population in the studie area is primarily affected by anthropogenic factors. It was found that the selected trees showed satisfactory vegetative activity and a satisfactory potential for generative reproduction. Therefore, the six analzyed trees can be accepted as mother trees for the reestablishment of Service Tree population in the terrirory of Banjaluka region.

Key words: *genetic resources, pomology analysis, the algorithm of the dynamics of phenological phases*.

*The research was conducted under the Programme for Conservation of Plant Genetic Resources in Republic of Srpska.

GENETIC DIVERSITY OF CITRUS GERMPLASM COLLECTION FROM MONTENEGRO AS INFERRED BY MICROSATELLITES

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Thirty two individuals sampled from citrus germplasm collection in Montenegro were analyzed by 10 microsatellite loci in order to assess true cultivar identity and phylogenetic relationships. Genetic diversity of analyzed set was assessed by calculating genetic parameters. A total of 62 alleles were amplified with mean number of alleles per locus of 6.2. The most informative loci were CMS7 (0.704), CT19-02 (0.689), CMS4 (0.654), TAA15 (0.651) and GT03 (0.645) with the average polymorphic information content of 0.511. Observed heterozygosity was calculated for each locus as a measure of marker diversity and varied from 3% (CT02) to 94% (CMS7). Mean observed heterozygosity for all loci was 48% being in a range with the previous researches done. A microsatellite dendrogram was constructed using an unweighted pair group method in order to illustrate genetic relationship among all citruses accessions analyzed. Evaluation of citruses relatedness and assessment of molecular diversity is important for characterization of germplasm, establishment of breeding programs and registration of new cultivars.

Key words: *molecular markers, SSR, cultivar identification, genetic relatedness*.

The research was funded by the Slovenian Research Agency, grant no. P4-0077.

EXPLORATION , CHARACTERIZATION, COLLECTION AND CONSERVATION OF V.VINIFERA L. SSP. SYLVESTRIS GERMOPLASM IN ALBANIA

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In Albania wild grapevines are known as Larushk. During 2009-2010 they are investigated 17 localities with the aim to explore V.Vinifera L. ssp. Sylvestris. The number of spontaneous vines found is very limited and especially threatened by various environmental and anthropogenic factors in Albania. Up to now only 97 plants are found. The evaluation and preservation is very important. The plants found are localized geographically and 38 of them are described using OIV descriptors list. The state of health of plants *in situ* is very good. No fungal diseases were visible. There are taken cuttings from the wild plants with the aim to multiply them and there are planted in field gene bank collection. This ex situ collection could be used to protect the Albanian V. Vinifera L. ssp. Sylvestris populations and it's utilization in breeding programs.

Key words: *Vitis sylvestris, wild plant, evaluation, conservation*

PRESENCE OF CHIMERISM WITHIN OLD ASEXUALLY PROPAGATED GRAPEVINE CULTIVARS FROM BALKANS

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Vegetative propagation assumes non-meiotic recombination as a source of variability and other recombination based mechanisms are responsible for the generation of allelic variations. Chimerism is one of the mechanisms for achieving phenotypic diversity in grapevines representing a mutation in one of the three meristematic cell layers that later differentiate into specific plant tissues, or the reversal of cell layers brings a different layer to the front. Cellular rearrangements may occasionally lead to homogenization of the genotype of the whole plant. This is a possible mechanism for drift of genotypes of clones evolving over time into grapevine cultivars. The chimeric state was established by microsatellite amplification of triallelic genotypes for a single locus and the two-layered nature by the appearance of triallelic profiles in leaf. A total of 138 grapevine cultivars collected in five countries from the Balkan Peninsula were analyzed using 22 microsatellite loci. The presence of three different alleles for a locus, visualized by three peaks, was occasionally observed in some cultivars. Chimerism was detected at five loci (VVMD7, VVMD32, VChr8a, VChr8b and VChr9a). Sixteen cultivars showed the presence of chimerism each at one locus only. Ten out of the 16 chimeric cultivars were sampled from the Serbian germplasm collection (Portugizac SRB, Muškat Ruža SRB, Drenak Crni SRB, Župljanka SRB, Trbljan Beli SRB, Vrban Crveni SRB, Ružica Mirisava SRB, Kratošija SRB, Smederevka SRB and Gročanka SRB). Three were sampled from Macedonia (Crn Valandovski Drenok MAK, Čauš Bel MAK and Končanka); two from Bosnia and Herzegovina (Bena and Surac Plavi) and one from Slovenia (Star Refošk Merče). Three allelic profiles were most frequently observed at locus VVMD7 and were found in 12 different cultivars. These results are interpreted as a consequence of a periclinal chimera meristem structure, although the high frequency of a tri-allelic profile at one locus deserves further study.

Key words: *genotyping, microsatellites, clones, Vitis vinifera* L.

Acknowledgement: The research was funded by the European Commission's Joint Research Project of the Joint Call of the SEE-ERA.NET PLUS, grant No. ERA 155/01 and by the Slovenian Research Agency, grant no. P4-0077.

ASSESSMENT OF GENETIC DIVERSITY IN OPIUM POPPY (PAPAVER SOMNIFERUM L.) BASED ON AGRO-MORPHOLOGICAL CHARACTERS

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The aim of the present study was pre-breeding characterization and identification of the genetic diversity between 48 opium poppy (Papaver somniferum L.) genotypes, based on nine quantitative traits. The germplasm originated from different countries including the landraces and breeding lines from Macedonia. The pattern of morphological variation was evaluated using principal component and cluster analyses. The first three principal components with eigenvalues more than 1 contributed 80.56% of the variability amongst genotypes. Productive traits such as weight of the main capsule, weight of the seed from the main capsule, yield of capsules and seed per plant, seed yield per plant were the most important characters in the first principal component. The evaluated germplasm was grouped into two main clusters using **cluster analysis**. The first cluster comprised three genotypes while the second cluster consists of three subgroups, each containing different number of genotypes. The performed study revealed high variability among the evaluated poppy germplasm. The obtained information could be used in the future breeding programs or genetic studies on opium poppy.

Key words: *poppy, genetic diversity, principal component analysis, cluster analysis, agro-morphological traits*.

CHARACTERIZATION AND UTILIZATION OF RED CLOVER (*TRIFOLIUM PRATENSE* L.) COLLECTION IN NOVI SAD

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Red clover (*Trifolium pratense* L.) is the second most important perennial forage legume in Serbia. According to recent statistical date (Statistical Yearbook 2009-2011) it is cultivated on around 120.000 ha. It is grown alone or mixed with grasses in the hilly and mountainous parts of central Serbia. Nowadays red clover is considered as a very important catch crop and green manure for organic farming and sustainable agriculture around the world. Compared with alfalfa red clover grows better on soils that are somewhat less fertile, more acidic and wetter. The low yields and a shortage of cultivar seed have led to a decline in the area sown to this forage legume in Serbia. However, the advancement of agricultural production and increased livestock production in the country demand a higher contribution of red clover to high quality feed production, which can be done by the introduction of necessary cultural practices into large-scale production and by planting new, higher-yielding varieties of improved quality. To be successful in breeding work, it was important to correctly select breeding targets and methods as well as to gather breeding material with as high genetic variability as possible. Twenty years ago, the Institute of Field and Vegetable Crops began a concentrated effort on the collection of red clover in order to obtain as much genetic variability as possible for the subsequent breeding of this crop. Domestic local populations (early type - medium type) from Serbia and the Republic of Srpska were collected first. More recently, the Institute's red clover collection has been significantly enlarged through international collaborations with the world's leading gene banks and institutes maintaining reference collections. The Institute's red clover collection currently has about 607 red clover accessions. Research of the current Institute's red clover collection has been started on the characterization and evaluation of the most important morphological-biological and agronomic traits in the field conditions.

***Key words*: *red clover (Trifolium pratense* L.*), collection, characterization, utilization, breeding*.

GENETIC VARIATION OF NEW WHEAT LINES

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Common wheat (*Triticum aestivum* L.) is the main culture in the the agriculture production strukture of Albania. Creating appropriate cultivars which are tollerant to high temperatures and dryness in the maturity stage, is particularly important.

For this purpose, in this study, 14 new lines of wheat were studied. The testing was implemented in the Experimental Station at the Agriculture University of Tirana. Field design consisted in a randomized blocks design (RBD) with three replications. Data for various morphological and yield traits were taken and analyzed for plant height (PH), spike length (SL), spikelet's per spike (SS), grain weight per spike (GWS), spike Weight (SW), yield (Y) and days to maturity (DM).

Results showed that L05 is more competitive as compared with other lines part of the study. It has SL (9.2 cm), GWS (2.4 g per spike) and grain yield (7.8 t ha-1).Also this line has short vegetative period about 181 days. Other lines have showed lower values of the production indicators or a longer vegetative period, and therefore, consequently, more damages in the maturity time in specific years. The variance analysis proved the differences between cultivars on extending the period until full maturity and on realized production.

Based on these results, L05 will be presented in the National Seed Institute, in order to implement the oficial testing for the registration in the Varieties Catalogue.

Key words: *randomized block, lines, varietet, abiotic stress, testing.*

BIODIVERSITY AND HEAVY METAL POLLUTIONS IN FRESHWATER ECOSISTEMS IN BORDER AREAS FROM TUNDZHA RIVER, BULGARIA

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The purpose of the carried on analysis has been to investigate the biological variety of the freshwater ecosystems form the Tunzha River and to make an ecological evaluation of their condition. The analyses have been made in the region from the border areas on the river Tunzha, Bulgaria. For an ecological evaluation of the situation of the analyzed freshwater ecosystems, principal biotic indexes have been fixed. The analysis of the dominant structure of the found taxons has been presented to the level of the component communities. These researches would allow to make a characterization of the situation and a prognostication of the changes in the studied freshwater biocenoses under the influence of the anthropogenous effects; to present recommendations for preservation of the genetic fund in them; to plan possibilities for preservation of the natural water resources in connection with the total decreasing of the water resources in Bulgaria and the possibility to use them for drinking water in the nearest future; to plan possibilities to prevent any transborder pollution and the consequences related to it. The studies from could to be used in various monitoring systems for reported on pollution's on the water environment and the organisms, inhabited the anthropogenous ecosystems.

Key words: *biodiversity, bioindication, freshwater fish parasites, Tundzha River, South Bulgaria*.

BOTANICAL GARDEN OF UNIVERSITY OF BANJALUKA*

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The Botanical Garden of the University of Banjaluka is part of the University City complex and occupies 5.3 ha of space. The complex is located along the left bank of the river Vrbas, with the natural terrain altitude of 150 m. It began as the Austro-Hungarian barracks "Vrbas" at the end of the nineteenth century and it was used for military purposes until 2004. After being assigned to the University of Banja Luka in 2004, the area was allocated to the Genetic Resources Institute to make use of it.

The Botanical Garden facilities are divided into three sections. In one section, the setting up of the botanical collections of genetic resources has begun. There is a fruit collection with 18 *Malus* and 13 *Pyrus* accessions and their preliminary characterization also started. The alpinetums were designed for the purpose of the establishing the *ex-situ* collection of some vegetable and medicinal plants. In the middle section, a lake was planned and the establishment of an arboretum collection was initiated on the area covering 1.5 ha. This arboretum collection was primarily established to represent autochthonous woody species with their herbaceous companions from corresponding phytocenoses in the ground floor vegetation. In this phase, there were planted 46 plant species. In the third section, green houses were designed and a building with Gene bank facilities and laboratories was built, as well.

Bosnia and Herzegovina is very rich in flora, but there area only a few arboretums and botanical gardens. The Botanical Garden of the University of Banjaluka as a place for ex-situ plant conservation is of great importance for the conservation of biodiversity as well for scientific research in this field.

Key words: *ex-situ conservation, genetic resources, fruit collection, arboretum.*

* The Botanical Garden of the University of Banjaluka has been supported by the City of Banjaluka since 2004, and by the Ministry of Agriculture, Forestry and Water Management of the Republic of Srpska since 2008.

THE USAGE OF OOCYTES AND EMBRYOS IN ANIMAL GENETIC RESOURCES CONSERVATION *EX SITU* (a review)

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In the last few decades, farm animal genetic diversity has rapidly declined. Therefore, it is in the interest of the international community to conserve the livestock genetics. *In situ* (live animals herds) model of genome conservation is expensive and limited for practical usage. Becouse, *ex situ (ex vivo)* conservation model are developed to cryopreserve animal genetic resources in genome (gene banks) to regenerate a particular population in future. Although significant progress has been made in oocyte and embryo cryopreservation of several domestic species, to date a standardized procedure has not been established. Successful long-term cryopreservation of oocytes and embryos would preserve the genetic material from unexpectedly dead animals and facilitate many assisted reproductive technologies. There are the biological, economical and moral imperative and interest of the international community to conserve the livestock genetics.

Key words: *oocytes, embryos, genetic resources, preservation, ex situ.*

4.7 Field crop production

RESULTS OF THE RESEARCH ON DIFFERENT HYBRIDS OF STANDARD GRAIN QUALITY WHITE KERNEL MAIZE IN 2010 AND 2011

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Due to its agronomic features, chemical composition and technological properties, standard grain quality white kernel maize is becoming increasingly attractive for production and processing. Thanks to the intensification of organic production this type of maize is gaining in importance. In The Republic of Serbia the majority of registered hybrids of standard grain quality white kernel maize are the result of the breeding conducted at the Maize Research Institute Zemun Polje and the Institute of Field and Vegetable Crops Novi Sad.

In this research the properties of the hybrids of standard grain quality white kernel maize were examined and compared to the required standards, i.e. the properties of one hybrid from the FAO 300 Group and three hybrids from the FAO 600 Group. In 2010, trials were conducted in 4 localities (Pančevo, Sombor, Zemun Polje, Novi Sad), and during 2011 they were conducted in 5 localities (Pančevo, Sombor, Zemun Polje, Novi Sad, Kikinda).

In 2010, as one of the more productive hybrids in the FAO 300 Group, with the yield of 8.9 t ha^{-1} and average moisture content of 18.6%, the examined hybrid ZP 317b, had higher yield for 2.1 t ha^{-1} and 1.8% less moisture content than the hybrid standard in this group ZPSC 300b. In the second year of investigation differences in yield in favor of ZP 317b was 1.6 t ha^{-1} and was observed even 3.2% less moisture in the same hybrid. In the research of the hybrids from the FAO 600 Group, the highest average yield of 11.5 t ha^{-1} was recorded in the hybrid ZP 655b, while the standard hybrid NS 609b gave the lowest yield of 9.0 t ha^{-1}. In the second year, the highest average yield per hectare was achieved again in the hybrid ZP 655b (11.1 t ha^{-1}), while the identical average yield was recorded in the hybrid NVPB 1061 and the standard hybrid NS 609b (8.4 t ha^{-1}).

Key words: *standard grain quality white kernel maize, yield, locality.*

INBRED LINES DONORS OF FAVORABLE ALLELES FOR THE IMPROVEMENT OF GRAIN ROW NUMBER OF F_1 MAIZE HYBRID

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The eight inbred lines of maize of different cycles of selection and the origin of the BSSS BSCB1 synthetic populations were studied in order to assess which has the greatest relative value of favorable alleles for the improvement of traits among the elite single cross corn hybrids. On the base of the calculated parameters μG UBND, PTC and NI were found that the largest number of favorable alleles for the repair of the number of kernel rows had the inbred line B73 (C5) and B84 (C7) from the synthetic population BSSS and B91 (C8) and B90 (C7) from synthetics BSCB1. These lines are from the later cycles of recurrent selection that are expressed as better donors of favorable alleles in relation to the line from the previous cycles. Rank correlation between the used parameters were positive and highly significant, while the highest values of correlation for the number of kernel rows was established between PTC, μG and UBND and PTC and NI. The largest number of rows per ear had hybrid B73 (C5) x B84 (C7).

Key words: *maize, inbred line, donors, the number of kernel rows, rank correlation.*

WEATHER CHARACTERISTICS IMPACTS IN 20010 AND 2011 ON MAIZE YIELDS IN CROATIA

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Maize is main field crop on arable lands in Croatia. According data of State Bureau for Statistics in the decade period 2001-2010 maize in Croatia was grown on 303300 ha/year and annually yields were ranged from 4.2 to 8.0 t/ha. In two years (2003 and 2007) mean yields were bellow 5.0 t/ha, while in two years (2008 and 2009) the yields were above 7.0 t/ha. Weather characteristics, especially precipitation quantities and their distribution, as well as mean air-temperatures are main reasons for considerable variation of annual yields of maize. Aim of this study was testing precipitation and temperature regimes with aspects of their favorability for maize growing at two growing seasons (2010 and 2011) based on six sites (Osijek, Slavonski Brod, Bjelovar, Sisak, Zagreb i Varaždin) data. These data were compared with the long-term mean (LTM) 1961-1990. The growing season 2010 was mainly favorable for maize growing and annual yield of maize in Croatia was 7.0 t/ha. Precipitation in the April-May period of 2010 (mean of six tested sites) were 710 mm or 54% above LTM, while mean air-temperature in the same period was 17.9 oC or higher for 1.0 oC compared to LTM. However, the growing season 2011 was less favorable for maize growing due to drought and high air-temperatures. For example, precipitation in the April-May period of 2011 was 274 mm or 40% bellow LTM, while air-temperature was 19.2 oC or for 2.3 oC higher compared to LTM. With that regard, less favorable conditions were in the eastern part (Osijek 246 mm and 19.4 oC) compared to the western part (Varazdin 281 mm and 18.4 oC) of the region continental Croatia. As result of less favorable weather conditions are even up to 30% (estimation) lower yields of maize in 2011 compared to the normal weather years with emphasis that yield reduction is higher in the eastern part of the region and on light textured soils. The similar estimation of maize yield reduction in 2011 is for neighboring countries Serbia, Hungary and Bosnia and Herzegovina. By correspondingly soil management practice (for example, ploughing in autumn including application of the higher fertilization rates, especially by potassium) and using of more tolerant hybrids could be possible alleviate drought stress in maize growing.

Key words*: *maize, Croatia, precipitation, air-temperature, grain yield.

PGPR AS BIO-FERTILIZERS AND THEIR APPLICATION IN MAIZE

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Microorganisms account for 60-90% of the total biochemical activity in the soil. They play a major role in the processes of humification and dehumification, formation and maintenance of the productive capacity of soil. They also take part in the biological control of bacterial species that parasitize plants, degradation of pesticides, cycling of essential elements, plant supply with assimilated matter, production of physiologically active substances and the fixation of atmospheric nitrogen.

Maize, an important agricultural crop, releases root secretions which considerably affect the composition and abundance of microorganisms not only in the rhizosphere, but also in the surrounding soil. Additionally, the abundance and diversity of microorganisms in the soil under the maize crop depend on the physical and chemical soil properties, climatic factors, as well as on the system of cultivation, methods of soil tillage, hybrids used, etc.

Rhizobacteria inhabit plant roots and the soil in contact with the roots (rhizosphere). It has been observed in the recent decades that many rhizobacteria including Azotobacter, Azospirillum, Bacillus, Pseudomonas, Clostridium, Klebsiella and Enterobacter stimulate the growth of maize plants. Success of inoculation depends on the survival rate of bacteria in the soil during growing season, which is conditioned by their multiplication rate in the rhizosphere, mobility and colonization along the root system. The application of PGPR-based (plant growth promoting rhizobacteria) biofertilizers reduces the use of expensive nitrogen fertilizers, facilitates plant uptake of phosphorus and influences the direction and dynamics of microbial processes that indirectly affect the maintenance and increase of soil fertility.

Biofertilizers containing highly effective strains of bacteria, algae and fungi. Their incorporation into the soil together with activates the microbial processes which improve the dynamics of plant supply with nitrogen, phosphorus, potassium and some micronutrients. Also, microorganisms stimulate the growth and development of plants by producing biologically active substances and by synthesizing enzymes involved in all biochemical processes in the soil.

Key words*: *biofertilizers, maize, microorganisms, PGPR.

POSSIBILITY OF INCREASING VOLUME, STRUCTURE OF PRODUCTION AND USE OF DOMESTIC WHEAT SEED IN AGRICULTURE OF THE REPUBLIC OF SRPSKA

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The objective of this research work is to explore the scope, structure and quality of production and use of domestic wheat in the RS.The subject of the research is to determine the production of wheat in the Republic of Srpska, the needs for seed wheat, determine the amount imported, and to identify measures to increase domestic production of seed wheat and to reduce imports.

The analysis of commercial wheat production in the period 2006-2010 showed that the production took place in the average area of 44 017,6 ha, with an average yield of 3,28 t/ha and total production of 145 591 t. The highest level of wheat production was recorded in 2007 when it was 172 481 t, and a minimum production was in 2010 when it was 84 647 t.

In the Republic of Srpska in 2010, the area under wheat amounted to 33 641 ha, which required about 8410 tons of wheat seed, and only 4,27% of the quantities of seed wheat needed for the RS market was produced in the RS, the rest comes from imports. According to the Indirect Taxation Administration data the Republic of Srpska imported 125 t of wheat seed in 2009. The quantities of imported wheat vary considerably from year to year and are influenced by the weather in the sowing season and the prices on the market.

Analysis of seed wheat in period 2006-2010 showed that the seed wheat occupied an average area of 128,8 ha, with the average yield of 4,06 t/ha and the total average production of 514,2 tons. The highest production was recorded in 2008 when it was 656,25 tons, and the lowest in 2010 359,4 tons.

Demand for wheat seed of the Republic of Srpska, based on five-year average, amounts to 13 205 tons, in which the domestic production share is 514 tons or 3.9%. The value of domestic wheat seed production in this period was 393 616 KM, and the value of missing quantities of seeds that are imported is 9 824 152 KM based on the domestic price.

Key words: *surface, wheat, age, yield, RS, needs, imports*.

GRAIN YIELD AND YIELD COMPONENTS OF TRITICALE AND RYE AS AFFECTED BY ACID SOILS FERTILIZATION SYSTEMS

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Acid soils have poor air-water and physico-mechanical properties, so those soils are instable regarding plant production. Those soils demand improvement, in order to reach a stable and rentable crop production.

This paper gives a report on the influence of fertilization systems in acid soils, and the effect of mineral fertilization on 1000 grain mass, hectoliter mass and grain yield of triticale and rye.

The trial was carried out in 2009-2010 in the Center of Agricultural and Technological Research, Zaječar, on vertisol soil type, with pH in KCl of 4.84-5.15. The trial involved three fertilization variants and two plant species (triticale and rye). In the first variant was applied NPK fertilizer (120:80:53), in the second one also NPK (120:160:53), while in the third one, besides mineral fertilizer (NPK 120:80:53), was applied 5 t ha^{-1} of lime fertilizer "Njival Ca" and 20 t ha^{-1} of manure. The trial was set in random complete block design (RCBD) with three repetitions, and the results were processed by analysis of variance.

This investigation results showed a significant effect of fertilization system on increase of 1000 grain mass, hectoliter mass and grain yield comparing with the control, in both plant species. The highest 1000 grain mass in triticale and rye (52.0 and 36.0 g respectively) was reached by the combination of mineral, lime and organic fertilizers, although differences between the variants were not significant. The highest hectoliter mass of triticale and rye (77.9 and 74.5 kg respectively) was obtained at the second variant with NPK fertilizer (120:160:53). The highest grain yield (4053 kg ha^{-1}) of triticale was reached by combined application of NPK, lime and manure, while the lowest one (1927 kg ha^{-1}) was observed at the control variant. The difference between variants II and III was not significant. The highest grain yield (2913 kg ha^{-1}) of rye was reached at the second variant with NPK fertilizer (120:160:53), and the lowest one at the control variant (1077 kg ha^{-1}). The difference between variants II and III again was not significant. The difference between triticale and rye regarding the average grain yield was 1027 kg ha^{-1}. The yield of triticale and rye by the implementation of multiple fertilization increased compared to control.

Our results confirm previous reports pointing that proper application of lime fertilizers, combined with organic and mineral ones, is the most efficient way to remediate low production properties of acid soils, which could multiply crop grain yield.

Key words: *triticale, rye, fertilization system, absolute mass, hectoliter mass, grain yield.*

NUTRITIVE VALUE AND YIELD OF OAT GRAIN *(Avena sativa L.)*

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The investigation was carried out on the experimental field of Small Grains Research Center, Kragujevac, the aim of exploration was to determine nutritive value and yield of oat grain by aspect of its using in feeding. This paper presents the results of Kragujevac varieties of spring oats (Slavuj, Vranac and Lovćen). Grain yield, 1000 kernel weight and protein content in grain three cultivars of oats was determined in a two-year field experiment.

Average grain yield of oat cultivars ranged from 3.281 t/ha to 4.792 t/ha. Slightly higher average values of grain yield were found in 2007 year. Average values of 1000 grain weight of oat cultivars varied in the range from 26.90 to 30.80 g. The results show that there are significant differences between cultivars, while the average protein content ranged from 11.05% to 12.88%. The year 2006 was significantly more favorable than 2007 for protein synthesis. It seems that this is a cultivar property, but is also under a very strong environmental influence.

The examined material could therefore be valuable both in terms of growing oats as a forage crop plants and in terms of it's processing on grain quality and productivity.

Key words: *grain yield, oat, quality, 1000 grain weight*.

CONTENT OF NON-ESSENTIAL AMINO ACIDS IN THE GRAINS OF WINTER AND SPRING VARIETIES OF OATS (AVENA SATIVA L.) UNDER THE CONDITIONS OF CENTRAL SOUTHERN BULGARIA

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The purpose of this survey is to study the content of non-essential amino acids in four winter (Dunav 1, Ruse 8, Resor 1, Linia M-K) and five spring (Obraztsov chiflik 4, Mina, HiFi, Novosadski golozarnest and Prista 2) varieties of oats grown in Central Southern Bulgaria within the period from 2007 to 2009.

The tested varieties have different content of non-essential amino acids. Dunav 1 has the highest quantity of cystine (2,02 g/100g) of all the winter varieties, Ruse 8 has the highest quantity of alanine (5,69 g/100g) and Resor 1 – the highest quantity of arginine (6,14 g/100g).

In general, the spring varieties have a higher quantity of glutamic acid (from 25,86 to 26,90 g/100g). Mina has the highest quantity of glutamic acid and also the highest quantity of cystine (2,14 g/100g), Novosadski golozarnest has the highest quantity of proline (8,05 g/100g) and HiFi ranks first in terms of aspartic acid (9,05 g/100g), serine (5,02 g/100g) and tyrosine (2,09 g/100g). In the study we have also established certain relations between the acids.

Key words: *oats, non-essential amino acids, alanine, arginine, cystine, glutamic acid, proline, serine*.

KOSTA – NEW VARIETY OF WINTER BARLEY

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New cultivar of winter barley named Kosta is included in the Variety list of agricultural plants of Bosnia and Herzegovina, created at the Agricultural Institute of Republic of Srpska-Banja Luka. Registered by the Administration Bosnia and Herzegovina for Plant Health Protection. New barley cultivar Kosta was created by crossing the genetically divergent parents, line BL 543 and cultivar NS 519. In this cultivar successfully combined the genes responsible for high grain yield potential, good processing quality (raw materials for industry and animal feed), excellent resistance to low temperatures, and very good resistance to lodging and plant diseases. In three-year trials cultivar Kosta achieved higher yield for 413 kg ha^{-1} comparing to the standard cultivar Sladoran. New cultivar has uniform large grain (amount of 1st class grain 98%), weight of 1000 grains 45g, hectoliter weight 60.31kg and average protein content 10.8%. Due to the characteristics of grain and a reduced content of protein <11.5%, cultivar Kosta meets the criteria of malting barley for malt production. The cultivar is medium early cultivar with red colored spikes, and more resistant to low temperature compared to the standard cultivar, with resistance to plant diseases at the standards level. A new cultivar of two-rowed barley of Agricultural Institute of Republic of Srpska-Banja Luka has a wide adaptability, satisfactory stability of yield, and good level of tolerance to drought.

Key words: *barley, variety, yield, quality, resistance*.

THE YIELD AND SOME MORPHOLOGICAL PROPERTIES OF NEWLY INTRODUCED ITALIAN RICE VARIETIES GROWN IN MACEDONIA

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This paper presents the results of investigation of three newly introduced Italian rice varieties: brio, ellebi and opale, in comparison with two standard varieties prima riska and R-76/6. The research was conducted during 2010 and 2011 under the agro-ecological conditions of Kocani region. Field experiments were set up upon the method of randomized block system. The yield of raw rice-paddy, the stem height, panicle length and number of productive tillers per m2 were analyzed. According to the obtained results, the highest average yield of paddy rice was achieved in the standard variety prima riska (9465 kg ha-1), while the lowest value was found in the newly introduced italian rice variety ellebi (7635 kg ha-1). In both years of investigation, the yield of paddy rice of the standard variety R-76/6 as well as the newly introduced varieties: brio, ellebi and opale was the most significantly lower compared to standard variety prima riska. The stem height of the newly introduced Italian rice varieties was significantly shorter at two levels of probability, in comparison with two standard varieties, in both years of testing. The average panicle length of the varieties: brio (12.75cm), ellebi (16.64cm), opal (13.78cm) and the standard R-76/6 (15.30cm) is shorter than the average panicle length of the standard variety prima riska (18.65 cm).The highest average number of productive tillers per m2 was estimated for the variety ellebi (454.34) and the lowest for the standard variety R-76/6 (291.83). In general, according to the the results obtained in this investigation, the newly introduced Italian rice varieties: brio, ellebi and opale could be included in the rice breeding programs, especially for breeding short stem rice varieties.

Key words**:** *rice, varieties ,yield of paddy rice, stem, panicle, productive tillers*.

EVALUATION OF YIELD AND STABILITY OF PERSPECTIVE WINTER BARLEY LINES

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The studies were conducted in the Experimental field of the Department of Genetics and Plant Breeding – Agricultural University, Plovdiv during the period 2009- 2011. Then new breeding lines were investigated using lock design with 4 replications and 20 m^2 plot size.

The aim of the investigation was to estimated barley lines by yield, stability and some important traits, using Obzor as a standard. Applying biometrical and cluster analysis and index of yield stability have been established that some breeding lines had better traits in comparison to the standard cultivar "Obzor", as well as stabile yields regardless of differences in the climatic conditions of the years.

Key words: *winter barley, cluster analysis, yield stability*.

WEED ASSOCIATION AMONG WINTER OILSEED RAPE PLANTS- A MEDIUM FOR PROPAGATION OF ECONOMICALLY SIGNIFICANT PESTS ON VEGETABLE CROPS

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Over the last few years the number of fields planted with winter oilseed rape has significantly increased (Brassica napus oleifera biennuis D.D.). A serious technological problem during the process of growing is posed by the weeds and the self-seeders of grain crops, which enhance the spreading and increase the population of the main pests.

During the period from 2007 to 2010, we conducted experiments with winter oilseed rape plants in the experimental fields of the Agricultural University in the town of Plovdiv. For a reporting of the species composition of the pests were used a classical methods in entomoly - entomological bag mowing, isolation of the species of insects from individual plants.

We established the weed composition within the crops, which consisted mainly of annual weeds - Amaranthus retroflexus L., Papaver rhoes L., Sinapis arvensis L., Poa annua L., Chenopodium album L., Setaria spp. and others, as well as some perennial weeds – Sorghum halepense Scop. and Convolvulus arvensis L.

We registered the following pests: Agrotis ipsilon Hunf, Mamestra brassicae L; Oxythyrea funesta Poda; Opatrum sabulosum L.; Thrips tabaci Lind., Aphis gossypii Glov.; Subcoccinella vigintiquatuorpunctata L.; Euxoa temera Hb. etc.

We made an analysis of the possibilities for distribution and propagation of the economically significant pests which grow within the weed associations and among the winter oilseed rape plants and later spread among the spring crops.

Key words: *oilseed rape, weeds, pests*.

AGRONOMIC CHARACTERISTICS OF WINTER OIL RAPE HYBRIDS DEPENDING OF NITROGEN TOP DRESSING

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Oilseed rape is one of the most important sources of vegetable oil in the world. The nutrient demand of oilseed rape is considerably higher than that of cereals. Compare to cereals, winter oilseed rape requires more available nitrogen and this element is an important component with strong effect on seed yield and quality, but from other side has affects on the reduction of oil content. Winter oiseed rape hybrids with high yield potential might have high nitrogen requirements. On the other hand the vigor of those plants might also be expressed as improved nitrogen uptake by a vigorous rooting system. In many cases N ferilization requirement do not take into account varietal types for B. napus and it's based on fertilizer norm, with corrections according to environmental conditions. The objective of this study is to evaluate prelimenary results of the influence of nitrogen top dressing to the yield and yield componenets of 8 winter oil rape hybrids and 2 winter oil rape cultivars. Field trial was carried out in vilage Gluvo (near Skopje), in 2010/2011. Experimental design was a split-plot with 3 replications and 3 nitrogen regimes as main factor. Fertilizer treatments were: N, N+120 kg N/ha, N + 120 + 70 kg N/ha. Treatment N as a base fertilize corresponded to 70 kg N/ha. Two ammonium nitrate dressing were broadcast, first on 25 of February and second on 15 of March. From the results which we obtain it can be concluded that two times top dressing have statistical significant differences (P = 0.05) on the yield of the hybrids/varieties, number of seed/pod and length of the pod (compared with one times and without top dressing), but did not express any significants on hight of the plant and number of primary branches/plant. On a hybrids/variety level, Hybrirock (KWS), Rohan (NPZ-Lembke) and Albatros (Limagrin) may be considered as most promissing for the skopje region.

Key words: *winter oilseed rape, nitrogen, top dressing, yield, yield components*.

ESTIMATION OF RED CLOVER (*Trifolium pratense* L.) FORAGE QUALITY PARAMETERS DEPENDING ON THE CULTIVAR, CUT AND STAGE OF GROWTH

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One of the important factors influencing the feeding value of a forage is its stage of maturity at time of harvesting. As a result of investigations carried out over a number of years, it is an accepted fact that a forage quality decreases with increasing maturitu. A field trial was conducted to determine the forage quality parameters of two red clover cultivars – Nike and K-39 and to quantify the effects of cultivar, cut and stage of growth on red clover forage quality. The experiment was designed as three factorial trials, by randomized block system in three replicates. Three stages of growth of red clover (*Trifolium pratense* L.) *cv* Nike and K-39 were examined in the second and third cut. The changes in chemical constituents of red clover were analyzed by Weende system of analysis. The differences between forage quality of investigated red clover cultivars were significant for crude ash, crude protein, crude fibre and nitrogen free extract ($P< 0.05$). The results of this investigation indicated that the crude protein content of red clover declined with advancing maturity in the second and third cut (from 245.60 to 180.50 g kg^{-1} of DM and from 256.25 to 160.25 g kg^{-1} of DM, respectively). Despite the crude protein, the content of crude fiber increased in both investigated cultivars of red clover. The achieved results show that *cv* K-39 had lower foage quality at the second cut, with lower crude protein and higher crude fibre than *cv* Nike.

Key words: *red clover, quality, cut, growth stage, cultivar*.

COMPONENTS OF YIELD OF GRASS-CLOVER MIXTURES IN HILLY-MOUNTAINOUS AREAS

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Meadows and pastures, both, with the surface and with potential, are the most important source of forage for ruminants in hilly-mountainous area. Natural pastures cover large areas, but have small forage production. With sowing of grass-clover mixtures much higher production of better quality vegetative mass could be obtained. The composition of the mixtures is very important, therefore, the selection of the appropriate mixture is condition of obtaining large amounts of forage of adequate quality. The aim of the experiment was to determine the influence of planting mixtures of different composition and proportion of each component in a hilly area of Manjača on quantity and quality of forage. During the experimental work several important parameters for the production of forage. were investigated. The results obtained by the three-year experiment in the field and laboratory show statistically significant differences between the yield parameters. The data showed that the selection of the appropriate mixture is very important in order to achieve high yield with desirable quality characteristics.

Key words: *mixture composition, yield, forage quality*.

CHANGE IN THE PEDOLOGICAL CHARACTERISTICS OF THE DEPOSOL AT RECLAMATION

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Research on the reclamation of deposol in the lignite mine Stanarihas been performed since 2007. In a three years period, agrotechnical and biological measures of the reclamation were implemented on the experimental plot. During the cultivation of crops, mineral fertilization and liming were performed. The conducted research includes the change of the basic physical and chemical characteristics in the surface layer of the treated deposol. Analyses were performed in 2009. and 2011. Changes in the mechanical part were monitored by reduction in the clay fraction, which didn't result in. Significant improvement of the reaction of the soil wasn' tconfirmed. Slight increase in concentration of the physiologically active P2O5 and K2O is the result of the application of mineral fertilizers. Adsorptioncapacity and degree of saturation of base cations in the meliorated deposol were increased. The content of trace elements was reduced at the end of the test period. The presence of toxic elements is below the allowable limit. On the experimental plots where reclamation measures were implemented, there is improvement in of physical and chemical characteristics of the meliorated deposol.

Key words: *meliorated deposol, physical and chemical characteristics, biological reclamation, Stanari.*

STRUCTURE OF TIME SILAGE HARVERS AND CUTTING HEIGHT SILAGE MAIZE

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Abstract: Silage harvesters have vast declared performances that are in practice often hard to reach due to both objective and subjective factors and therefore it is useful to have available data and indicators that are achieved under conditions of exploitation. The aim of the study is to determine explotation characteristics and quality of performance of silage harvesters in order to increase productivity.The applied methods are standard for these issues,and are related to the fild-lab and exploating trials of silage harvesters. In the specific regional conditions, the average size of a parcel per a farm household is 2.93 ha and consists of a large number of parcels uneven in shape. The yield of silage of the whole corn plant was in average 32.5 t h^{-1} with moisture of the silage of 62.6%. This paper presents the structure of the silage harvester's working time,where coefficient is small and working times is 35%.. The height of the cut in the corn plant ranged from 15 to 20 cm,for specific agrecological conditionals are recommended height of cut corn plants 17cm. The conclusions indicate that demands required for corn plant silage are of a complex nature, especialy with parcels that are distant and small and the examinations within the specific regional conditions are very important.

Key words: *combine silage, corn silage, cutting height*.

ESTABLISHING TIME FOR THE DRYING OF CORN BY USING DRYER TECHNOLOGY

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In the paper presented investigation of establishing time of drying of corn by using dryer technology or to drying the corn of different ripening groups (groups from 400 to 700) with increased moisture at the exit of the dryer for corn with the 19.47% on storage moisture and increased temperature of corn grains at 35.5 °C.

Methodology used in this paper is based on measuring of different parameters in three repetitions during drying process and measuring and determination of the parameters in the process of post-drying (temperature and moisture content of the corn grain, the parameters of air and drying ageneses, time for conditioning and time for venting). After the results obtained their systematization were carried out, and the calculations were performed and together with the technological process of the drying showed in the i-x diagram for wet air.

The aim of this study was to determine the time needed for corn grain drying using dryer technology after leaving the drier.

This technology is based on cooling corn grain after drying it, but not in the cooling zone in the kiln, but in separate cells for conditioning.

Tests show that the grain in the cells age from 7 to 10 hours and during that time it is „sweated" in order to be cooled by the external by blowing air through the fan after sweating. Moisture from the grain surface is removed by the air and grain is dried to the level of the storage moisture. Total of 149.797 kg of corn graine of average humidity of 33.85% was dried. Time of ventilation lasted 50 hours while the time of conditioning lasted 27.10 hours.

Key words: *conditioning, drying, corn grain, ventilation.*

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