



Book of Abstracts

**III INTERNATIONAL SYMPOSIUM AND
XIX SCIENTIFIC CONFERENCE
OF AGRONOMISTS OF REPUBLIC OF SRPSKA**

*Trebinje, Bosnia and Herzegovina
March 25 - 28, 2014*



BOOK OF ABSTRACTS



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XIX SCIENTIFIC CONFERENCE OF AGRONOMISTS OF
REPUBLIC OF SRPSKA

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Publisher

Faculty of Agriculture, University of Banja Luka
Bulevar vojvode Petra Bojovića 1a, 78000 Banja Luka, RS-BiH

Editor in Chief

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Technical Editors

Marinko Vekić
Đorđe Savić

Circulation

300

CIP-Katalogizacija u publikaciji
Narodna i univerzitetska biblioteka
Republike Srpske, Baňa Luka

631(048.3)(0.034.2)

**INTERNATIONAL Symposium (III ; Trebinje ;
2014)**

Book of Abstracts [Elektronski izvor] / III
International Symposium and XIX Scientific Conference
of Agronomists of Republic of Srpska, March 25-28, 2014
Trebinje, Bosnia and Herzegovina ; [organizers Faculty of
Agriculture, University of Banjaluka in cooperation with
Biotechnical Faculty, University of Ljubljana ; editor in
chief Siniša Mitrić]. - Banja Luka : Faculty of Agriculture,
2014. - 1 elektronski optički disk (CD-ROM) : tekst ; 12
cm

Nasl. sa nasl. ekrana. - Tiraž 300. - Tekst na srp. i engl.
jeziku. - Registar.

ISBN 978-99938-93-27-1

1. Scientific Conference of Agronomists of Republic of
Srpska (XIX ; Trebinje ; 2014) 2. Faculty of Agriculture,
University of Banjaluka 3. Biotechnical Faculty, University
of Ljubljana

COBISS.RS-ID 4181784





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XIX Scientific Conference of Agronomists
of Republic of Srpska

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ABSTRACTS

Trebinje, Bosnia and Herzegovina
March 25-28, 2014

ORGANIZERS

Faculty of Agriculture, University of Banjaluka

in cooperation with

Biotechnical faculty, University of Ljubljana

SUPPORTED BY

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

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SYMPOSIUM PROGRAMME

BOOK OF ABSTRACTS

16



PROGRAMME OF THE WORKING SESSIONS
PROGRAM RADA SEKCIJA

Session Sekcija	Date and time Datum i vrijeme	Hall Sala
Plenary session <i>Plenarna izlaganja</i>	Wednesday, March, 26 th <i>Srijeda, 26. mart</i> 9 ³⁰ -11 ³⁰	Big Hall, HET <i>Velika sala, HET</i>
Animal Husbandry <i>Stočarstvo</i>	Wednesday, March 26 th <i>Srijeda, 26. mart</i> 12 ⁰⁰ -14 ⁰⁰	Big Hall, Hotel Leotar <i>Velika sala, hotel Leotar</i>
Crop Production <i>Ratarstvo</i>	Wednesday, March 26 th <i>Srijeda, 26. mart</i> 12 ⁰⁰ -14 ⁰⁰	Small hall, Hotel Leotar <i>Mala sala, hotel Leotar</i>
Plant Protection <i>Zaštita biljaka</i>	Thursday, March 27 th <i>Četvrtak, 27. mart</i> 8 ³⁰ -10 ³⁰	Small Hall, Hotel Leotar <i>Mala sala, hotel Leotar</i>
Fruit Growing and Viticulture <i>Voćarstvo i vinogradarstvo</i>	Thursday, March 27 th <i>Četvrtak, 27. mart</i> 9 ⁰⁰ -11 ³⁰	Big Hall, Hotel Leotar <i>Velika sala, hotel Leotar</i>
Agricultural Economics and Rural Development <i>Agrarna ekonomija i ruralni razvoj</i>	Thursday, March 27 th <i>Četvrtak, 27. mart</i> 9 ⁰⁰ -12 ⁰⁰	Big Hall, HET <i>Velika sala, HET</i>
Agroecology, Organic Agriculture, Soil Science <i>Agroekologija, Organska Poljoprivreda, Pedologija</i>	Thursday, March 27 th <i>Četvrtak, 27. mart</i> 10 ³⁰ -13 ⁰⁰	Small hall, Hotel Leotar <i>Mala sala, hotel Leotar</i>
Vegetable Growing, Medicinal Plants <i>Povrtarstvo, Ljekovito bilje</i>	Thursday, March 27 th <i>Četvrtak, 27. mart</i> 11 ³⁰ -13 ³⁰	Big Hall, Hotel Leotar <i>Velika sala, hotel Leotar</i>

IMPORTANT NOTICE FOR POSTER SESSION
VAŽNO OBAVJEŠTENJE ZA POSTER SEKCIJU

Session I: Animal Husbandry

Sekcija I: Stočarstvo

All authors are invited to exhibit their posters at the designated poster area on Tuesday, March 25th 2014 from afternoon or on Wednesday, March 26th before start of session, till 12:00 hours. Authors are kindly requested to remove their posters immediately after discussion (no later than 15:00 hours). Posters that are not removed timely will be removed by the organiser.

Autori postera mogu da izlože postere u prostor predviđen za izlaganje postera u utorak 25.03.2014. poslije podne ili u srijedu 26.03.2014. do početka rada sekcije (12:00 časova). Autori su dužni ukloniti postere nakon diskusije o poster sekciji (najkasnije do 15:00 časova). Poster koji ne budu uklonjeni do naznačenog roka, biće uklonjeni od strane organizatora.

Session II: Crop Production

Sekcija II: Ratarstvo

All authors are invited to exhibit their posters at the designated poster area on Tuesday, March 25th 2014 from afternoon or on Wednesday, March 26th before start of session, till 12:00 hours. Authors are kindly requested to remove their posters immediately after discussion (no later than 15:00 hours). Posters that are not removed timely will be removed by the organiser.

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Session III: Agricultural Economics and Rural Development

Sekcija III: Agroekonomija i ruralni razvoj

All authors are invited to exhibit their posters at the designated poster area on Wednesday, March 26th 2014 (until 19:00 hours) and on Thursday, March 27th 2014 until the beginning of the session (until 09:00 hours). Authors are kindly requested to remove their posters immediately after discussion. Posters that are not removed timely will be removed by the organizer.

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Session IV: Fruit Growing and Viticulture

Sekcija IV: Voćarstvo i vinogradarstvo

All authors are invited to exhibit their posters at the designated poster area on Wednesday, March 26th 2014 (until 19:00 hours) and on Thursday, March 27th 2014 until the beginning of the session (until 09:00 hours). Authors are kindly requested to remove their posters immediately after discussion. Posters that

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Session V: Vegetable Growing

Sekcija V: Povrtarstvo

All authors are invited to exhibit their posters at the designated poster area on Wednesday, March 26th 2014 (until 19:00 hours) and on Thursday, March 27th 2014 until the beginning of the session (until 09:00 hours). Authors are kindly requested to remove their posters immediately after discussion. Posters that are not removed timely will be removed by the organizer.

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Session VI: Plant protection

Sekcija VI: Zaštita biljaka

All authors are invited to exhibit their posters at the designated poster area on Wednesday, March 26th 2014 (until 19:00 hours) and on Thursday, March 27th 2014 until the beginning of the session (until 08:30 hours). Authors are kindly requested to remove their posters immediately after discussion. Posters that are not removed timely will be removed by the organizer.

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Session VII: Agroecology, Organic Agriculture, Soil Science

Sekcija VII: Agroekologija, organska poljoprivreda, pedologija

All authors are invited to exhibit their posters at the designated poster area Wednesday, March 26th 2014 (until 19:00 hours) and on Thursday, March 27th 2014 until the beginning of the session (until 09:00 hours). Authors are kindly requested to remove their posters immediately after discussion. Posters that are not removed timely will be removed by the organizer.

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SYMPOSIUM PROGRAMME
PROGRAM RADA

Tuesday, March, 25th, 2014
Utorak, 25. mart 2014.

Arrival and registration of participants
Dolazak i prijava učesnika

Wednesday, March, 26th, 2014
Srijeda, 26. mart 2014.

Registration of participants
Prijava učesnika

Big Hall, HET Company
Velika sala, HET

9⁰⁰ – 9³⁰ Opening ceremony
Otvaranje Simpozijuma

Plenary Sessions
Plenarna izlaganja

Working committee Aleksandar Ostojić, Miljan Cvetković, Igor Potočnik, Goce
Radno predsjedništvo Čilev

9³⁰ – 10⁰⁰ Ralf-Udo Ehlers
BIOLOGICAL CONTROL IN EUROPE

10⁰⁰ – 10³⁰ Andrej Udovč
ROLES OF COOPERATIVES IN THE POST SOCIALIST PERIOD AND
FACTORS INFLUENCING FARMERS' WILLINGNESS TO COOPERATE
FOR MARKETING THEIR PRODUCTS

10³⁰ – 11⁰⁰ Daniel Falta
ANIMAL PRODUCTION AND HUSBANDRY IN THE CZECH REPUBLIC
AND THE EU

11⁰⁰ – 11³⁰ Discussion
Diskusija

11³⁰ – 12⁰⁰ Cocktail
Koktel

12⁰⁰ - 14⁰⁰ **Parallel Working Sessions**
Paralelne radne sekcije
Session I: Animal Production
Sekcija I: Animalna proizvodnja
Session II: Crop production
Sekcija II: Ratarstvo

Session I: Animal Production
Sekcija I: Animalna proizvodnja

Big Hall, Hotel LEOTAR
Velika sala, Hotel LEOTAR

Oral presentation
Usmene prezentacije

Working Committee Dragutin Matarugić, Goce Čilev, Đorđe Savić
Radno predsjedništvo

12⁰⁰ – 12¹⁰	Z. Gacovski, G. Čilev, B. Petrovska INTRODUCTION OF GENETICALLY MODIFIED ORGANISMS (GMOS) THREAT AND HEALTH BENEFITS OF ANIMALS AND CITIZENS OF THE R. MACEDONIA
12¹⁰-12²⁰	M. Glavić, A. Budiša, S. Osmanagić, A. Hasić, A. Zenunović CONTROL OF CORN SILAGE QUALITY ON FARMS FOR MILK PRODUCTION IN NORTHERN BIH <i>KONTROLA KVALITETA KUKURUZNE SILAŽE NA FARMAMA ZA PROIZVODNJU MLIJEKA U SJEVERNOM DIJELU BIH</i>
12²⁰-12³⁰	G. Čilev, Z. Gacovski, V. Jankovski, B. Petrovska INFLUENCE OF NUTRITION OF HIGH YIELDING COWS ON QUANTITY AND QUALITY OF MILK <i>UTICAJ ISHRANE VISOKOPROIZVODNIH KRAVA NA KOLICINU I KVALITET MLEKA</i>
12³⁰-12⁴⁰	B. Važić, B. Rogić, M. Drinić, N.Savić LEVEL OF GLUCOSE IN THE BLOOD OF SIMENTAL COWS <i>SADRŽAJ GLUKOZE U KRVI KRAVA SIMENTALSKE RASE</i>
12⁴⁰-12⁵⁰	B. Petrovska, Z. Gacovski, G. Čilev, N. Petrovska, I. Zdraveski THE TREND OF INCREASE OR DESREASE IN SHEEP BREEDING IN SEPARATE REGIONS OF THE REPUBLIC OF MACEDONIA
12⁵⁰-13⁰⁰	C. Mekić, P. Perišić, S. Hristov, Z. Novaković, D. Romić INFLUENCE OF TWINNING ON THE MILK YIELD OF IMPROVED PIROT SHEEP BREED POPULATION
13⁰⁰-13¹⁰	M.M. Urošević, D. Drobnjak, U. Ozkanal, Y. Ograk, E. Umran Bozkurt, D. Matarugić, S. Erat, M. Matejević, B.M. Urošević VARIABILITY OF MORPHOMETRIC PARAMETERS OF TURKISH SHEPHERD DOGS KANGAL HEAD <i>VARIJABILNOST MORFOMETRIJSKIH PARAMETARA GLAVE TURSKOG PASTIRSKOG PSA KANGALA</i>
13¹⁰ – 13³⁰	Poster session and coffee break <i>Pregled postera i kafe pauza</i>
13³⁰-14⁰⁰	Discussion <i>Diskusija</i>

Poster presentation
Poster prezentacije

Moderator Đorđe Savić
Moderator

I-1	J. Andrišek, G. Chládek, J. Javorová, M. Velecká, M. Večeřa, D. Falta THE EFFECT OF LOW AND HIGH ENVIRONMENTAL TEMPERATURE TO THE MOVEMENT ACTIVITY OF CZECH FLECKVIEH DAIRY COWS
I-2	M. Večeřa, D. Falta, J. Andrišek, J. Javorová, M. Velecká, G. Chládek THE EFFECT OF MILK YIELD ON RESTING BEHAVIOUR OF CZECH FLECKVIEH COWS IN FREE-STALL STABLE
I-3	M. Velecká, J. Javorová, J. Andrišek, M. Večeřa, D. Falta, G. Chládek CHANGES IN PROTEIN CONTENT IN THE SUMMER AND ITS IMPACT ON THE COMPOSITION AND QUALITY PARAMETERS OF MILK FROM HOLSTEIN COWS
I-4	J. Javorová, M. Velecká, D. Falta, J. Andrišek, M. Večeřa, S. Studený, G. Chládek EFFECT OF MILK PROTEIN CONTENT ON TECHNOLOGICAL PROPERTIES OF BULK MILK SAMPLES FROM CZECH FLECKVIEH COWS IN WINTER PERIOD
I-5	T. Könyves, N. Zlatković, B. Miščević, M. Stojšin, L. Lengyel SOMATIC CELL COUNT VARIATION IN DIFFERENT DAIRY HERD
I-6	N. Zlatković, T. Könyves, B. Miščević, L. Lengyel, M. Stojšin RELATIONSHIP AMONG COW AGE MILK PRODUCTION AND QUALITY IN DAIRY CATTLE
I-7	V. Vuković, M. Vičentijević INFLUENCE OF THE QUANTITY AND CONTAMINATION OF MILK ON CONCENTRATION OF ANTIBIOTICS IN MIXED MILK
I-8	D. Milanov, B. Vidić, B. Prunić, D. Todorović, D. Bugarski BACTERIAL BIOFILMS – IMPORTANCE FOR THE ETIOLOGY OF BOVINE MASTITIS AND THEIR IMPACT ON THE THERAPY BASED ON THE RESULTS OF ANTIMICROBIAL SUSCEPTIBILITY TESTING OF AGENTS <i>BAKTERIJSKI BIOFILMOVI – ZNAČAJ U ETIOLOGIJI MASTITISA KRAVA I UTICAJ NA EFEKAT LEČENJA BAZIRANOG NA REZULTATIMA ISPITIVANJA OSETLJIVOSTI UZROČNIKA NA ANTIBIOTIKE</i>
I-9	I. Zlatanović, D. Radojičić, D. Radivojević, M. Pajić, K. Gligorević, M. Dražić EFFICIENCY AND USING POSSIBILITIES OF HEAT RECOVERY PROCESS FROM MILK COOLING SYSTEM WITH PRECOOLING
I-10	Ž. Savić, B. Radović, Z. Ž. Ilić, N. Lalić UTILIZATION RATE OF MILK IN AUTOCHTHONOUS PRODUCTION OF SJENICA CHEESE AND ITS DISTRIBUTION <i>RANDMAN PROIZVODNJE I DISTRIBUCIJA SASTOJAKA MLEKA U SIRI PRI AUTOHTONOJ PROIZVODNJI SJENIČKOG SIRA</i>
I-11	O. Stevanović, M. Stojiljković, B. Vejnović, S. Ivanov, D. Nedić BASIC MORPHOMETRIC ANALYSIS OF KARAKACHAN SHEEP IN SERBIA <i>OSNOVNA MORFOMETRIJSKA ANALIZA KARAKAČANSKE OVCE U SRBIJI</i>
I-12	M. Klopsch, M.M.Urošević, D. Drobnjak, D. Matarugić, E. Umran Bozkurt, S. Erat, M. Matejević, B.M. Urošević

	VARIABILITY IN HEIGHT AT WITHERS OF RHODESIAN RIDGEBACK <i>VARIJACIJE VISINE GREBENA RODEZIJSKOG RIDŽBEKA</i>
I-13	M. Matejević, Z. Ristić, M. Urošević, D. Drobnjak <i>BROJNOST SRPSKIH GONIČA I SRPSKIH TROBOJNIH GONIČA U SRBIJI U PERIODU OD 2002. DO 2012. GODINE</i>
I-14	S. Jotanović, Đ. Savić, M. Vekić <i>SOME BIOCHEMICAL BLOOD PARAMETERS OF SOWS IN LACTATION NEKI BIOHEMIJSKI PARAMETRI KRVI KRMAČA U LAKTACIJI</i>
I-15	S. Jotanović, M. Vekić, Đ. Savić, R. Mijatović <i>VAGINAL MUCUS IMPEDANCE IN SOWS AND GILTS IN ESTRUS ISPITIVANJE OTPORA VAGINALNE SLUZI U ESTRIČNIH KRMAČA I NAZIMICA</i>
I-16	P. Horký, L. Zeman, J. Skládanka, D. Falta <i>THE EFFECT OF VARIOUS FORMS OF SELENIUM ON THE QUALITY OF THE EJACULATE OF BOARS</i>
I-17	V. Zekić, N. Tica, N. Džinić, D. Milić, D. Lukač <i>THE ECONOMIC CHARACTERISTICS OF SPECIALIZED FATTENING PIG BREEDS EKONOMSKA OBELEŽJA TOVA SPECIJALIZOVANIH RASA SVINJA</i>
I-18	Z. Škrbić, Z. Pavlovski, V. Petričević, M. Lukić, L. Stojanović <i>RELATED INCIDENCE OF FOOT PAD LESIONS AND BODY WEIGHT OF BROILERS OF MODERATE GROWTH IN DIFFERENT REARING SYSTEMS</i>
I-19	Z. Pavlovski, Z. Škrbić, N. Stanišić, M. Lukić, V. Petričević <i>NUTRITIONAL VALUE AND QUALITY OF EGG SHELL FROM DIFFERENT GENOTYPES OF CHICKENS</i>
I-20	T. Pandurević, S. Mitrović, V. Đermanović, M. Lalović, A. Bjelica <i>KORELACIONA ZAVISNOST IZMEĐU MASE PRIJE KLANJA ODNOSNO MASE OBRAĐENOG TRUPA ZA ROŠTILJ I VRIJEDNIJIH DIJELOVA TRUPA BROJLERA RAZLIČITIH PROVENIJENCI</i>
I-21	M. Lukić, V. Petričević, Z. Pavlovski, Z. Škrbić, M. Petričević <i>BIOLOGICAL QUALITY TEST OF MIXTURE FOR BROILERS ON THE SERBIAN MARKET</i>
I-22	V. Petričević, M. Lukić, Z. Pavlovski, Z. Škrbić, Ž. Jokić, D. Vitorović, M. Petričević <i>EFFECT OF RAW SOY BEANS IN MIXTURES FOR LAYER HENS ON EGG QUALITY AND EGG SHELL QUALITY</i>
I-23	D. Prvulović, M. Popović, D. Kojić, G. Grubor-Lajšić <i>THE EFFECTS OF ZEOLITES AND CLAYS ON PARAQUAT INDUCED OXIDATIVE STRESS IN KIDNEY AND SPLEEN OF BROILERS UTICAJ ZEOLITA I GLINA NA PARAMETRE OKSIDATIVNOG STRESA IZAZVANOG PARAKAVATOM U BUBREZIMA I SLEZINI BROJLERA</i>
I-24	V. Đogatović, A. Marić <i>QUALITY OF TABLE EGGS OF DIFFERENT WEIGHT CLASSES KVALITET KONZUMNIH JAJA RAZLIČITE MASE</i>
I-25	M. Vekić, S. Jotanović, M. Mitraković, Đ. Savić <i>EFFECT OF SHORT-TERM STORAGE ON SOME INCUBATION RESULTS OF BROILER HATCHING EGGS UTICAJ KRATKOG PERIODA ČUVANJA NA INKUBACIONE REZULTATE JAJA ZA NASAD TEŠKOG LINIJSKOG HIBRIDA</i>
I-26	V. Živanić, S. Jotanović, M. Vekić

	ANALYSIS OF INCUBATION RESULTS IN EARLY AND MIDDLE PHASE OF EXPLOITATION OF BROILER BREEDER FLOCK <i>ANALIZA INKUBACIONIH REZULTATA U RANOJ I SREDNJOJ FAZI EKSPLOATACIJE RODITELJSKOG JATA TEŠKOG LINIJSKOG HIBRIDA</i>
I-27	N. Vukelić, N. Novković, J. Živković MEASURING TECHNICAL EFFICIENCY OF BROILER FARMS IN VOJVODINA USING DATA ENVELOPE ANALYSIS
I-28	M. Mladenovic, G. Mirjanić, J. Tolimir BIOLOGICAL DEVELOPMENT OF BEE COLONIES RELATED TO DIFFERENT TYPES OF ARTIFICIAL SWARMING
I-29	G. Marković, J. Lujić, M. Madić SORGHUM IN CARP (<i>CYPRINUS CARPIO</i> L.) DIET
I-30	B. Milenković, S. Barać TESTING ENERGY EFFICIENCY OF MIXERS FOR ANIMAL FEED PRODUCTION <i>ISPITIVANJE ENERGETSKE EFIKASNOSTI MEŠALICA ZA PROIZVODNJU STOČNE HRANE</i>
I-31	J. Knežević, N. Gudžić, S. Čirić, M. Aksić, D. Beković, N. Tmušić THE QUALITY OF SILAGE AND ALFALFA ORCHARD GRASS EQUAL SHAVES
I-32	N. Savković, V. Komlenić, S. Jotanović STATE OF COMPLIANCE OF REPUBLIC OF SRPSKA LEGISLATIVE WITH EU DIRECTIVES RELATING TO THE FIELD OF ENVIRONMENTAL PROTECTION <i>PRESJEK STANJA USKLAĐENOSTI ZAKONA REPUBLIKE SRPSKE SA DIREKTIVAMA EVROPSKE UNIJE IZ OBLASTI ZAŠTITE ŽIVOTNE SREDINE</i>
I-33	D. Falta, A. Hooperová POSSIBILITIES OF STUDYING AT THE FACULTY OF AGRONOMY, MENDEL UNIVERSITY IN BRNO (CZ)
I-34	B. Vidić, S. Savić, Ž. Grgić, N. Prica INFLUENCE OF ECOLOGICAL CHANGES TO THE OCCURENCE OF INFECTIOUS DISEASES
I-35	Z. Novaković, I. Sočo, C. Mekić, M. Timotijević USAGE OF MEDICINES IN VETERINARY MEDICINE AND POSSIBILITY OF SIDE EFFECTS APPEARANCE

Session II: Crop Production
Sekcija II: Ratarstvo

Small hall, hotel LEOTAR
Mala sala, hotel LEOTAR

Oral presentations
Usmene prezentacije

Working Committee Željko Dolijanović, Ivica Đalović, Desimir Knežević
Radno predsjedništvo

12⁰⁰-12¹⁰	D. Knežević, A. Radosavac, D. Mićanović, J. Živić, I. Stančić HOW TO ACHIEVE HIGH YIELD AND LOW INVESTMENT IN WHEAT PRODUCTION? <i>KAKO POSTIĆI VISOK PRINOS I NISKA ULAGANJA U PROIZVODNJI PŠENICE?</i>
12¹⁰-12²⁰	I. Đalović, Đ. Jocković, G. Bekavac, S. Šeremešić, D. Milošev, D. Bogdanović GENOTYPE AND FERTILIZATION IMPACTS ON Fe and Mn STATUS IN MAIZE PLANTS
12²⁰-12³⁰	M.S. Awaad EFFECT OF SLOW-RELEASE NITROGEN FERTILIZERS ON MAIZE PLANTS GROWN ON NEW RECLAIMED SOIL
12³⁰-12⁴⁵	D. Dončić <i>SAVREMENA ZAŠTITA KUKURUZA</i>
12⁴⁵-12⁵⁵	D. Lopandić, M. Filipović, Z. Čamdžija, Ž. Jovanović, S. Božinović, S. Mladenović-Drinić, S. Prodanović ZP MAIZE HYBRIDS IN PRODUCTION REFLECTED IN THE 2013 th IN BOSNIA AND HERZEGOVINA
12⁵⁵-13⁰⁵	El Sayed El-Habbasha, Awwad Abed Elhaleem RESPONSE OF YIELD AND YIELD ATTRIBUTES OF GROUNDNUT TO PHOSPHORUS LEVELS AND SOME BIO- FERTILIZERS
13⁰⁵-13¹⁰	A. Marjanović Jeromela, R. Marinković, P. Mitrović CREATION OF NEW GENOTYPES AND IMPROVEMENT OF RAPESEED PRODUCTION TECHNOLOGY AT THE INSTITUTE OF FIELD AND VEGETABLE CROPS, NOVI SAD <i>STVARANJE NOVIH GENOTIPOVA I POBOLJŠANJE TEHNOLOGIJE PROIZVODNJE ULJANE REPICE U INSTITUTU ZA RATARSTVO I POVRTARSTVO, NOVI SAD</i>
13¹⁰-13³⁰	Poster session and coffee break <i>Pregled postera i kafe pauza</i>
13³⁰-14⁰⁰	Discussion <i>Diskusija</i>

Poster session
Poster sekcija

Moderator Danijela Kondić
Moderator

II - 1	N. Tmušić, M. Jelić, K. Nikolić, J. Knežević THE INFLUENCE OF WEATHER CONDITIONS AND FERTILIZING METHOD ON PLANT HEIGHT AT DIFFERENT CULTIVARS OF WINTER WHEAT <i>UTICAJ VREMENSKIH USLOVA I NAČINA DJUBRENJA NA VISINU BILJKE KOD RAZLIČITIH SORTI OZIME PŠENICE</i>
II - 2	M. Tabaković, S. Jovanovoć, G. Todorović, M. Mišović, M. Sečansk, R. Sabovljević EFFECTS OF PRODUCTION CONDITIONS AND TEST TEMPERATURES ON TRAITS OF MAIZE HYBRID SEEDS <i>UTICAJ USLOVA PROIZVODNJE I TEMPERATURE ISPITIVANJA NA OSOBINE HIBRIDNOG SEMENA KUKURUZA</i>
II - 3	S. Stojković, N. Deletić, M. Biberdžić, M. Aksić, D. Beković, S. Gudžić GENOTYPIC AND PHENOTYPIC CORRELATION BETWEEN YIELD COMPONENTS IN S ₁ AND HS PROGENIES OF AN F ₃ MAIZE POPULATION <i>GENOTIPISKE I FENOTIPISKE KORELACIJE KOMPONENTI PRINOSA KOD S₁ I HS POTOMSTAVA JEDNE F₃ POPULACIJE KUKURUZA</i>
II - 4	M. Sečanski, G. Todorović, J. Srdić, V. Dragičević, S. Jovanović, M Tabaković INBRED LINES AS DONORS OF FAVOURABLE ALLELES FOR THE IMPROVEMENT OF THE PERCENT OF LODGED AND BROKEN PLANTS OF F1 MAIZE HYBRID <i>INBRED LINIJE DONORI POŽELJNIH ALELA ZA POPRAVKU OSOBINE PROCENAT POLEGLIH I SLOMLJENIH BILJAKA F1 HIBRIDA KUKURUZA</i>
II - 5	Nožinić M., Đukić V., Pržulj N., Vesna B., T. Cvijanović, M. Vlačina EXPERIENCE IN THE MANUFACTURE OF LIQUID BIOFUEL <i>ISKUSTVA U PROIZVODNJI TEČNIH BIOGORIVA</i>
II - 6	N. Malić, D. Mandić SOME QUANTITATIVE PROPERTIES OF WINTER WHEAT (<i>Triticum aestivum</i> L.) GROWN IN MELIORATED DEPOSOL <i>NEKE KVANTITATIVNE OSOBINE OZIME PŠENICE (Triticum aestivum L.) GAJENE NA MELIORISANOM DEPOSOLU</i>
II - 7	M. Madić, M. Jelić, D. Knežević, D. Đurović, A. Paunović, S. Tanasković GRAIN YIELD AND YIELD COMPONENTS IN TRITICALE ON ACIDIC SOILS DEPENDING ON MINERAL FERTILIZATION AND LIMING
II - 8	I. Leskošek-Čukalović, S. Despotović, M. Kokolj, V Nedović, A Kalušević, J. Dobrijević THE INFLUENCE OF THE PARTICLE SIZE DISTRIBUTION OF MAIZE AS RAW MATERIAL ON EXTRACT CONTENT OF BEER <i>ISPITIVANJE UTICAJA GRANULOMETRIJSKOG SASTAVA KUKURUZA KAO SIROVINE NA SADRŽAJ EKSTRAKTA PIVA</i>
II - 9	S. Kostadinova, G. Panayotova, M. Almaliev EFFECT OF FERTILIZING SYSTEMS ON THE PHOSPHORUS EFFICIENCY INDICATORS AT DURUM WHEAT
II - 10	D. Knežević, D. Kondić, A. Yu. Dragović, S. Marković, V. Zečević

	IMPROVEMENT OF GRAIN QUALITY AND QUALITY OF BREAD WHEAT <i>UNAPREĐENJE KVALITETA ZRNA I KVALITETA HLEBNE PŠENICE</i>
II - 11	S. V. Jovanović, G. Todorović, M. Tabaković, M. Sečanski, D. Ranković, M. Mišović EFFECTS OF DIFFERENT TYPE OF CYTOPLASM ON THE EAR HEIGHT IN MAIZE INBRED LINES <i>UTICAJ RAZLIČITOG TIPa CITOPLAZME NA VISINU BILJKE DO KLIPA INBRED LINIJA KUKURUZA</i>
II - 12	A. Ghaemi, H. Rahimian M., M. Nassiri M. DRY MATTER PRODUCTION AND PARTITIONING PATTERN IN SUGAR BEET
II - 13	M. Dražić, M. Pajić, D. Radojičić, K. Gligorević, I. Zlatanović, Z. Dumanović APPLICATION TECHNIQUES OF LIQUID STARTER FERTILIZER IN COMMERCIAL MAIZE PRODUCTION <i>TEHNIKA INKORPORACIJE TEČNOG STARTNOG ĐUBRIVA U PROIZVODNJI KUKURUZA</i>
II - 14	Ž. Dolijanović, N. Momirović, M. Simić, S. Oljača, A. Mikić, S. Katić THE EFFECT OF FALL SOWN DIFFERENT COVER CROPS ON SWEET MAIZE WEEDINESS
II - 15	N. Deletić, S. Stojković, S. Gudžić, M. Jelić, M. Aksić, M. Biberdžić THE EFFECT OF SOME YIELD COMPONENTS ON GRAIN YIELD OF WINTER WHEAT <i>UTICAJ NEKIH KOMPONENTI PRINOSA NA PRINOS ZRNA OZIME PŠENCE</i>
II - 16	M. Biberdžić, S. Barać, N. Deletić, S. Stojković, D. Lalević INFLUENCE OF TILLAGE DEPTH ON SOME MORPHOLOGICAL AND PRODUCTIVE TRAITS OF WINTER RYE <i>UTICAJ DUBINE OBRADe ZEMLJIŠTA NA NEKE MORFOLOŠKE I PRODUKTIVNE OSOBINE OZIME RAŽI</i>
II - 17	M. Almaliev UPTAKE AND UTILIZATION EFFICIENCY OF NITROGEN AND PHOSPHORUS IN DURUM WHEAT
II - 18	M. Aksić, N. Gudžić, N. Deletić, S. Gudžić, S. Stojković, J. Knežević, A. Đikić COMPARISON BETWEEN MEASURED AND CALCULATED POTENTIAL EVAPOTRANSPIRATION OF WINTER WHEAT BY USING CROPWAT MODEL <i>KOMPARACIJA IZMERENE I OBRAČUNATE POTENCIJALNE EVAPOTRANSPIRACIJE OZIME PŠENICE KORIŠĆENJEM CROPWAT MODELA</i>
II - 19	V. Radić, Đ. Gatarić, B. Petković INVESTIGATION OF GERMPLASM OF CLOVER IN LOCAL AGROECOLOGICAL CONDITIONS <i>ISPITIVANJE GERMPLAZME DJETELINA U LOKALNIM AGROEKOLOŠKIM USLOVIMA</i>
II - 20	D. Beković, R. Stanisavljević, M. Biberdžić, S. Stojković, J. Knežević EFFECT OF ROW SPACING ON SEED YIELD, YIELD COMPONENTS AND SEED QUALITY OF ALFALFA <i>UTICAJ MEĐUREDNOG RASTOJANJA NA PRINOS, KOMPONENTE PRINOSA I KVALITET SEMENA LUCERKE</i>
II - 21	Ž. Lakić, V. Svetko, M. Petrović, J. Ikanović SEED YIELD AND SEED YIELD COMPONENTS OF AUTOCHTHONOUS PERENNIAL RYEGRASS POPULATIONS

	<i>PRINOS I KOMPONENTE PRINOSA SJEMENA AUTOHTONIH POPULACIJA ENGLESKOG LJULJA</i>
II - 22	D. Tomić, N. Bokan, V. Stevović, D. Đurović, M. Madić EFFECT OF THE FOLIAR APPLICATION OF PHOSPHORUS AND POTASSIUM ON THE GRAIN YIELD OF FORAGE PEAS (<i>Pisum sativum ssp. arvense</i> L.) ON ACID SOIL <i>UTICAJ FOLIJARNE PRIMENE FOSFORA I KALIJUMA NA PRINOS ZRNA STOČNOG GRAŠKA (Pisum sativum ssp. arvense L.) NA KISELOM ZEMLJIŠTU</i>
II - 23	D. Tomić, V. Stevović, D. Đurović, M. Vujisić, M. Vidojević EFFECT OF THE FOLIAR APPLICATION OF LIQUID ORGANIC FERTILIZER "BIOPLANT FLORA" ON FORAGE PEAS (<i>Pisum sativum ssp. arvense</i> L.) GRAIN YIELD <i>UTICAJ FOLIJARNE PRIMENE TEČNOG ORGANSKOG ĐUBRIVA "BIOPLANT FLORA" NA PRINOS ZRNA KRMNOG GRAŠKA (Pisum sativum ssp. arvense L.)</i>
II - 24	F. Kashta STUDY OF DRY MATTER ACCUMULATION AND YIELD OF SOME DURUM WHEAT GENOTYPES
II - 25	S. Barać, A. Đikić, I. Mihajlović, M. Biberdžić, B. Milenković, M. Aksić THE RESULTS OF EXPLOITATION TRIALS OF OUT-DIGGERS IN OUT-DIGGING THE MERCANTILE POTATO IN THE SONDITIONS OF NORTHERN KOSOVO AND METOHIA <i>REZULTATI EKSPLOATACIONIH ISPITIVANJA VADILICA PRI VAĐENJU MERKANTILNOG KROMPIRA U USLOVIMA SEVERNOG KOSOVA I METOHIJE</i>
II - 26	A. Canko GRAIN YIELD, TEST WEIGHT AND PROTEIN HERITABILITY AND GENOTYPE X ENVIRONMENT INTERACTION OF DURUM WHEAT
14 ⁰⁰	Lunch <i>Ručak</i>
16 ⁰⁰	Visit to orchards and vineyards Popovo polje ad Bus departure in 16 ⁰⁰ from the hotel Leotar parking Posjeta voćnjacima i vinogradima Popovo polje ad <i>Polazak autobusa u 16⁰⁰ ispred hotela Leotar</i>
19 ³⁰	Dinner <i>Večera</i>

Thursday, March, 27th, 2014
Četvrtak, 27. mart 2014.

9⁰⁰ - 14⁰⁰	Parallel Working Sessions Paralelne radne sekcije Section III: Agroecology and Rural Development <i>Sekcija III: Agrarna ekonomija i ruralni razvoj</i> Section IV: Fruit Growing and Viticulture <i>Sekcija IV: Voćarstvo i vinogradarstvo</i> Section V: Vegetable Growing, Medicinal Plants <i>Sekcija V: Povrtarstvo, Ljekovito bilje</i> Section VI: Plant Protection <i>Sekcija VI: Zaštita bilja</i> Section VII: Agroecology, Organic Agriculture, Soil Science <i>Sekcija VII: Agroekologija, Organska Poljoprivreda, Pedologija</i>
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Section III: Agroecology and Rural Development
Sekcija III: Agrarna ekonomija i ruralni razvoj

Big Hall, HET
Velika sala, HET

Oral presentation
Usmene prezentacije

Working Committee Danica Bošnjak, Dragić Živković, Nebojša Novković
Radno predsjedništvo

9⁰⁰-9¹⁰	D. Bošnjak, V. Rodić, J. Karapandžin CHANGES OF RELATIONS BETWEEN MATERIAL INPUTS AND ACHIEVED RESULTS IN SOY BEAN PRODUCTION ON FAMILY FARMS IN VOJVODINA <i>PROMENE ODNOSA MATERIJALNIH ULAGANJA I OSTVARENIH REZULTATA U PROIZVODNJI SOJE NA PORODIČNIM GAZDINSTVIMA U VOJVODINI</i>
9¹⁰-9²⁰	K. Huzeman, N. Novković FARM MANAGEMENT INFORMATION SYSTEMS: A CASE STUDY <i>INFORMACIONI SISTEM ZA UPRAVLJANJE GAZDINSTVOM: STUDIJA SLUČAJA</i>
9²⁰-9³⁰	Mirjanić S., Ostojić A., Vaško Ž., Rokvić G., Drinić LJ., Mrdalj V., Figurek A. ATTITUDES OF CONSUMER AND PRODUCER WITH RESPECT TO THE PURCHASE OF AGRICULTURE PRODUCTS AT GREEN AND LIVESTOCK MARKETS <i>STAVOVI POTROŠAČA I PROIZVOĐAČA U VEZI KUPOVINE POLJOPRIVREDNIH PROIZVODA NA PIJACAMA</i>
9³⁰-9⁴⁰	N. Novković, B. Mutavdžić, Ž. Ilin, D. Lazić

	RED PEPPER PRODUCTION CHARACTERISTICS ANALYSIS IN EUROPEAN UNION COUNTRIES <i>ANALIZA PROIZVODNIH OBELEŽJA PAPRIKE U ZEMLJAMA EVROPSKE UNIJE</i>
9⁴⁰-9⁵⁰	Z. Vasiljević, V. Zarić, V. Kovačević AGRICULTURAL INSURANCE IN REPUBLIC OF SERBIA <i>OSIGURANJE POLJOPRIVREDE U REPUBLICI SRBIJI</i>
9⁵⁰-10⁰⁰	Ž. Vaško IMPACT OF INPUT PRICES ON COMPETITIVENESS OF DOMESTIC AGRICULTURE <i>UTICAJ CIJENA INPUTA NA KONKURENTNOST DOMAĆE POLJOPRIVREDE</i>
10⁰⁰-10¹⁰	B. Vlahović, A. Puškarić <i>STANJE I PERSPEKTIVA MEĐUNARODNOG TRŽIŠTA PIVA</i>
10¹⁰-10²⁰	D. Živković, S. Jelić, B. Dimitrijević FAMILY FARMS AND POVERTY <i>PORODIČNA POLJOPRIVREDNA GAZDINSTVA I SIROMAŠTVO</i>
10²⁰-10³⁰	R. Svitlica, B. Torić, S. Stanojčić-Eminagić AGRICULTURAL ASSOCIATIONS IN BOSNIA AND HERZEGOVINA - CURRENT SITUATION <i>POLJOPRIVREDNA UDRUŽENJA U BOSNI I HERCEGOVINI - TRENUTNA SITUACIJA</i>
10³⁰-10⁴⁰	A. Perpar, D. Kastelec, A. Udovč USE OF MULTIVARIATE STATISTICAL METHODS FOR EXPLAINING THE DIFFERENCES IN THE DEVELOPMENT OF SLOVENIAN MUNICIPALITIES AND REGIONS
10⁴⁰-10⁵⁰	B. Gulan POSITION OF RURAL AREAS IN SERBIA <i>POLOŽAJ RURALNIH SREDINA U SRBIJI</i>
10⁵⁰-11⁰⁰	D. Brković INSTITUTIONAL ANALYSIS FOR LAG "VRŠATEC" <i>INSTITUCIONALNA ANALIZA LAG-A "VRŠATEC"</i>
11⁰⁰-11¹⁰	S. Potkonjak, T. Zoranović, K. Mačkić REGIONAL HYDROSYSTEMS TO SUPPORT RURAL DEVELOPMENT IN VOJVODINA PROVINCE
11¹⁰ - 12⁰⁰	Poster session and coffee break <i>Pregled postera i kafe pauza</i>
12⁰⁰-12³⁰	Discussion <i>Diskusija</i>

Poster presentation
Poster sekcija

Moderator Željko Vaško
Moderator

III - 1	U. Radojević, J. Milovanović, M. Arandelović POSSIBILITIES OF APPLYING ENVIRONMENTAL MODELING FOR CALCULATING BIOMASS PRODUCTION OF AGROENERGY CROPS <i>MOGUĆNOSTI PRIMENE EKOLOŠKOG MODELOVANJA ZA PRORAČUN PRODUKCIJE BIOMASE AGROENERGETSKIH USEVA</i>
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III - 2	M. Jovanović, A. Despotović, M. Joksimović IMPORTANCE AND ROLE OF FOOD INDUSTRY IN ECONOMIC AND REGIONAL DEVELOPMENT OF MONTENEGRO
III - 3	Lj. Drinić, A., Ostojić, A. Figurek TENDENCIES AND DIRECTIONS OF DEVELOPMENT OF THE FOOD INDUSTRY OF THE REPUBLIC OF SRPSKA <i>TENDECIJE I PRAVCI RAZVOJA PREHRAMBENE INDUSTRIJE REPUBLIKE SRPSKE</i>
III - 4	R. Stefanović CURRENT GLOBAL TRENDS IN FOOD SUPPLY <i>AKTUELNI SVETSKI TRENDOVI U SNABDEVANJU HRANOM</i>
III - 5	A. Ostojić, V. Mrdalj COMPETITIVENESS OF THE FRUITS AND VEGETABLES SECTOR AND CONDITIONS OF EXPORT TO EU MARKET <i>KONKURENTNOST SEKTORA VOĆA I POVRĆA REPUBLIKE SRPSKE I USLOVI IZVOZA NA TRŽIŠTE EU</i>
III - 6	N. Driouech, T. M. Chau Le, H. El Bilali, A. Abouabdillah, S. Berjan, S. Kocic, V. Milic, B. Govedarica URBAN AGRICULTURE IN CENTRAL AND EASTERN BOSNIA AND HERZEGOVINA
III - 7	S. Turudija Živanović, S. Ceranić, N. Novković, T. Živanović SWOT ANALYSIS OF SECTOR OF MEDICINAL AND AROMATIC PLANTS IN SERBIA <i>SWOT ANALIZA SEKTORA LEKOVITOG I AROMATIČNOG BILJA U SRBIJI</i>
III - 8	S. Trivković, B. Raičić, Z. Maličević ANALYSIS OF THE STORAGE SPACE IN REPUBLIC OF SRPSKA IN ORDER TO INCREASE AGRICULTURAL PRODUCTION <i>ANALIZA SKLADIŠNOG PROSTORA U REPUBLICI SRPSKOJ U CILJU POVEĆANJA POLJOPRIVREDNE PROIZVODNJE</i>
III - 9	P. Benka, J. Grabić, A. Bezdán, A. Salvai, R. Savić DESIGNING OF DRAINAGE CANALS NETWORK DURING LAND CONSOLIDATION PROCESS <i>IZRADA MREŽE KANALA ZA ODVODNJAVANJE U POSTUPKU UREĐENJA ZEMLJIŠNE TERITORIJE</i>
III - 10	M. Tratnik, S. Batič, F. Steinman, M. Černič Istenič, M. Pintar USE AND OPERATION OF WATER RESERVOIR AND IRRIGATION SYSTEMS – OPTIMIZATION THROUGH STAKEHOLDER PARTICIPATION
III - 11	Z. Črepinšek, L. Kajfez-Bogataj SLOVENIAN PHENOLOGICAL ARCHIVE AND ITS IMPORTANCE FOR AGRICULTURE
III - 12	G. Meta, S. Meta, E. Ibraliu MANAGEMENT ALBANIAN ECONOMY THROUGH THE BANKING SYSTEM
III - 13	M. Klodič, A. Udovč MODEL OF COOPERATIVE ACTION OF OLIVE GROWERS IN SLOVENIAN ISTRIA
III - 14	G. Maksimovic, R. Jovanovic, S. Mitrovic, T. Ivanovic ECONOMIC ADEQUACY OF BLACKBERRY IN RURAL AREAS OF SIRINIC DISTRICT
III - 15	A. Despotović, M. Jovanović, M. Joksimović

	FAMILY FARMS IN MONTENEGRO AS A FACTOR FOR DEVELOPMENT OF VILLAGE AND AGRICULTURE
	M. Nevoljica, S. Ceranić
III - 16	MISSION AND IMPORTANCE OF ADVISORY WORK FOR FARM BUSINESS IN SERBIA <i>ZADACI I ZNAČAJ SAVETODAVNOG RADA ZA POSLOVANJE POLJOPRIVREDNIH GAZDINSTAVA U SRBIJI</i>
	S. Berjan, J. Petrovic, T. M. Chau Le, H. El Bilali, A. Abouabdillah, N. Driouech,
III - 17	S. Kocic, D. Petrovic SAVING STRATEGIES OF RURAL HOUSEHOLDS IN EASTERN BOSNIA
	D. Jovanović, S. Milićević, I. Mačužić, M. Petrušić
III - 18	THE QUALITY OF NATURAL ENVIROMENT AND ORGANIC PRODUCTS IN MEETING THE EXPECTATIONS AND NEEDS OF TOURISTS

Session IV: Fruit Growing and Viticulture ***Sekcija IV: Voćarstvo i vinogradstvo***

Big hall, hotel LEOTAR
Velika sala, hotel LEOTAR

Oral presentations
Usmene prezentacije

Working Committee Tomo Milošević, Tomislav Jemrić, Zorica Ranković Vasić
Radno predsjedništvo

9⁰⁰-9¹⁰	T. Milošević, N. Milošević, I. Glišić, R. Nikolić EXPERIENCES WITH INVIGORATING SWEET CHERRY ROOTSTOCKS IN CACAK REGION (WESTERN SERBIA) WHEN USED FOR HIGH DENSITY PLANTING SYSTEM <i>ISKUSTVA SA BUJNIM PODLOGAMA ZA TREŠNJU U OBLASTI ČAČKA (ZAPADNA SRBIJA) KADA SU KORIŠĆENE ZA GUSTU SADNJU</i>
9¹⁰-9²⁰	T. Jemrić, P. Škrlec, G. Fruk, M. Skendrović Babojelić, M. Blažinkov, Z. Šindrak THE USE OF MYCORRHYZA IN FRUIT GROWING
9²⁰-9³⁰	Milivojević J., Radivojević D., Poledica M., Nikolić M., Dragišić Maksimović J. DOES THE MICROCLIMATE UNDER HAIL PROTECTION NET INFLUENCE PRODUCTIVITY AND FRUIT QUALITY OF BLUEBERRY CV. 'DUKE'?
9³⁰-9⁴⁰	D. Milić, B. Kalanović Bulatović, B. Dimitrijević THE ANTI-HAIL NETS AS A FACTOR RISK REDUCTION IN APPLE PRODUCTION <i>PROTIVGRADNE MREŽE KAO FAKTOR SMANJENJA RIZIKA U PROIZVODNJI JABUKE</i>
9⁴⁰-9⁵⁰	S. Gandev, V. Dzhuvinov EVALUATION OF SOME WALNUT CULTIVARS UNDER CLIMATIC CONDITIONS OF SOUTH BULGARIA
9⁵⁰-10⁰⁰	S. Stanivuković, G. Đurić, B. Pašalić SOLUBLE SOLID CONTENT IN THE CELL JUICE OF PEAR FRUIT FLESH

DEPENDING ON THE POSITION ON THE TREE
SADRŽAJ RASTVORLJIVE SUVE MATERIJE U ĆELIJSKOM SOKU MESA PLODOVA KRUŠKE U ZAVISNOSTI OD POLOŽAJA NA STABLU

10⁰⁰-10¹⁰	S. Gandev PRESENT SITUATION AND PROBLEMS OF WALNUT PROPAGATION METHODS
10¹⁰-10²⁰	Z. Ranković-Vasić, B. Radovanović, V. Pajić, Branislava Sivčev, Slavica Todić, Zoran Atanacković PHENOLIC COMPOUNDS AND ANTIOXIDANT ACTIVITY OF PINOT NOIR GRAPEVINE VARIETY
10²⁰-10⁴⁵	Poster session and coffee break <i>Pregled postera i kafe pauza</i>
10⁴⁵-11³⁰	Discussion <i>Diskusija</i>

Poster session
Poster sekcija

Moderator Miljan Cvetković
Moderator

IV – 1	D. Bodilović, N. Mičić, M. Cvetković IMPACT OF UNDERCUT TREATMENT ON FRUITING BRANCH IN INTENSIVE PLUM GROWING SYSTEMS <i>UTICAJ ZAHVATA PODSECANJA NOSAČA RODNOG DRVETA U INTENZIVNIM SISTEMIMA GAJENJA ŠLJIVE</i>
IV – 2	M. Ćopić, N. Mičić, M. Cvetković, G. Đurić MORPHOLOGICAL ANALYSIS OF POLLEN GRAIN OF SWEET CHESTNUT (<i>Castanea sativa</i> Mill.) <i>MORFOLOŠKA ANALIZA POLENOVOG ZRNA PITOMOG KESTENA (Castanea sativa Mill.)</i>
IV – 3	B. Đorđević, D. Đurović, G. Zec, Č. Oparnica, T. Vulić THE INFLUENCE OF SHOOTS AGE ON GENERATIVE POTENTIAL AND FRUIT QUALITY OF RED CURRANT (<i>Ribes rubrum</i> L.) CULTIVARS <i>UTICAJ STAROSTI IZDANAKA NA GENERATIVNI POTENCIJAL I KVALITET PLODOVA SORTI CRVENE RIBIZLE (Ribes rubrum L.)</i>
IV – 4	I. Kecman, S. Stojnić, B. Zorić, B. Karapetrović, D. Vidović, G. Stolić, M. Cvetković FEATURES NURSERY PRODUCTION IN THE REPUBLIC OF SRPSKA <i>KARAKTERISTIKE RASADNIČKE PROIZVODNJE NA TERITORIJI REPUBLIKE SRPSKE</i>
IV – 5	B. Lazović, M. Adakalić, S. Ljutica, T. Perović VARIABILITY OF OIL CONTENT IN FRUIT OF OLIVE VARIETY ŽUTICA ON MONTENEGRIN COAST <i>VARIABILITY OF OIL CONTENT IN FRUIT OF OLIVE VARIETY ŽUTICA ON MONTENEGRIN COAST</i>
IV – 6	M. Sušić MORPHOMETRIC CHARACTERISTICS OF CURRENT PLUM VARIETIES <i>POMOLOŠKE KARAKTERISTIKE AKTUELNIH SORTI ŠLJIVE</i>
IV – 7	Z. Šindrak, T. Jemrić, M. Maretić, M. Skendrović Babojelić, M. Marasović, T.

	Veljančić THE POMOLOGICAL CHARACTERISTICS OF LEMONS GROWN IN DALMATIA
IV - 8	Z. Alić-Džanović, M. Radović, B. Gaćeša, M. Kulina, O. Kurtović POMOLOGICAL PROPERTIES OF SOME CULTIVARS OF PLUM IN CONDITIONS OF SARAJEVO
IV - 9	Z. Alić-Džanović, M. Radović, O. Kurtović, B. Gaćeša, M. Kulina, M. Prlić THE YIELD SOME TOLERANT CULTIVARS OF PLUM IN TERMS OF SARAJEVO
IV - 10	Arnaudov V., Gandev S., Dimova M. SUSCEPTIBILITY OF SOME WALNUT CULTIVARS TO <i>GNOMONIA LEPTOSTYI</i> AND <i>XANTHOMONAS ARBORICOLA</i> PV. <i>JUGLANDIS</i> IN BULGARIA
IV - 11	V. Bursić, G. Vuković, B. Dedić, M. Meseldžija, D. Prvulović, Đ. Malenčić, M. Popovi COMPARISON OF HPLC-DAD AND LC-MS/MS FOR THE SEPARATION AND VALIDATION OF PHENOLIC ACIDS IN CHERRIES
IV - 12	D. Čekić EFFECTS OF THE SUBSTRATE, FRUIT POSITION ON THE TREE AND HARVEST TIME ON THE FRUIT MATURITY DEGREE IN THE VARIETIES OF RED DELICIOUS AND IDARED <i>UTICAJ PODLOGE, POZICIJE PLODA NA STABLU I VREMENA BERBE NA STEPEN ZRELOSTI PLODOVA KOD SORTI JABUKE CRVENI DELIŠES I AJDARED</i>
IV - 13	M. Ćizmović, R. Popović, B. Lazović, M. Adakalić, T. Perović FLORAL MORPHOLOGY CHARACTERIZATION OF SOME POMEGRANATE (<i>Punica granatum</i> L.) CULTIVARS GROWN IN MONTENEGRO
IV - 14	D. Drobnjak, Z. Keserović, B. Vračević, J. Simić THE EFFECT OF CHEMICAL FRUIT THINNING OF 'GOLDEN DELICIOUS' APPLE <i>HEMIJSKO PRORJEĐIVANJE PLODOVA JABUKE ZLATNI DELIŠES</i>
IV - 15	A. Džubur, R. Popović, G. Popović, S. Šoškić, M. Kulina IMPACT INDOLBUTERNE ACID ON PROPERTIES RIZOGENA RIPE CUTTINGS OF RED CURRANT (<i>Ribes rubrum</i> L.) <i>UTICAJ INDOLBUTERNE KISELINE NA RIZOGENA SVOJSTVA ZRELIH REZNICA CRVENE RIBIZLE (Ribes rubrum L.)</i>
IV - 16	P. Ilić, N. Mičić, G. Đurić DYNAMIC OF FLOWERING AND POLLEN VIABILITY OF HAZEL IN CONDITIONS OF NORTH-WEST REPUBLIC OF SRPSKA <i>DINAMIKA CVJETANJA I ŽIVOTNA SPOSOBNOST POLENA LIJESKE U USLOVIMA SJEVEROZAPADNE REPUBLIKE SRPSKE</i>
IV - 17	Jaćimović V., Božović Đ. IMMUNITY ON LOW TEMPERATURE, THE CAUSES OF DISEASES AND PESTS OF SELECTED CORNELIAN CHERRY GENOTYPES (<i>Cornus mas</i> L.) IN THE UPPER POLIMLJE REGION <i>OTPORNOST NA NISKE TEMPERATURE, PROUZROKOVAČE BOLESTI I ŠTETOČINE IZDOJENIH GENOTIPOVA DRIJENA (Cornus mas L.) SA PODRUČJA GORNJEG POLIMLJA</i>
IV - 18	M. Misimović, N. Zavišić, Ž. Lakić EFFECT OF AQUEOUS EXTRACTS ON BLACKBERRIES YIELD IN ORGANIC

	PRODUCTION <i>UTICAJ PRIMJENE VODENIH EKSRAKATA NA PRINOS KUPINE U ORGANSKOJ PROIZVODNJI</i>
IV - 19	M. Pajić, M. Dražić, V. Pajić, D. Radojičić, K. Gligorević, M. Oljača ENERGY ASPECTS OF EXPLOITATION OF PRUNING RESIDUES FROM APPLE PRODUCTION <i>ENERGETSKI ASPEKTI KORIŠĆENJA REZIDBENIH OSTATAKA IZ PROIZVODNJE JABUKA</i>
IV - 20	R. Popović, G. Popović, M. Čizmović, R. Prenkić, S. Šoškić APPLICATION BIOSTIMULATORS BENEFIT PZ INCREASE FRUIT WEIGHT IN LEMON MEYER (Citrus Meyer Y. Tan). PRIMJENA BIOSTIMULATORA BENEFITA PZ ZA POVEĆANJE MASE PLODA U LIMUNA MEJER (Citrus meyer Y.Tan)
IV - 21	R. Prenkić, A. Odalović, G. Šebek, M. Radunović INFLUENCE OF TIME AND THINING INTERSPACE ON YIELD AND QUALITY OF PEACH AND NECTARINE FRUIT IN MONTENEGRO
IV - 22	D. Prvulović, J. Šućur, B. Borković, M. Popović, Đ. Malenčić, M. Ljubojević, V. Ognjanov PHENOLIC CONTENT AND ANTIOXIDANT ACTIVITY OF SOUR CHERRY FRUITS CULTIVAR OBLAČINSKA <i>SADRŽAJ FENOLNIH JEDINJENJA I ANTIOKSIDATIVNA AKTIVNOST PLODA OBLAČINSKE VIŠNJE</i>
IV - 23	Radivojević D., Milivojević J., Miletić N., Zabrkić G. EFFICIENCY OF FRUITLET THINNING IN 'GOLDEN DELICIOUS' AND 'GRANNY SMITH' APPLES BY USE OF METAMITRON
IV - 24	M. Skendrović Babojelić, V. Crnjac, Z. Šindrak, T. Jemrić, T. Horvat FLOWERING PHENOLOGY OF FOUR APPLE CULTIVARS IN THE TERRITORY OF RAVNI KOTARI
IV - 25	S. Šoškić, R. Popović, Dž. Vukotić FEATURES OF YIELD OF PEACH DEPENDING ON THE DIFFERENT SYSTEMS AND REGIMES OF IRRIGATION <i>KARAKTERTISTIKE PRINOSA BRESKVE U ZAVISNOSTI OD RAZLIČITIH NAČINA I REŽIMA NAVODNJAVANJA</i>
IV - 26	T. Stoyanova, I. Minev, P. Minkow STUDY ON EARLY APPLE CULTIVARS ('PETROVKA') FROM THE GENE POOL OF TROYAN AND APRILTSI
IV - 27	B. Kalanović Bulatović, D. Milić, B. Sivčev FILLING-IN EMPTY SPACES IN VINEYARDS AS AN OPTION FOR COST REDUCTION <i>POPUNA PRAZNIH MESTA U VINOGRADIMA KAO MOGUĆNOST SMANJENJA TROŠKOVA</i>
IV - 28	I. Radojević, D. Nikolić, Z. Ranković-Vasić PRODUCTION AND TECHNOLOGICAL PROPERTIES OF CLONES CABERNET SAUVIGNON CULTIVAR IN THE NIS WINE-GROWING REGION
IV - 29	M. Garić, S. Barać, Z. Jovanović, M. Ristić, I. Radojević <i>AGROBIOLOŠKA I TEHNOLOŠKA SVOJSTVA KLONOVA SORTE BURGUNDAC SIVI (B - 10 I RULANDER 2/ 54) U NIŠKOM PODREJONU</i>
IV - 30	Z. Jovanović, B. Ćirković, M. Garić THE VEGETATIVE POTENTIAL OF THE VINE CULTIVAR WHITE

	TAMJANIKA IN THE CONDITIONS OF ŽUPA VINE DISTRICT T. Jovanović-Cvetković, D. Mijatović
IV – 31	AMPHELOMETRIC CHARACTERISTICS OF GRAPE BUNCH OF VARIETIES ZILAVKA AND BLATINA <i>AMPELOMETRIJSKE KARAKTERISTIKE GROZDA SORTI ŽILAVKA I BLATINA</i>
IV – 32	N. Marković, Z. Atanacković, Z. Ranković-Vasić, S. Matijašević DIFFERENT POTASSIUM FERTILIZERS DOSES AND THEIR IMPACT ON Ca:Mg AND K:Mg RATIO IN THE GRAPEVINE ORGANS
IV – 33	D. Mijatović, T. Jovanović Cvetković, D. Pantić, D. Jović EFFECT OF THE PRUNING ON THE SIZE OF CLUSTER OF THE TABLE GRAPES VARIETIES <i>UTICAJ DUŽINE REZIDBE NA VELIČINU GROZDA STONIH SORTI VINOVE LOZE</i>

Session V: Vegetable Growing, Medical Plant
Sekcija V: Povrtarstvo, Ljekovito bilje

Big hall, hotel LEOTAR
Velika sala, hotel LEOTAR

Oral presentations
Usmene prezentacije

Working Committee Alban Ibrailu, Mirjana Vasić, Zoran Jovović
Radno predsjedništvo

11 ³⁰ -11 ⁴⁰	Z. Jovović, A. Velimirović, D. Poštić, M. Šilj INVENTORIZATION, COLLECTING AND CONSERVATION OF POTATO GENETIC RESOURCES IN MONTENEGRO
11 ⁴⁰ -11 ⁵⁰	M. Vasić, J. Čota, M. Zdravković, V. Todorović, R. Lajšić ASSORTMENT OF DRY BEAN IN BOSNIA AND HERZEGOVINA <i>SORTIMENT PASULJA (GRAHA) U BIH</i>
11 ⁵⁰ -12 ⁰⁰	Đ. Moravčević, J. Gvozdanović Varga, A. Stojanović, D. Beatović, V. Todorović THE EFFECT OF PLANT DENSITY ON PHOTOSYNTHESIS PRODUCTIVITY AND YIELD OF SPRING GARLIC (<i>Allium sativum</i> L.) <i>UTICAJ GUSTINE USEVA NA PRODUKTIVNOST FOTOSINTEZE I PRINOS BELOG LUKA PROLETNJAKA (Allium sativum L.)</i>
12 ⁰⁰ -12 ¹⁰	E. Brkan, J. Pejičić THE INFLUENCE OF GRAFTING ON YIELD AND QUALITY OF WATERMELON <i>UTICAJ KALEMLJENJA NA PRINOS I KVALITET LUBENICE</i>
12 ¹⁰ -12 ²⁰	V. Nedović, T. Petrović, M. Mihajlović, M. Pešić, A. Sebők CAPINFOOD-IMPROVING THE ENABLING ENVIRONMENT AND PUBLIC AWARENESS FOR INNOVATION IN THE SOUTH-EAST-EUROPEAN FOOD SECTOR THROUGH TRANSNATIONAL COLLABORATION
12 ²⁰ -13 ⁰⁰	Poster session and coffee break <i>Pregled postera i kafe pauza</i>

13⁰⁰-13³⁰ Discussion
Diskusija

Poster session
Poster sekcija

Moderator Vida Todorović
Moderator

V - 1	A. Ibraliu, N. Kadiasi, J. Shehu, F. Elezi VARIABILITY OF ESSENTIAL OIL OF <i>MENTA PIPERITA</i> L. GROWING IN ALBANIA
V - 2	I. Tošić; V. Trkulja; I. Koleška; V. Todorović, M. Dardić HYBRID EFFECT ON THE YIELD OF TOMATO GROWN IN GREENHOUSE <i>UTICAJ HIBRIDA NA PRINOS PARADAJZA GAJENOG U PLASTENIKU</i>
V - 3	I. Tošić, Z. Golić, A. Radosavac EFFECTS OF BIOFERTILIZERS APPLICATION ON THE LETTUCE YIELD (<i>Lactuca sativa</i> L.) <i>EFEKTI PRIMJENE BIOFERTILIZATORA NA PRINOS ZELENE SALATE (Lactuca sativa L.)</i>
V - 4	E. Brkan, J. Pejičić APPLICATION OF ORGANIC LIQUID NUTRIENT VINASSE IN PEPPER PRODUCTION <i>PRIMJENA ORGANSKOG TEKUĆEG HRANJIVA VINASSE U PROIZVODNJI PAPRIKE</i>
V - 5	M. S. Cherfaoui INFLUENCE OF ENRICHMENT OF GREENHOUSE AIR CARBON DIOXIDE ON GROWTH AND PRODUCTIVITY: TOMATO (<i>LYCOPERSICON esculentum</i> Miller), PEPPER (<i>CAPSIUM annuum</i> L.) AND CUCUMBER (<i>CUCUMIS sativus</i> L.)
V - 6	J. Čota, J. Čota, A. Hadžić, M. Šilj QUANTITATIVE AND QUALITATIVE CHARACTERISTICS OF NEW VARIETIES OF ONIONS <i>KVALITATIVNE I KVANTITATIVNE OSOBINE NOVIH SORTI CRVENOG LUKA</i>
V - 7	V. Rašković, R. Stepić, V. Milošević, B. Kovačević, M. Veselić IMPORTANCE OF THE CHOICE VARIETIES OF TOMATOES ON THE DYNAMICS OF THE YIELD AND THE AMOUNTS OF REALIZED INCOME <i>ZNAČAJ IZBORA SORTE PARADAJZA NA DINAMIKU FORMIRANJA PRINOSA I VISINU OSTVARENOG BRUTO PRIHODA</i>
V - 8	D. Beatović, S. Jelačić, Đ. Moravčević, V. Zarić USE OF HOME-MADE RAW MATERIAL IN ECHINACEA (<i>Echinacea</i> sp.) AND THYME (<i>Thymus vulgaris</i>) NURSERY PLANT PRODUCTION <i>PRIMENA DOMAĆIH SIROVINA U PROIZVODNJI RASADA ECHINACEJE (Echinacea sp.) I TIMIJANA (Thymus vulgaris)</i>
V - 9	S. Zeljković, N. Parađiković, U. Šušak, M. Tkalec GROWTH AND DEVELOPMENT OF BASIL TRANSPLANTS (<i>Ocimum basilicum</i> L.) UNDER BIOSTIMULANTS APPLICATION <i>RAST I RAZVOJ RASADA BOSILJKA (Ocimum basilicum L.) POD UTICAJEM BIOSTIMULATORA</i>

Session VI: Plant Protection
Sekcija VI: Zaštita biljaka

Small hall, hotel LEOTAR
Mala sala, hotel LEOTAR

Oral presentations
Usmene prezentacije

Working Committee Brankica Tanović, Dragana Božić, Snježana Hrnčić
Radno predsjedništvo

8³⁰-8⁴⁰	B. Tanović, B. Mirković, J. Hrustić, M. Mihajlović, M. Stević, G. Delibašić, P. Vukša FUNGI ASSOCIATED WITH RASPBERRY DISEASES IN SERBIA
8⁴⁰-8⁵⁰	I. Stančić, S. Petrović, J. Živić, D. Knežević THE EFFECT OF THE INTERACTION OF FUNGICIDES ON THE PATHOLOGICAL CHANGES OF SUGAR BEET SEEDLINGS <i>UTICAJA INTERAKCIJE FUNGICIDA NA PATOLOŠKE PROMENE KLIJANACA ŠEĆERNE REPE</i>
8⁵⁰-9⁰⁰	D. Delić, M. Afechtal, K. Djelouah, B. Lolić, A. Karačić MOLECULAR IDENTIFICATION OF <i>CITRUS TRISTEZA VIRUS</i> <i>MOLEKULARNA IDENTIFIKACIJA CITRUS TRISTEZA VIRUS</i>
9⁰⁰-9¹⁰	B. Lolić, G. Perković, Z. Đurić, S. Hrnčić, D. Delić THE TWO-YEAR STUDY OF MAIZE REDNESS DISEASE IN BOSNIA AND HERZEGOVINA <i>DVOGODIŠNJA ISTRAŽIVANJA CRVENILA KUKURUZA U BOSNI I HERCEGOVINI</i>
9¹⁰-9²⁰	D. Marisavljević THE PRIORITIZATION PROCESS FOR INVASIVE ALIEN PLANTS <i>PROCES PRIORIZACIJE INVAZIVNIH BILJAKA</i>
9²⁰-9³⁰	D. Božić, S. Vrbnicanin, M. Saric-Krsmanovic, G. Malidza FITNESS OF TRIBENURON-METHYL RESISTANT SUNFLOWER HYBRID
9³⁰-9⁴⁰	B. Nježić, R.U. Ehlers POSSIBILITIES OF CONTROL OF PLUM SAWFLIES <i>Hoplocampa minuta</i> and <i>H. flava</i> BY ENTOMOPATOGENIC NEMATODES <i>MOGUĆNOSTI KONTROLE OSICA ŠLJIVE Hoplocampa minuta i H. flava ENTOMOPATOGENIM NEMATODAMA</i>
9⁴⁰-10⁰⁰	Poster session and coffee break <i>Pregled postera i kafe pauza</i>
10⁰⁰-10³⁰	Discussion <i>Diskusija</i>

Poster session

Poster sekcija

Moderator Duška Delić

Moderator

VI - 1	T. Perović, S. Hrnčić, M. Čizmović OLIVE WEEVIL <i>Rhynchites cribripennis</i> Desbrochers (COLEOPTERA: ATTELABIDAE) IMPORTANT OLIVE PEST IN MONTENEGRO <i>SURLAŠ MASLINE Rhynchites cribripennis Desbrochers (COLEOPTERA: ATTELABIDAE) ZNAČAJNA ŠTETOČINA MASLINE U CRNOJ GORI</i>
VI - 2	Y. Dimitrov, N. Palagacheva, L. Dospatliev EFFICIENT PEST CONTROL OF POLLEN BEETLE (<i>MELIGETHES AENEUS</i> F.) AND POSSIBILITIES FOR PROTECTING THE POLLINATORS IN OILSEED RAPE AGROCENOSIS
VI - 3	M. Dimova, M. Titjnov, V. Arnaudov, S. Gandev THE HARMFUL EFFECT OF CHERRY LEAF SPOT (<i>BLUMERIELLA JAAPII</i>) ON SOUR CHERRY AND THE INFLUENCE ON FRUIT YIELD
VI - 4	S. Gudžić, N. Delečić, N. Gudžić, M. Aksić, K. Nikolić, S. Stojković INCIDENCE AND INTENSITY OF WHEAT POWDER MILDEW IN VARIOUS MINERAL NUTRITION REGIMES AFTER LIMING <i>POJAVA I INTENZITET PEPELNICE PŠENICE PRI RAZLIČITIM REŽIMIMA ISHRANE NAKON KALCIFIKACIJE</i>
VI - 5	Z. Kovačević, B. Kelečević, S. Mitrić INVASIVE WEEDS IN BOSNIA AND HERZEGOVINA <i>INVAZIVNI KOROVI U BOSNI I HERCEGOVINI</i>
VI - 6	M. Marković, S. Rajković, Lj. Rakonjac, A. Lučić CHANGE OF THE MODULUS OF ELASTICITY OF OAKWOOD UNDER THE INFLUENCE OF FUNGUS <i>Coniophora puteana</i>
VI - 7	M. Meseldžija, V. Bursić, G. Vuković, S. Miroslavljević PRESENCE OF TRIAZINE HERBICIDES AND THEIR METABOLITES IN CANAL WATER
VI - 8	P. Mitrović, Ž. Milovac, V. Trkulja, B. Jocković, V. Radić, M. Jocković, A. Marjanović-Jeromela THE POSSIBILITY OF SPREADING LEPTOSPHAERIA MACULANS and LEPTOSPHAERIA BIGLOBOSA RAPESEED
VI - 9	A. Stanić, P. Nikolić, N. Grujić, S. Hrnčić, B. Nježić PLANT-PARASITIC NEMATODES OF MUNICIPALITIES TREBINJE AND LJUBINJE <i>FITOPARAZITNE NEMATODE NA PODRUČJU OPŠTINA TREBINJE I LJUBINJE</i>
VI - 10	R. Stepić, V. Milošević, V. Rašković, N. Stošić, V. Stepić WEED VEGETATION IN ROW CROPS OF WESTERN SREM <i>KOROVSKA VEGETACIJA OKOPAVINA ZAPADNOG SREMA</i>
VI - 11	S. Tanasković, M. Vasić, I. Sivčev, M. Madić, D. Đurović, A. Paunović, D. Knežević NUMBER OF COUGHT SPECIMENS OF WESTERN CORN ROOTWORM (<i>Diabrotica virgifera virgifera</i> LeConte, Col.: Chrysomelidae) ON PHEROMON AND YELLOW STICKY TRAP IN FIELD OF DIFFERENT HISTORY
VI - 12	S. Vrbančanin, D. Božić, D. Pavlović, D. Stojicević

	RESPONSE OF <i>SORGHUM HALEPENSE</i> (L.) PERS. TO NICOSULFURON
VI - 13	J. Živić, I. Stančić, S. Petrović, D. Knežević BIOLOGICAL METHODS OF DETECTION AND NUMEROSITY CONTROL OF <i>TUTA ABSOLUTA</i> ON TOMATO <i>BIOLOSKE METODE DETEKCIJE I KONTROLE BROJNOSTI TUTA ABSOLUTA NA PARADAJZU</i>
VI - 14	Z. Maličević, B. Raičić, D. Mitrović, J. Turan INFLUENCE OF THE CALIBRATION, TARAGE AND ADJUSTMENTS OF THE MODERN ATOMIZER ON THE QUALITY OF APPLICATION <i>UTICAJ KALIBRACIJE, BAŽDARENJA I PODEŠAVANJA ATOMIZERA SAVREMENE KONCEPCIJE NA KVALITET APLIKACIJE</i>

Session VII: Agroecology, Organic Agriculture, Soil Science

Sekcija VII: Agroekologija, Organska poljoprivreda, Pedologija

Small hall, Hotel LEOTAR
Mala sala, hotel LEOTAR

Oral presentations
Usmene prezentacije

Working Committee Mile Dardić, Besnik Gjongecaj, Nataša Sarap
Radno predsjedništvo

10 ³⁰ -10 ⁴⁰	M. Dardić, Ž. Lakić ORGANIC AGRICULTURE AS A PRODUCTION CHALLENGE IN PRESERVATION OF THE ENVIRONMENT <i>ORGANSKA POLJOPRIVREDA KAO PROIZVODNI IZAZOV U OČUVANJU ŽIVOTNE SREDINE</i>
10 ⁴⁰ -10 ⁵⁰	J. Karapandžin, V. Rodić, D. Janković, D. Bošnjak MEASURING ENVIRONMENTAL WORLDVIEW AMONG STUDENTS OF AGRICULTURE <i>MERENJE PROEKOLOŠKE ORIJENTISANOSTI STUDENATA POLJOPRIVREDE PRIMENOM NEP SKALE</i>
10 ⁵⁰ -11 ⁰⁰	A. Radosavac, N. Jović THE EFFECT OF ADDITIVES IN HEAVY FUEL OIL ON THE ECOLOGICAL AND ECONOMIC CHARACTERISTICS
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11 ¹⁰ -11 ²⁰	R. Cvejić, S. Marković, M. Pintar SUCCESSSES AND BARRIERS TO IRRIGATION DEVELOPMENT:

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11²⁰-11³⁰	B. Gjongecaj, A. Bardhi CLASSIFICATION OF THE ALBANIAN CLIMATE BASED ON THE COMBINATION BETWEEN POTENTIAL EVAPOTRANSPIRATION ANI RAINFALL
11³⁰-11⁴⁰	V. Miličić, M. Pintar, A. Udovč APPLICABILITY OF AGENT-BASED MODELLING IN PREDICTING LAND USE CHANGES IN THE MUNICIPALITY OF KOPER IN SLOVENIA
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Moderator Mihajlo Marković
Moderator

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VII - 2	D. Banjak ASSESSMENT OF IRRIGATION WATER SUITABILITY OF THE SUŠICA RIVER CATCHMENT, TRIBUTARY OF THE TREBIŠNJICA RIVER
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VII - 4	N. Sarap, I. Đalović, S. Šeremešić, D. Milošev, M. Janković, P. Mitrović THE GROSS ALPHA AND BETA RADIOACTIVITY CONCENTRATION OF CHERNOZEM SOIL FROM STATIONARY EXPERIMENTS
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VII - 6	Djikić A, Gudžić N., Aksić M., Barac A. OVERBURDEN MATERIALS OF KOSOVO COAL MINES, AS A SUBSTRATE FOR SEMIRECLAMATION
VII - 7	M. Glavan, M. Pintar, J. Urbanc IMPACT OF AGRICULTURE ON NITRATE-NITROGEN (NO ₃ -N) LEACHING IN WATER PROTECTED AREAS - THE RIVER DRAVA ALLUVIAL PLAIN, SLOVENIA
VII - 8	Z. Golić, N. Malić, M. Marković MICROBIOLOGICAL ACTIVITY OF DEPOSOL IN PROCESS OF RECULTIVATION AT THE LOCATION OF COAL MINE STANARI <i>MIKROBIOLOŠKA AKTIVNOST DEPOSOLA U PROCESU REKULTIVACIJE NA</i>

<i>LOKACIJI RUDNIKA UGLJA STANARI</i>	
VII - 9	N. Gudžić, M. Aksić, A. Đikić, J. Knežević, S. Gudžić EFFECT OF LONG-TERM PHOSPHORUS FERTILIZATION ON AGROCHEMICAL PROPERTIES OF ACIDIC CLAY SOIL AND THE CONTENT OF AVAILABLE Fe, Mn AND Zn <i>UTICAJ VIŠEGOGODIŠNJEG ĐUBRENJA FOSFOROM NA OSNOVNE MAGROHEMIJSKE OSOBINE BESKARBONATNE SMONICE I SADRŽAJ PRISTUPAČNOG Fe, Mn i Zn</i>
VII - 10	L. Kajfež Bogataj, Z. Črepinšek CLIMATE CHANGE AS A COMPLEX PROCESS IN BALKAN REGION
VII - 11	M. Pintar, R. Cvejić, M. Glavan, M. Tratnik, V. Zupanc GOING WITH THE FLOW: RESPONSIBLE USE OF WATER IN AGRICULTURE
VII - 12	S. Rajkovic, M. Markovic, R. Rajkovic, D. Mitic, Lj. Rakonjac, A. Lucic DAMAGE ASSESMENT OF ASSIMILATION ORGANS AGAINST OZONE
VII - 13	R. Savić, A. Bezdan, J. Josimov-Dunderski, Lj. Letić, V. Nikolić, G. Ondrašek WATER QUALITY DEGRADATION OF THE KRIVAJA WATERCOURSE <i>DEGRADACIJA KVALITETA VODE VODOTOKA KRIVAJA</i>
VII - 14	V. Zupanc, R. Cvejić, M. Pintar RECOLTIVATION OF AGRICULTURAL LAND AFTER CONSTRUCTION OF HYDROPOWER PLANT BASIN
VII - 15	J. Shehu, A. Imeri, A. Ibraliu, A. Mullaj, L. Kashta FLORA AND VEGETATION OF KANINA CASTLE IN VLORA DISTRICT (ALBANIA)
VII - 16	J. Shehu, A. Imeri, A. Ibraliu, A. Mullaj FLORA AND VEGETATION OF AMPHITHEATRE WALL IN DURRËS DISTRICT (ALBANIA)
VII - 17	F. Karahan DETERMINING OF THE PLANT SPECIES TO REMAIN UNDER PAZARYOLU DAMP LAKE, CHORUH VALLEY
14⁰⁰	Lunch <i>Ručak</i>
16³⁰	Round table: Organization of plant protection prognostic service <i>Okrugli sto: Organizacija rada prognozno-izvještajne službe</i> Uvodničari: – Stane Klemenčič, Kmetijsko gozdarski zavod Maribor, – Dragica Janković, Prognozno-izvještajna služba zaštite bilja AP Vojvodine, – Boris Pašalić, pomoćnik ministra poljoprivrede, šumarstva i vodoprivrede u Vladi Republike Srpske u Resoru za pružanje stručnih usluga u poljoprivredi Republike Srpske, – Gordana Rokvić, Poljoprivredni fakultet, Banja Luka, – Igor Marčeta, Udruženje voćara "Integralna proizvodnja voća".
20⁰⁰	Gala dinner <i>Svečana večera</i>

Friday, March 28th, 2014
Petak, 28. mart 2014.

DAN ZA POLJOPRIVREDNE PROIZVOĐAČE

	Velika sala, hotel Leotar
10⁰⁰ - 10⁴⁵	Dragutin Matarugić, Poljoprivredni fakultet, Banja Luka <i>Otkrivanje estrusa u krava</i>
10⁴⁵ - 11³⁰	Đorđe Savić, Poljoprivredni fakultet, Banja Luka <i>Šta nam može reći mlijeko?</i>
11³⁰ - 11⁴⁵	Dubravka Bujić, Saša Dragičević, Resor za pružanje stručnih usluga u poljoprivredi Republike Srpske <i>Stanje Registra uzgajivača kvalitetno priplodne stoke i Centralni registar muških matičnih grla</i>
	Mala sala, hotel Leotar
10⁰⁰ - 10³⁰	Vida Todorović, Poljoprivredni fakultet, Banja Luka <i>Mogućnosti proizvodnje povrća van glavne proizvodne sezone</i>
10³⁰ - 10⁴⁵	Siniša Šišić, Kompanija BASF <i>Zaštita povrća</i>
10⁴⁵ - 11¹⁵	Miljan Cvetković, Poljoprivredni fakultet, Banja Luka <i>Formiranje uzgojnog oblika kajsije i višnje</i>
11¹⁵ - 11³⁰	Siniša Šišić, Kompanija BASF <i>Zaštita voćaka</i>
11³⁰ - 11⁴⁵	Sreten Rilak, kompanija Galenika Fitofarmacija a.d., Zemun <i>Zaštita vinove loze sa posebnim osvrtom na najznačajnije prouzrokovane bolesti i štetočine</i>
	Crveni salon, hotel Leotar
10⁰⁰ - 11³⁰	Okrugli sto <i>Mogućnosti podrške proizvodnji duvana</i> Učestvuju: – predstavnici <i>FABRIKE DUVANA BANJA LUKA</i> – predstavnici kompanije <i>BULGARTABAC</i> – predstavnici proizvođača duvana iz Istočne Hercegovine, Semberije i Posavine
13⁰⁰	Conclusions and closing of Symposium <i>Zaključci i zatvaranje Simpozijuma</i>

PLENARY SESSION

BIOLOGICAL CONTROL IN EUROPE

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Biodiversity provides a huge potential for the development of biological control agents (BCAs). The biocontrol industry, represented by the International Biocontrol Manufacturers Association (IBMA), has commercialised many of these BCAs. Products are almost exclusively used in inundative control, also to improve plant health and yields. Driving forces for biological control have been the development of fungicide and insecticide resistance, problems with chemical residues in food, the consumer-orientated policy of retailers in Europe and more stringent EU pesticide legislation, which now prioritises non-chemical control measures. Whereas biocontrol is the dominant approach in glasshouse IPM in Europe, the use in outdoor agriculture is still limited, but steadily increasing. The structure of biocontrol industry is consolidating. Growing profits capitalised small and medium sized enterprises (SMEs), which permitted major investments into production facilities, registration of new products and improved marketing. Recent mergers of SMEs provided the opportunity to form larger product portfolios. Whether recent acquisitions of biocontrol companies by transnational chemical companies will enhance the role of biocontrol in IPM practice, will be noticeable within the next few years. Major constrains for biocontrol are lacking acceptance of growers, long-lasting and expensive authorisation of BCA products and authorisation of chemical products for minor use or emergency situation (Article 53 EC regulation 1107/2009). Policy makers want to promote reduction of chemical pesticides as documented in the Sustainable Use Directive (2009/128/ EC), but still underestimate the potential contribution biocontrol products can provide to improve IPM. Several examples of successful implementation of biological control measures will be presented.

ROLES OF COOPERATIVES IN THE POST SOCIALIST PERIOD AND FACTORS INFLUENCING FARMERS' WILLINGNESS TO COOPERATE FOR MARKETING THEIR PRODUCTS

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The presentation in the first part presents an overview of the situation in the agricultural cooperative movement in the post socialist period with some emphasis on the case of Slovenia. Cooperatives have in Slovenia an uninterrupted traditions of over hundred and forty years, where in different political systems they have had different roles. We focus on the development in the period after the adoption of the Cooperative act in 1992, with the focus on the situation in last decade. Based on the literature review we analysed the performance of the cooperatives, their governance structure and market position. Further we present the future prospect of the cooperatives' development in Slovenia. In the second part of the presentation we than focus on the analysis of the factors influencing farmers' willingness to cooperate for marketing their products. Also in this analysis we have focused on the cooperation within the cooperatives where we compare the results of the international research projects' results and the result of the analysis of the situation in the Slovenian agricultural sector. The research on influencing factors was divided into three topics, namely business organizational analysis of the effectiveness of the organizational form of integration, survey-based analysis of the views of farmers on cooperation and evaluation of factors that affect the willingness to networking, and organizational and legal analysis of the various forms of integration of farmers. The results of the survey analysis shows that the opinion on the adequacy and effectiveness of the participation of farmers in agricultural cooperatives in Slovenia is quite divided. The majority of the farmers participating in the study even believe that farmers can better market their products themselves and that they do not need the help of existing cooperative business relationships. Most evident causes for such thinking can be found in the way the division of the possible operating surplus of cooperatives is established and in the lack of mutual information on the results of operations of the cooperative. Moreover, the majority of respondents in the survey believe that the cooperative is not good enough source of information for the development of their activities. However, due to the way the decision-making is done by the management often the members who are in decision-making bodies are favored. This kind of critical thinking can be seen especially by small and medium - sized farmers, where the sense of unequal position with regard to service the cooperatives offer to larger farmers prevail. Similarly critical to cooperatives are the former cooperative members. The survey also observed that the members who exited do not wish to re- integrate their business with the cooperative. These results are in high congruity with the results of the similar researches in other post-socialist countries. Farming in the future will be based on three interdependent and balanced pillars - economic, social and environmental. Regarding the organizational business principles and including the strong principles of social entrepreneurship, we believe that as an organizational form cooperatives are those who would best help in the construction of these pillars and achievement of the objectives. In addition, the cooperatives as in many cases an important owners of food processing industry also preserve the local environment and provide a long-term conservation of agricultural production, while ensuring traceability of product quality and safe food for the consumer.

ANIMAL PRODUCTION AND HUSBANDRY IN THE CZECH REPUBLIC AND THE EU

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The Czech Republic attended to EU on 1st May 2004. Regarding to cattle, after attendance CZ to the EU were and still is declines in the numbers of animals, which was started after the collapse of the communist bloc in 90's. The number of dairy cows in the EU-28 in 2012 stood at 23.204 million, an increase of 0.7% from 2011. Highest number of dairy cows in the EU has Germany (4.190,500 dairy population). Malta being the smallest milk producer held just 6,300 dairy cows in 2012. Dairy cows population in Czech republic is 367,100 cows. Between 2011 and 2012 the country with the largest fall in dairy cows both in percentage and numerical terms was Poland, where numbers fell by 4.1% (100,000 dairy cows) to 2 346 million dairy cows. The main product in term of GDP is milk. Farm milk production in EU-27 increased by 18 % between 2001 and 2011, to a total of 156 million tonnes. Milk production in Czech republic is around 2 741 million liters. Among the Member States, Germany and France recorded the largest quantities of milk collected in 2011, as well as the highest production levels of butter and cheese. Dairies collected 142 million tonnes, 98 % of which was cows' milk. Specialised farms had on national average between 3 and 141 dairy cows, in CZ there is more than 150 dairy cows in one stable. Milk is used either on farms or processed in dairies. Gross indigenous production of beef/veal for the EU-27 was in 2013 7 595 000 t. In case of pig meat was production 22 453 000 tons; production of poultry meat was 11 929 000 t. Meat per capita consumption projections (2013) in the EU was: beef/veal 16,6 kg/head; pork 42,9 kg/head; poultry 24.1 kg/head; sheep/goat 2.6 kg/head. Total consumption of EU-27 was 86.2 kg/head.

Key words: EU, agronomy, cattle, production

Acknowledgment: This research was supported by grant project FA MENDELU IGA TP 2014

ORAL PRESENTATION

Section 1. Animal Production

**INTRODUCTION OF GENETICALLY MODIFIED ORGANISMS (GMOS)
THREAT AND HEALTH BENEFITS OF ANIMALS AND CITIZENS OF THE R.
MACEDONIA**

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Genetically modified organisms (GMO) are organisms whose genetic modification of heritable genetic material (DNA) is planned amendment to the unnatural way by applying modern techniques of genetic engineering, or, gene or genes from one organism are inserted into another organism. What in nature with a natural breeding would never be created. GMO source of modified laboratory (food, supplements and various additives), which differ from natural foods in the composition of their genes, which carry the genetic material of plant species and some animal species. Scientists and environmentalists have found that GM food and feed, pose a threat - negative changes to human health, animals and the surrounding environment. Because using the diet can cause various allergies, weakened immunity, the occurrence of sterility, faster aging, secretion of toxins, cancer, dementia, causing impairment and other diseases. Despite this threat, there are positive benefits appear as: prevention of diseases, obtaining products with greater nutritional value, crops more resistant to pests, diseases, pesticides and climatic influences. At the conference in Asilmar (1975), the topic of the discussion was the danger connected with the application of genetic engineering (GI) and the conclusion was, use of this technology should be controlled by the state, to the moment when with security will be known that it is harmless. Legal regulations that governs this area, according to the Agency for Food and Veterinary, R. Macedonia is the Law on GMOs, Official Journal of Republic Macedonia, no. 35 of 14.03.2008 and amendments to the Law on GMOs, Official Journal of Republic Macedonia, no. 163 of 26.11.2013. That fully complies with EU legislation, which is considered one of the most restrictive and most rigorous in terms of meeting the requirements for safety. Regulations on the manner and conditions of marketing of GMO animal feed, which supposed to come into force on 26.11.2013, were withdrawn. In Republic Macedonia competent authorities claim that there are no GMO foods, so far has no submitted such a request and has not issued a single permit to import. The food that is imported for feeding animals must have a certificate confirming that not contain GMOs.

Key words: GMO, GM, GI, environment, health, law.

CONTROL OF CORN SILAGE QUALITY ON FARMS FOR MILK PRODUCTION IN NORTHERN BIH

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The goal of the research was to monitor the quality of corn silage on farms in the period from 2008. to 2012th year , and to compare the quality of silage by years of research . The analysis of corn silage at 65 farms in the northern part of Bosnia and Herzegovina has been done, where is the largest production of raw milk in about 85 % of total production in Bosnia and Herzegovina. Samples for analysis were taken in 2008, 2010 and 2012. The following parameters of corn silage quality were determined: acidity (pH), crude protein (CP), crude fiber (SC) and moisture content (SV). The quality of corn silage varies much more in one year, by the farms, than by years of production, although the agro-climatic conditions for production were different in the years of production (particularly drought in 2012). The medium value of SP by years of research is in 2008 - 6.94 %, 2010 - 6.82 % and in 2012th was 6.31 %. The low level of protein indicates a bad choice of hybrids for sowing and storing silage at a later stage of corn development. The acidity (pH), the medium value by year of research is in 2008 - 3.81, in 2010 - 4.03 and in 2012 - 4.01. The acidity is in the limits of optimal values for corn silage. The medium value of SC by years of research is in 2008th 31.69 %, 2010 - 31.9 % and in 2012 - 33.99 %. The high content of cellulose is an indicator of storing corn silage in later stage of corn maturation. Moisture content, the medium value by years of the research is in 2008 - 68.48 %, 2010 - 68.75 % and in the 2012 - 68.43 %. The moisture content is within the optimum values for corn silage.

Keywords: silage, protein, cellulose, acidity, humidity

KONTROLA KVALITETA KUKURUZNE SILAŽE NA FARMAMA ZA PROIZVODNJU MLIJEKA U SJEVERNOM DIJELU BIH

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Cilj istraživanja je bio pratiti kvalitet kukuruzne silaže na farmama u periodu od 2008. do 2012. godine, i uporediti kvalitet silaže po godinama istraživanja. Urađena je analiza kukuruzne silaže na 65 farmi iz sjevernog dijela Bosne i Hercegovine, gdje je i najveća proizvodnja sirovog mlijeka, oko 85% od ukupne proizvodnje u BiH. Uzorci za analizu su rađeni 2008., 2010. i 2012. godine. Utvrđivani su slijedeći parametri kvaliteta kukuruzne silaže: kiselost (pH), sirovi proteini (SP), sirova celuloza (SC) i sadržaj vlage (SV). Kvalitet kukuruzne silaže puno više varira u jednoj godini, po farmama, nego po godinama proizvodnje, mada su agroklimatski uslovi proizvodnje bili različiti u godinama proizvodnje (izrazita suša 2012. godine). Srednja vrijednost SP po godinama istraživanja je 2008. godine 6,94%, 2010. godine 6,82% i 2012. godine 6,31%. Nizak nivo proteina ukazuje na loš izbor hibrida za sjetvu i spremanje silaže u kasnijoj fazi razvoja kukuruza. Kiselost (pH), srednja vrijednost po godinama istraživanja je 2008. godine 3,81, 2010. godine 4,03 i 2012. godine 4,01. Kiselost je granicama optimalne vrijednosti za kukuruznu silažu. Srednja vrijednost SC po godinama istraživanja je 2008. godine 31,69%, 2010. godine 31,9% i 2012. godine 33,99%. Visok sadržaj celuloze je pokazatelj spremanja kukuruzne silaže u kasnijoj fazi zrenja kukuruza. Sadržaj vlage, srednja vrijednost po godinama istraživanja je 2008. godine 68,48%, 2010. godine 68,75% i 2012. godine 68,43%. Sadržaj vlage je u granicama optimalne vrijednosti za kukuruznu silažu.

Ključne riječi: silaža, protein, celuloza, kiselost, vlaga

INFLUENCE OF NUTRITION OF HIGHYIELDING COWS ON QUANTITY AND QUALITY OF MILK

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In the spring-summer parameters nutrition of milk cows and their influence on quantity and quality of milk were analyzed on a farm with 100 cows of Holstein-fresian breed. In this paper shown the results of production and chemical composition of milk on 30 cows in different phases of lactation divided into two groups (control and experimental). On I control group who feed with standard way of nutrition (ration who used on the farm) average daily production of milk per cow is 22.49 kg with the following chemical composition of milk: average daily content of milk fat is 3.75%, protein 3.57%, lactose 4.65%, nonfat dry matter 9.56% and total dry matter 13.31%. On II experimental group who feed with norming ration average daily production of milk per cow is 24.04 kg with the following chemical composition of milk: average daily content of milk fat is 3.99%, protein 3.57%, lactose 4.65%, nonfat dry matter 9.58% and total dry matter 13.57%. Getting results shown increase milk production for 1.55 kg-6.89% and better chemical composition of milk into experimental group of cows. Dry matter from 13.31% increase to 13.57%-1.95%, milk fat content from 3.75 to 3.99%-6.4%, NFDm from 9.56 to 9.58%-0.21%, then content of protein and lactose stay on equal level. Determinated that the norming nutrition have influence on increase production and better chemical composition of milk without necessary spend high level of nutrient i.e. nutrition of cows into recommended normative.

Key words: high productive cows; nutrition, dairy, chemical composition of milk

UTICAJ ISHRANE VISOKOPROIZVODNIH KRAVA NA KOLICINU I KVALITET MLEKA

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Na kravarskoj farmi MILKO-HF u Prilepu, R. Makedonija sa kapacitetom oko 100 krava Holstajnfrijske rase u periodu prolece-ljeto 2005 godine analizirani su parametri ishrane na krava muzara podeljene u dve grupe (kontrolna i ogledna), te njihov uticaj na kolicinu i kvalitet mleka. U radu su izneti rezultati o proizvodnju i hemijskom kvalitetu mleka kontrolne i ogledne grupe krava. Kod I (kontrolne) grupe koja su hranjena sa vec postojnim nacinom ishrane (dazba koja se koristi na farmi) prosečna dnevna proizvodnja mleka po kravi je bila 22.49 litara sa 3.75 % masnoce, 3.57 % proteina, 4.65 % laktoze, 9.56 % obezmascene suve materije i 13.31 % ukupne suve materije, dok kod II (ogledne) grupe koja su hranjena sa kreirani model ishrane (normirana dazba) je bila 24.04 litara sa 3.99 % masnoce, 3.57% proteina, 4.65 % laktoze, 9.58 % obezmascene suve materije i 13.57 % ukupne suve materije. Iz dobijenih rezultata vidi se da je doslo do povecanje proizvodnje mleka za 1.55 litara odnosno 6.89 % i poboljsanje hemijskog sastava mleka, kod ogledne grupe krava. Tako je suva materija sa 13.31 povecana na 13.57% odnosno za 1.95 %, sadrzaj masti sa 3.75 na 3.99% odnosno za 6.4 %, SMBM sa 9.56 na 9.58% odnosno 0.21 % dok sadrzaj proteina i laktoze je ostao na istom nivou. Ustanovljeno je da normirana ishrana, a ne proizvolna uticala je na povecanje proizvodnju i poboljsanje hemijskog sastava mleka, bez nepotrebnog utroska visak hranljivih materija nego sto je to potrebno po preporucenog normativa.

Kljucne reci: visokomlecne krave, ishrana, mleko, hemijski sastav mleka

LEVEL OF GLUCOSE IN THE BLOOD OF SIMENTAL COWS

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The largest portion of carbohydrates that entered into the digestive tract of ruminants is being fermented by enzymes of microorganisms in the rumen and reticulum. The final product of fermentation are the volatile fatty acids, which are the most important source of energy in the body of ruminants. On the other hand, in the non-ruminants, the main source of energy is glucose. Glucose participates in the ruminant body in very important metabolic processes. However, a very small amount of glucose is absorbed in the intestine of ruminants and it is insufficient to supply the organism of the energy. Therefore, in the ruminant tissues is made glucose in the process of gluconeogenesis, mainly in liver, and lesser extent in kidney. The most important carbohydrates in the feed of ruminants are: cellulose, hemicellulose, starch, pectin and fructans. Feed for ruminants containing in the dry matter on average 20 - 30% cellulose, 14 - 20% hemicellulose, 10% pectin and lignin 2 - 12%. The largest part of the sugars and starches, as well as soluble and the cellulose and hemicellulose, as well as insoluble carbohydrates are fermented to volatile fatty acids: acetic, propionic, butyric, formic, isobutyric, valeric, isovaleric and caproic acids. Besides the above fatty acids during fermentation, in stomach are produced gases such as methane, carbon dioxide and hydrogen. These gases are excreted from the body of animals through regurgitation. A minor amount of entered carbohydrates and some of their polymers in microorganisms avoid fermentation in the stomachs and arrive in the last part of the digestive tract. Since most of the feed glucose are digested in the rumen, ruminants provide their needs in glucose in the process of biosynthesis, mainly from propionic acids and other simple compounds. The aim of this research was to determine whether there are differences in the content of glucose in the blood of simmental cows bred at two localities, different feeding season and production phase. In order to determine the content of glucose in the blood of Simmental cows, the blood is taken of the animals from two localities, with different diets and care. Per 10 animals are monitored at each locality. Data were analyzed by factorial experiment scheme, where the factors were the localities, the production phase and feeding season. It was found that there are statistical differences in the content of glucose in the blood of Simmental cows depending on localities and feed seasons. Also, there are interaction effects between localities and feeding season.

Keywords: Simmental, cows, blood, glucose

SADRŽAJ GLUKOZE U KRVI KRAVA SIMENTALSKE RASE

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Najveći dio ugljenih hidrata unijetih u digestivni trakt preživara biva putem enzima mikroorganizama fermentisan u predželudcima. Krajnji produkt fermentacije su isparljive masne kiseline, koje predstavljaju najvažniji izvor energije u organizmu preživara. Nasuprot ovome, u nepreživara kao glavni izvor energije pojavljuje se glukoza. Glukoza kod preživara učestvuje u organizmu u veoma važnim metaboličkim procesima. Međutim, mala količina glukoze se apsorbuje u crijevima preživara i ista je nedovoljna za snabijevanje organizma energijom. Zbog toga preživari u njihovim tkivima u procesu glukoneogeneze, uglavnom u jetri, a i manjoj mjeri i u bubrezima stvaraju glukozu. Najvažniji ugljeni hidrati u hrani preživara su: celuloza, hemiceluloza, skrob, fruktan i pektin. Hraniva za preživare sadrže u suvoj materiji u prosjeku 20 - 30% celuloze, 14 - 20% hemiceluloze, do 10% pektina i lignina 2 - 12%. Najveći dio šećera i skroba, kao rastvorljivih i celuloze i hemiceluloze, kao nerastvorljivih ugljenih hidrata, bivaju fermentisani do isparljivih masnih kiselina: sirćetne, pripionske, buterne, mravlje, izobuterne, valerijanske, izovalerijanske i kapronske kiseline. Pored navedenih masnih kiselina prilikom fermentacije stvaraju se gasovi kao što su: metan, ugljen dioksid i vodonik. Ovi gasovi se izlučuju iz organizma životinja putem podrigivanja. Manja količina unijetih ugljenih hidrata i dio njihovih polimera u mikroorganizmima, izbjegavaju fermentaciju u predželudcima i dospjevaju u zadnje dijelove digestivnog trakta. Pošto najveći dio glukoze hrane biva razgrađen u rumenu, preživari svoje potrebe u glukozu obezbjeđuju biosintezom, uglavnom iz propionske kiseline i drugih jednostavnih jedinjenja. Cilj ovog rada bio je da se utvrdi da li ima razlike u sadržaju glukoze u krvi krava simentalne rase držanih na dva lokaliteta, kao da li se sadržaj istog parametra krvi razlikuju između sezona ishrane i proizvodnih faza. Da bi se utvrdio sadržaj glukoze u krvi simentalnih krava, ista je uzimana od životinja sa dva lokaliteta, koja se između sebe razlikuju po načinu ishrane i njege. Sa svakog lokaliteta praćeno je po 10 grla kroz proizvodene faze i sezone ishrane. Dobiveni podaci su obrađeni po šemi faktorijalnog ogleda, pri čemu su faktori bili lokaliteti, faze proizvodnje i sezona ishrane. Na osnovu dobivenih rezultata utvrđeno je da postoji statistička razlika u sadržaju glukoze u krvi krava simentalne rase između lokaliteta, sezona ishrane i interakcije faktora lokaliteti i sezone ishrane.

Ključne riječi: simentalac, krava, krv, glukoza

**THE TREND OF INCREASE OR DECREASE IN SHEEP BREEDING IN
SEPARATE REGIONS OF THE REPUBLIC OF MACEDONIA**

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The national agricultural policy in R. Macedonia to encourage the development of agriculture has been implemented in order to receive greater competitiveness in the market by introducing measures to subsidize agriculture, including sheep breeding. According to the latest data from the State Statistical Office and different analysis, the subsidizing of farmers has an increasing trend from 2005 to 2013, which contributes to the increase in the export, which in the period of 2005 was symbolic and amounted to 278 million euro's, while in November last year it amounted to 384 million euro's. The subject of this research paper is to validate the numerical balance of the total number of cattle in sheep breeding in the individual and the business sector in R. Macedonia by regions: Vardar, Eastern, Southwest, Southeast, Pelagonia, Poloski, Northeast and Skopje region. The aim is to see whether this branch of husbandry registered an upward or a downward trend (despite the tendency of subsidies) in the period from 2009 to 2012. According to the registered data there can be observed a downward trend in the number of sheep grown in the state. Most heads of sheep was recorded in 2010 (778,404), but in period after that number is decreasing in 2011 with 776,631 head, while in 2012 that number was 732,338 cattle and in 2009 it was 755,357 cattle. According to our research this current situation is due to several reasons including: Fewer farmers are engaged in breeding of sheep Production costs have increased Increasing costs for raw materials and feed An insufficient age structure of the population in rural areas An insufficient road infrastructure and collection centers of meat and milk in rural areas Insufficient number pasture for forestation or cultivation of different crops Sales price of lamb and milk remaining the same. To increase the number of sheep, the competent authorities endeavor to prepare a strategy for reducing the negative trend in sheep and livestock in general by implementing policies to raise money to subsidize and create a profile of contemporary young farmers.

Keywords: Sheep breeding, subvention, development program

INFLUENCE OF TWINNING ON THE MILK YIELD OF IMPROVED PIROT SHEEP BREED POPULATION

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Aim of this paper was to contribute to real aspect of milk production between sheep of pirot improved breed that lambed and raised singles and sheep that lambed and raised twins. Sheep milk yield and milk fat content were determined by regular monthly (every 30days) controls. Lactation period length was at the average 180days for both researched groups. Statistically very significant ($P < 0,01$) influence of birth type on total amount of produced milk was determined. Sheep that lambed twins produced more milk during lactation period than sheep that lambed singles by 13,89kg or 21,79%. Highest average daily production of milk was determined in the first month of the lactation and difference was 0,134kg (23,72%) in favor of sheep that twinned, which was statistically very significant ($P < 0,01$). Average daily milk yield for sheep that had twins was 0,431kg and for sheep that had singles 0,354kg, difference was 0,077kg (21,75%) which had direct influence on total milk production during lactation. Average milk fat content for sheep that had twins was 6.69% while for the sheep that had singles was 6.69%, determined difference of 0.25% was not statistically significant ($P > 0,05$). This result was expected as it is known that milk production and milk fat content is in negative correlation. Significant ($P < 0,01$) influence of birth type at total milk fat production was determined. Sheep that had twins produced 5.19kg of milk fat and sheep that had singles produced 4,43kg difference was 0,77kg (17,42%). Obtained results show that there is significant influence of twinning and number of raised lambs on milk and milk fat production for pirot improved sheep population.

Key words: pirot improved sheep, type of birth, milk yield, milk fat content.

VARIABILITY OF MORPHOMETRIC PARAMETERS OF TURKISH SHEPHERD DOGS KANGAL HEAD

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It is regarded that the modern form of Anatolian shepherd dogs, including the Kangal, appeared in the beginning of the twelfth century, time of the rise of the Ottoman Empire. The primary role of Kangal dogs in its region of origin, the city of Sivas and east Anatolia, was protecting flocks of sheep from attack by predators in various climate and terrain conditions. Today, the Kangal is present in all regions of turkey where flocks are grazing, with unchanged purpose. The breed standard determines the basic exterior parameters. Among these are parameters that define the appearance and shape of the head. The research took place in the area of Sivas, in Anatolia and in the vicinity of Ankara. 125 dogs (76 males and 49 bitches) were measured for six exterior parameters of the head. The obtained data was statistically analyzed. This paper shows mean values of the observed indexes and parameters, minimal and maximal values, and descriptive statistical parameters. Statistical significance for the observed difference in the values of parameters recorded in males and bitches was tested by t-test. It can be observed from the obtained results that the mean head length in Turkish shepherd dog Kangal was 28.79 cm, with range from 25.00 to 33.00 cm. Mean skull length was 17.34 cm, and mean muzzle length was 11.52 cm. Skull to muzzle ratio is 60:40. Mean skull width was 16.00 cm, which is about 55% of the head length. Kangal skull is roughly of quadratic shape, as its width to length ratio is 60:55. Muzzle width is 8.35 cm, while muzzle depth is 10.37 cm. There is a very significant statistical difference between genders ($P < 0.001$) for mean values of all observed parameters except muzzle length, where the difference was statistically significant. ($P < 0.05$). Only one difference of index value between genders (skull width index) had no statistical significance ($P > 0.05$). The obtained results are in accordance with values described by this Turkey autochthonous breed FCI standard.

Keywords: Kangal, standard, exterior, head

VARIJABILNOST MORFOMETRIJSKIH PARAMETARA GLAVE TURSKOG PASTIRSKOG PSA KANGALA

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Smatra se da je današnji izgled anadolskih pastirskih pasa uključujući i Kangla formiran početkom 12. veka kada je nastalo i Otomansko carstvo. Osnovna uloga Kangala u regionu svog postanka grada Sivasa i Istočne Anadolije bila je zaštita stada ovaca od napada divljih predatora u različitim vremenskim uslovima i po različitim terenima. Danas je prisutan u svim delovima Turske gde se obavlja ispaša stada, a namena mu je i dalje ostala ista. Standardom za ovu rasu su utvrđeni osnovni eksterijerni parametri. U grupi tih parametara značajno mesto pripada onima koji definišu izgled i oblik glave. Istraživanje je sprovedeno u okolini grada Sivas, u Anadoliji i u okolini Ankare. Zootehnički je obrađeno 125 pasa (76 mužjaka i 49 ženki). Mereno je šest eksterijernih parametara na glavi. Podaci su statistički obrađeni i prikazane su srednje vrednosti merenih parametara i indeksa, maksimalna i minimalna vrednost, kao i deskriptivni statistički parametri. Primenom t-testa izračunata je statistička značajnost razlike merenih parametara između mužjaka i ženki. Iz dobijenih rezultata se zaključuje da je prosečna dužina glave kod turskog pastirskog psa kangala 28.79 cm uz interval variranja od 25.00 do 33.00 cm. Prosečna dužina lobanje je 17.34 cm, a njuške 11.52 cm. Odnos između lobanje i njuške je 60:40. Širina lobanje je prosečno 16.00 cm, što je oko 55% dužine glave. Ako uporedimo međusoban odnos širine lobanje sa njenom dužinom, može se reći da je lobanja kangala približno kvadrat, i da stoje u odnosu 60:55. Širina njuške je 8.35 cm, a dubina njuške 10.37 cm. Statistička značajnost između polovima je bila vrlo značajna ($P < 0.001$) za srednje vrednosti kod svih merenih parametara osim kod dužine njuške gde je vrednost bila značajna ($P < 0.05$). Kod vrednosti indeksa samo u jednom slučaju nije bilo statističke značajnosti ($P > 0.05$), između polova i to kod vrednosti indeksa širine lobanje. Dobijeni rezultati su u saglasnosti sa vrednostima koje propisuje standard za ovu tursku autohtonu rasu.

Ključne reči : Kangal, standard, eksterijer, glava

Section 2. Crop Production

HOW TO ACHIEVE HIGH YIELD AND LOW INVESTMENT IN WHEAT PRODUCTION?

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Wheat seed yields, economically important for the survival of the seed industry, milling and baking industry can also be evaluated with the use of rational mineral nutrition. In wheat breeding for high yield potential created genotypes with improved efficiency in terms of adoption of nitrogen when grown under low or high doses of nitrogen nutrition. Heritability of traits important to improve the effective absorption and utilization of mineral has a medium to high value, so it is reasonable to expect genetic progress in creating cultivars with improved efficiency of nitrogen utilization and increased seed yield. The level of nitrogen in the soil can be used together with the genetic diversity of the wheat cultivars to improve efficiency of nitrogen uptake and utilization. Opportunities to develop economically acceptable cultivars can provide the benefit of seed companies and farmers and increase food production in the world. Low input cultivars or cultivars with optimized cultivation technology should be included in official trials to be used to evaluate production economy whose seed should be brought to the marketplace where their economic advantage will be realized. Improved technology of crop, which was developed in past decades has allowed farmers to avoid many of the problems involved in the production of wheat. In this paper presented grain yield and protein content in wheat grown breeding under different rate of nitrogen fertility (control=0, N1=20, N2=40 and N3=80 kg ha⁻¹). In both years of experiment, value of grain yield and protein contents were response to the increase in N fertility. The highest average yield in both years had Ana Morava (7430 kg ha⁻¹) and the less G-3610 (7055 kg ha⁻¹) while the highest protein contents had Julija Mono (14.4%) and the less G-3595 (13.0%) on the variant of applied nitrogen (N3=80 kg ha⁻¹). However, to optimize the application of nitrogen is very important to know the environmental factors and management of all factors of production that affect the variation of yield and yield components. Lower costs of seed production will be more favorable location conditions characterized by consistent production of very rare occurrence of late frosts, hail, high temperatures, strong winds, dangerous diseases and weeds, precipitation at the time of pollination, and provided irrigation. Proper selection of genotypes growing technology and production sites will have a significant impact on the yield and stability of yield and cost of seed production

Key words: wheat, economics production, yield, nutrition, environment

KAKO POSTIĆI VISOK PRINOS I NISKA ULAGANJA U PROIZVODNJI PŠENICE?

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Prinosi semena pšenice su ekonomski važni za opstanak semenarstva, mlinске i pekarske industrije što se može proceniti upotrebom racionalne mineralne ishrane. U oplemenjivanju pšenice za visok potencijal prinosa stvoreni su genotipovi sa poboljšanom efikasnošću usvajanja azota u uslovima kada se gaji pod niskim ili visokim dozama ishrane azotom. Heritabilnost svojstava važnih za poboljšanje efikasnosti apsorpcije i iskorišćavanje mineralnih elemenata ima srednje do visoke vrednosti, pa je razumno očekivati genetički napredak u kreiranju sorti sa efikasnijim iskorišćavanjem azota i povećanim prinosom. Nivo azota u zemljištu može se iskoristiti zajedno sa genetičkim diverzitetom sorti pšenice za poboljšanje efikasnosti iskorišćavanja azota. Mogućnost razvijanja ekonomski prihvatljivih sorti može da obezbedi korist semenskim kompanijama i seljacima i povećanje proizvodnje hrane u svetu. Sorte sa manjim ulaganjima ili sorte sa optimizovanom tehnologijom gajenja treba da budu uključene u zvanične ogledе na kojima će se oceniti ekonomičnost proizvodnje čije seme treba izneti na tržište kome će njihova ekonomska prednost biti realizovana. Poboljšana tehnologije gajenja useva, koja je razvijana u proteklim decenijama je omogućila poljoprivrednicima da se izbegnu mnogi problemi koji su uključeni u proizvodnju pšenice. U ovom radu su predstavljeni rezultati prinosa zrna i sadržaja proteina kod pšenice gajene u uslovima đubrenja sa različitim dozama azota (kontrola=0, N1=20, N2=40 i N3=80kg/ha-1). U obe eksperimentalne godine, vrednost prinosa zrna i sadržaja proteina bili su odgovor na povećanje količine azota. Najveći prosečan prinos u obe godine imala Ana Morava (7430kg ha-1) a najmanji G-3610 (7055kg ha-1), dok je najveći sadržaj proteina imala Julija Mono (14,4%) a najmanji G-3595 (13,0%) na varijanti primenjenog azota N3=80kg/ha-1. Međutim, da bi optimizovali primenu azota vrlo je važno poznavati ekološke faktore i upravljanje svim faktorima u proizvodnji koji utiču na variranje prinosa i komponenti prinosa. Niži troškovi proizvodnje semena biće u povoljnijim uslovima lokacije koju karakteriše konzistentnost proizvodnje vrlo retke pojave kasnih mrazeva, grada, visokih temperatura, jakih vetrova, opasnih bolesti i korova, padavine u vreme oprašivanja, kao i obezbeđen sistem navodnjavanja. Pravilan izbor genotipova, tehnologije gajenja i lokaliteta proizvodnje će imati značajan uticaj na prinos i stabilnost prinosa i troškove u proizvodnji semena.

Ključne reči: pšenica, proizvodnja ekonomija, prinos, ishrana, okruženje

GENOTYPE AND FERTILIZATION IMPACTS ON FE AND MN STATUS IN MAIZE PLANTS

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Genetic variation in maize nutrient efficiency may be attributed to the two principal components: (a) genotypes may differ in their effectiveness in absorbing nutrients from the soil (uptake efficiency) and/or (b) they may differ in the efficiency with which the absorbed nutrients are utilized for dry matter production (utilization efficiency). The objectives of this study were to examine the differences among maize hybrids in iron (Fe) and manganese (Mn) status in leaves. The study was conducted in the multi-year stationary field experiment at the Institute of Field and Vegetable Crops, Novi Sad in Rimski Šančevi. The experimental design was a randomized, complete block design (split-plot design experiment) with four replications. The study treatments were: 1) control: maize in monoculture without mineral or organic fertilizers); 2) NPK: N60P60K60 – maize in monoculture, fertilized only with mineral fertilizers; 3) CR + NPK: crop residue + N60P60K60 – maize grown in monoculture, with plowing crop residues (maize) and the application of mineral fertilizers; 4) M + NPK: manure + N60P60K60 – maize grown in monoculture, with application of manure and mineral fertilizers. Six domestic maize hybrids originating from Institute of Field and Vegetable Crops, Novi Sad (NS 3014; NS 4015; NS 5043; NS 6010; NS 6030; NS 7020) were grown under field conditions. The ear-leaf at beginning of the silking stage (the second decade of July) was taken for chemical analysis (about 30 leaves in mean sample) from each plot. The total amounts of Fe and Mn in maize leaves were determined using inductively coupled plasma (ICP) technique after their microwave digestion by concentrated HNO₃ + H₂O₂. Iron (Fe) content in maize leaf compared with other micronutrients showed higher variation in dependence to a fertilization system. Diverse maize hybrid were statistically significant in Fe content, however only NS 5043 showed considerable response to CR + NPK that affected total leaf concentration and resulted with higher value of Fe (151.9 mg kg⁻¹). The higher total content of manganese (Mn) was found in the NPK (62.5 mg kg⁻¹), indicating that fertilization could have significant influence on Mg content in plant. Variation among different hybrids resulted with statistical differences and generally with increased length of vegetation maize concentration of Mn in plant increases. The higher content of Mn was found in maize leafs of NS 6030 (68.7 mg kg⁻¹) and NS 7020 (60.2 mg kg⁻¹). In general, significant influences of climatic conditions and genotype on Fe and Mn status in maize were found.

Key words: genotype, fertilization, Fe, Mn, maize.

**EFFECT OF SLOW-RELEASE NITROGEN FERTILIZERS ON MAIZE PLANTS
GROWN ON NEW RECLAIMED SOIL**

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A field experiments was done in summer 2009 season at privet farm, located at El-Sadat district, Minufiya Governorate, Egypt to evaluate the effect of ureaform or urea+humic acid as slow release nitrogen fertilizers at a rate of 60 and 100 kg fed⁻¹ compared to urea at rate of 120 kg fed⁻¹ on maize (*Zea mays* L.) (Single-cross 10) grown on sandy soil. The obtained results indicated that ear length, plant high, 100-grain weight, shoot and grain yields and biological yield were markedly significantly higher when application of ureaform at rate of 100 kg N/fed followed urea at rate of 100 kg N/fed + humic acid. Application of ureaform at high rate increased the values of nitrogen uptake by both shoot and grain of maize plant, while urea at high rate + humic acid induced the highest values of both phosphorus and potassium uptake for the same mentioned organs. Also, the results indicated that, maize plants received urea+humic acid or ureaform registred the highest values of fertilizer use efficiency, i.e., highest Agronomic efficiency and Apparent N recovery were obtained due to application of 60 kg N/fed urea+humic acid, while ureaform at rate of 100 kg N/fed gave the highest value of Physiological efficiency.

Key words: Slow release fertilizers, Sandy soils, Maize yield, Efficiency

**ZP MAIZE HYBRIDS IN PRODUCTION REFLECTED IN THE 2013 IN BOSNIA
AND HERZEGOVINA**

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Maize Research Institute „Zemun Polje“ conducts production experiments on the territory of Bosnia and Herzegovina for many years, primarily to determine the production characteristics, grain yield and stability of grain yield of ZP maize hybrids. Based on years of research (3-5 years) reliable regionalization of most yielding new ZP hybrids can be done, in addition to already tested, high yielding hybrids made in the preceding cycle of selection. 2013th year was average from the point of climatic conditions when it comes to the maize mercantile production, with very unfavorable conditions for grain filling period during august month. Based on the analysis of variance significant differences were detected in grain yield at probability level $P=0,05$. The lowest yielding hybrids were ZP 341 (7,384 t/ha) and ZP 735 (7,140 t/ha) and the highest yielding were hybrids ZP 555 (8,239 t/ha) and ZP 600 (8,099 t/ha). Most notably ZP 434, even though a hybrid of medium-early maturity group FAO 400 by grain yield follows the highest yielding hybrids of FAO 500 and FAO 600 maturity group. The same hybrids, given the lower moisture content at the time of harvest allows either harvesting directly by grain shelling or by harvesting whole ears for storing.

Key words: ZP hybrid, production characteristics, cycle of selection, grain yield

**RESPONSE OF YIELD AND YIELD ATTRIBUTES OF GROUNDNUT TO
PHOSPHORUS LEVELS AND SOME BIO- FERTILIZERS**

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Two field trials were carried out at the Agricultural Production and Research Station, National Research Centre, El Nubaria Province, El Behira Governorate, Egypt, during the two successive summer seasons 2010 and 2011 to study the effect of phosphorus levels (37 and 74 kg P₂O₅/ha) and inoculation with Microbean and Phosphorein bio-fertilizers and their combinations on yield and yield attributes of groundnut in a sandy soil. Increasing phosphorus levels increased each of number of pods/plant, weight of pods /plant, number of seeds/plant, weight of seeds/plant, 100-pod weight, 100-seed weight, pod, seed and straw yield/ha, oil percentage, oil yield/ha, seed protein content and NPK contents. However, number of seeds/pod and shelling percentage decreased by increasing phosphorus levels. Seed inoculation with Microbean and Phosphorus in sole treatments showed the lowest values of the aforementioned traits, except number of seeds/pod and shelling percentage compared with the other treatments. Most of the analyzed properties increased significantly when the two phosphorus levels were added in combination with two inoculants, compared to phosphorus levels alone. However, number of seeds/pod, shelling percentage, oil percentage, and potassium percentage did not show significant changes between the sole treatments of phosphorus or in combination with inoculation treatments.

Key words: groundnut, phosphorus fertilization, bio-fertilizers

**CREATION OF NEW GENOTYPES AND IMPROVEMENT OF RAPESEED
PRODUCTION TECHNOLOGY AT THE INSTITUTE OF FIELD AND
VEGETABLE CROPS, NOVI SAD**

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Rapeseed breeding at the Institute of Field and Vegetable Crops began in the mid 90s in the oil crops department on spring rapeseed. It intensified with the introduction of foreign varieties and lines of winter rapeseed. Today, the genetic collection consists of 56 species, 980 lines and 11 varieties of winter rapeseed and 20 lines of spring rapeseed. Genotypes are evaluated for 23 agronomic and quality traits, as well as to stress tolerance. The main objectives of rapeseed breeding in the newly formed rapeseed department are: high seed and oil yield, stability, resistance, 00 quality - no erucic acid and low glucosinolate content. Special emphasis is on breeding hybrids based on CMS Ogu - INRA - sterility system. So far, as a result of breeding, 11 winter and two spring varieties were registered in Serbia, 1 winter variety in Ukraine and 1 winter variety in EU. Entomological research involves all potentially harmful and useful insects, considering rapeseed production in our region. Phytopathological research is focused on occurrence and identification of potentially the most harmful parasitic fungi. Trials with organic rapeseed production were recently started with different sowing dates. Minor cultivated oilseed species are also studied within the department and their potential is evaluated as raw material for various uses in the processing industry.

Acknowledgement: This study was supported by the Ministry of Education, Science and Technological Development, Republic of Serbia through a project TR 31025.

Keywords: *Brassica napus* L., breeding, plant protection

**STVARANJE NOVIH GENOTIPOVA I POBOLJŠANJE TEHNOLOGIJE
PROIZVODNJE ULJANE REPICE U INSTITUTU ZA RATARSTVO I
POVRTARSTVO, NOVI SAD**

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Oplemenjivanje uljane repice u Institutu za ratarstvo i povrtarstvo započelo je sredinom 90-ih godina u Odeljenu za uljane kuture na jaroj repici. Intenzivirano je introdukcijom stranih sorti i linija ozime uljane repice. Danas se genetska kolekcija sastoji od 56 sorti i 980 linija ozime i 11 sorti i 20 linija jare uljane repice. Genotipovi se ispituju na 23 agronomska i kvalitativna svojstva, kao i na otpornost na stres. Osnovni ciljevi oplemenjivanja uljane repice u novoformiranom Odseku za uljanu repicu su: visok prinos semena i ulja, stabilnost, otpornost, kvalitet u tipu 00 - bez eruka kiseline i sa niskim sadržajem glukozinolata. Poseban akcenat stavljen je na oplemenjivanje hibrida koje je bazirano na CMS Ogu-INRA – sistemu sterilnosti. Do sada, kao rezultat oplemenjivanja, registrovano je 11 ozimih sorti i 2 jare sorte u Srbiji, u Ukrajini 1 ozima sorta i u EU –1 ozima sorta. U okviru entomoloških istraživanja u Institutu proučavaju se svi važniji štetni i korisni insekti za proizvodnju ovog useva u našem regionu. U okviru fitopatoloških istraživanja radi se na ispitivanju pojave i štetnosti potencijalno najštetnijih parazitnih gljiva. Započeti su i ogledi sa organskom proizvodnjom uljane repice u različitim rokovima setve. U okviru Odseka proučavaju se i manje gajene uljane biljne vrste i njihov potencijal kao sirovine za različite namene u prerađivačkoj industriji.

Zahvalnica: Ovo istraživanje je pomoglo Ministarstvo prosvete, nauke i tehnološkog razvoja Republike Srbije, projektom broj TR 31025

Ključne reči: *Brassica napus* L., oplemenjivanje, zaštita bilja

Section 3. Agricultural Economics and Rural Development

CHANGES OF RELATIONS BETWEEN MATERIAL INPUTS AND ACHIEVED RESULTS IN SOY BEAN PRODUCTION ON FAMILY FARMS IN VOJVODINA

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From 2007 to 2013, the area under industrial crops in Vojvodina has increased in relation to the total arable land, whilst the area under less-intensive crops has shrunken. Particularly the cultivation of soy bean has risen and it now covers about 8% of total arable land in this region. This increase has been driven primarily by family farms, because by now they grow soybeans on more than 6% of their arable land, which is much higher than previously. The success of the production is always determined by inputs spent and outputs obtained. Farmers mainly focus on inputs, because they can control them easier than outputs. The costs of inputs for the cultivation of soybean have increased dramatically in the observed period. It was a consequence of boosting purchase prices, rather than increase in quantities of inputs used. Previous studies have shown that raw material and fuel costs make up 2/3 of total variable costs, on a typical family farm in Vojvodina. Therefore, the authors analyzed the figures for input and output in two ways: absolute and relative values within the previously mentioned period. Given the large differences in the applied production technologies throughout Vojvodina, the standard technology recommended for family farms in the South Bačka district has been used for calculations, assuming it can provide satisfactory results in the other parts of Vojvodina, too. The main aim is to present the basic characteristics of the soy bean production's input/output relation and to discuss its impact on the future development of soybean production in this region. The obtained results show that farmers need a significant amount of the proceeds of soy bean productions to cover the costs of raw materials and fuel. Additionally, costs for both, raw materials and fuel, were highly volatile during the observed period, having an essential influence on the economic viability of soy bean production. Having in mind that during the most of the observed period input/output relation was not favorable for soy bean, decline of farmers' interest for growing this crop could be expected. However, other crops were exposed to even worse price disparities, making soy bean competitive in relation to wheat and corn. Consequently, the share of soybean production in Vojvodina has increased in both, relative and absolute figures.

Key words: soy bean, family holdings, inputs, outputs, equivalent amount of soy bean

This paper is part of the research projects No TR 31022 and OI72098 financed by the Ministry of Education, Science and Technological Development of the Republic of Serbia

PROMENE ODNOSA MATERIJALNIH ULAGANJA I OSTVARENIH REZULTATA U PROIZVODNJI SOJE NA PORODIČNIM GAZDINSTVIMA U VOJVODINI

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U strukturi korišćenja oranica površine pod industrijskim biljem u periodu 2007-2013. godine na području Vojvodine beleže pozitivan trend, na račun manje intenzivnih useva. U tom pogledu posebno se izdvaja soja, koja danas angažuje oko 8% ukupno raspoloživih oraničnih kapaciteta Vojvodine. Pozitivan trend površina pod sojom posledica je rasta interesovanja za proizvodnju ovog useva pre svega na porodičnim gazdinstvima, koja za proizvodnju soje sada izdvajaju nešto više od 6% svojih oranica, znatno više nego što je to bio slučaj u prošlosti. Ekonomski rezultat uvek je u funkciji učinjenih ulaganja sa jedne i ostvarene vrednosti proizvodnje sa druge strane. Proizvođači veliku pažnju posvećuju upravo ulaganjima jer ona direktno utiču na rezultate, a mogućnost uplivanja na njih je veća. Visok nivo materijalnih ulaganja koji je obeležio posmatrani period, uslovljen je rastom nabavnih cena, a ne povećanjem nivoa intenzivnosti proizvodnje. Dosadašnja istraživanja su pokazala da u strukturi troškova proizvodnje soje tipičnih proizvođača na porodičnim gazdinstvima u Vojvodini repromaterijal i gorivo čine čak 2/3 ukupnih varijabilnih troškova. Stoga je opredeljenje u radu da se akcenat stavi upravo na ovaj input/output odnos. U radu je izvršena analiza kretanja kako apsolutnih vrednosti materijalnih ulaganja i ostvarenih rezultata, tako i njihovog odnosa u periodu 2007-2013 godina. S obzirom na velike razlike u pogledu primenjene tehnologije proizvodnje, ispitivanja su usmerena na porodična gazdinstava koja promenjuju preporučenu tehnologiju za proizvodno područje južnobačkog okruga, a koja može da obezbedi zadovoljavajući nivo intenzivnosti proizvodnje i u ostalim delovima pokrajine. Cilj je da se ukaže na osnovne karakteristike input/output odnosa i njegov uticaj na mogućnosti za dalji razvoj proizvodnje soje u Vojvodini. Dobijeni rezultati pokazuju da ekvivalentne količine zrna soje, potrebne za nabavku repromaterijala i goriva, značajno variraju, direktno utičući na ekonomski položaj ovog useva. S obzirom da se u većem delu posmatranog perioda taj, takozvani ekserni paritet narušavao na štetu outputa, to bi sigurno rezultiralo opadanjem interesovanja proizvođača za gajenje soje, da se slična situacija nije dešavala i kod drugih kultura. Naime, povoljan tzv. interni paritet (između useva) omogućio je da soja, zahvaljujući pre svega nivou prodajnih cena, bude konkurentna u odnosu na pšenicu i kukuruz i tako zadrži, pa čak i poveća učešće u strukturi setve na posmatranom području.

Ključne reči: soja, porodična gazdinstva, inputi, output, ekvivalentne količine zrna

Rad je deo istraživanja na projektima TR 31022 and OI 72098 koje finansira Ministarstvo prosvete nauke i tehnološkog razvoja Republike Srbije

FARM MANAGEMENT INFORMATION SYSTEMS: A CASE STUDY

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Accurate and easy to use information systems (IS) are of fundamental importance for a successful operational farm management. This paper shows a functioning IS for a multifunctional, medium-sized farm in Germany, which deals with land cultivation, self-marketing of strawberries/raspberries, fattening hogs and offering stables for pension horses. This farm serves as a case study for introducing a customized IS. In this paper a specific IS is developed for the management (planning, organization, monitoring and controlling) of the production and business processes for the case study farm. To develop a IS for farm management first a system analysis has to be conducted. The system analysis incorporates a thorough examination of all the elements of the system (resources, production processes, services, administration, etc.) and the interdependencies of these elements among each other as well with their environment (markets for input and output factor, agricultural policy and regulation, etc.). Consequently, the modules of the IS are established. These are a modules for management of production (optimal planning and monitoring), for services (other non-agrarian services), for administration and business decision making (prices, input and output factors) and for calculations. Finally, the interconnections between the modules are established. The developed IS represents as specific model of the selected farm. Using the method of induction, the specific model is further developed to a general model, serving as a IS for various multifunctional farms.

Key words: Management, information system, farm

INFORMACIONI SISTEM ZA UPRAVLJANJE GAZDINSTVOM: STUDIJA SLUČAJA

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Uređen informacioni sistem (IS) je osnova za uspešno upravljanje poljoprivrednim gazdinstvom. U ovom radu je definisan informacioni sistem za upravljanje (planiranje, organizaciju i kontrolu) proizvodnjom i poslovanjem poljoprivrednog gazdinstva koje se bavi multifunkcionalnom poljoprivredom. Za definisanje IS za upravljanje gazdinstvom u prvom koraku je sprovedena sistemaska analiza interne komunikacije elemenata sistema (resursa, proizvodnje, usluga, administracije) i komunikacije sistema (gazdinstva) sa svojim okruženjem (tržištem, agrarnom politikom, i državnom administracijom). Na osnovu systemske analize konkretnog gazdinstva, koristeći metodu indukcije, definisan je opšti model IS za upravljanje poljoprivrednim gazdinstvom. Informacioni sistem za upravljanje gazdinstvom se sastoji od nekoliko systemski povezanih modula: Modul za upravljanje proizvodnjom (optimalno planiranje i praćenje proizvodnje), Modul za upravljanje uslugama (poljoprivredne i nepoljoprivredne usluge), Modul za administriranje i poslovno odlučivanje (cene inputa i proizvoda i kalkulacije), U radu je prikazano funkcionisanje modela na jednom gazdinstvu srednje veličine u Nemačkoj, koje se bavi ratarskom proizvodnjom, proizvodnjom jagoda, tovom svinja i pružanjem usluga oko sportskih konja.

Ključne reči: upravljanje, informacioni sistem, gazdinstvo

ATTITUDES OF CONSUMER AND PRODUCER WITH RESPECT TO THE PURCHASE OF AGRICULTURE PRODUCTS AT GREEN AND LIVESTOCK MARKETS

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Agricultural and other products can be sold in various ways. Primarily, the sale is divided into direct and indirect sales. In direct sales contact between seller and buyer is realized directly, but it can occur at different places, at the seller, at the buyer or elsewhere at the place that occurs as an intermediary between the seller and the buyer. One of these places of sale are green and livestock markets, a specific form of market institutions that facilitate direct contact between buyers and sellers (who may but need not always be producers or consumers of these products). The aim of the study was the determination of the attitudes of consumers and producers about buying or selling in the green and livestock markets, and in that sense determination of: the structure of supply and demand for primary agricultural products, the origin of the products being sold, the purchase frequency and continuity of supply, the value of the purchase, motives for buying and selling in the markets, the basic problems faced by consumers and producers when buying or selling in the markets, and attitudes toward each other and in relation to measures to improve the situation. Additionally the demographic structure of the consumer and producers is analyzed, including the analysis of the influence of demographic characteristics on differences in the attitudes of consumers and producers. The results of this research and analysis can be used in the future to create profiles of consumers and producers, and in this respect the creation of measures that would contribute to improve producer – consumer relations, synchronization of demand and supply of agricultural products, improve the quality and diversity of supply of food, etc. The research is conducted in 13 municipalities in Republic of Srpska. In each municipality, one green and one livestock market is selected. In total 65 respondents-consumers/buyers and 130 respondents-producers/sellers have being surveyed or 10 producers and 5 buyers per municipality. The selection of the municipalities is conducted based on their geographic position in one of the six regions in Republic of Srpska (Banjaluka, Prijedor, Dobož, Bijeljina, Istočno Sarajevo, Trebinje). Producers and consumers were randomly selected. The results of the research suggest the need for modernization and improvement of the green and livestock markets, that would produce results in minimum two direction, first in direction of fostering of production and second in function of distribution and quality of consumers supply.

Key words: attitudes of consumers and producers, the types of sales, green and livestock markets

STAVOVI POTROŠAČA I PROIZVOĐAČA U VEZI KUPOVINE POLJOPRIVREDNIH PROIZVODA NA PIJACAMA

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Poljoprivredni i drugi proizvodi mogu se prodavati na više načina. Primarno, načini prodaje se dijele na direktne i indirektno. Kod direktne prodaje kontakt između prodavca i kupca se ostvaruje neposredno, ali se to može odvijati na različitim mjestima, kod prodavca, kod kupca ili na nekom drugom mjestu koji se javlja kao posrednik između prodavca i kupca. Jedno od tih mjesta su tzv. "zelene" i stočne pijace, specifičan oblik tržišnih institucija koje omogućavaju direktan kontakt kupaca i prodavaca (koji mogu ali i ne moraju uvijek biti i proizvođači ili potrošači tih proizvoda). Cilj istraživanja bio je u utvrđivanju stavova potrošača i proizvođača o kupovini odnosno prodaji na zelenim i stočnim pijacama, te u tom smislu utvrđivanje: strukture ponude i tražnje za osnovnim poljoprivrednim proizvodima, porijeklo proizvoda koji se prodaju, frekvenciju kupovine i kontinuiranost ponude, vrijednost kupovine, motive kupovine i prodaje na pijacama, osnovne probleme s kojima se susreću potrošači i proizvođači prilikom kupovine odnosno prodaje na pijacama, te stavovi jednih i drugih u vezi mjera za unapređenje stanja. Posebno je analizirana demografska struktura potrošača i proizvođača, te analiziran uticaj demografskih karakteristika na razlike u stavovima potrošača i proizvođača. Rezultati ovog dijela istraživanja i analize mogu poslužiti u budućnosti za stvaranje profila potrošača i proizvođača, te u tom smislu kreiranje mjera koje bi doprinijele unapređenju odnosa proizvođač-potrošač, usklađivanje potražnje i ponude poljoprivrednih proizvoda, unapređenje kvaliteta i raznovrsnosti ponude prehrambenih proizvoda i dr. Istraživanje je provedeno na području 13 opština Republike Srpske, pri čemu je u svakoj od opština analizirana situacija na jednoj zelenoj i jednoj stočnoj pijaci. Ukupno je anketirano 65 potrošača i 130 proizvođača, odnosno po 10 proizvođača i 5 potrošača na svakoj opštini. Izbor opština je izvršen u odnosu na njihovu geografsku pripadnost jednoj od šest regija Republike Srpske (Banjaluka, Prijedor, Dobo, Bijeljina, Istočno Sarajevo, Trebinje). Proizvođači i potrošači birani su metodom slučajnog odabira. Rezultati istraživanja nameću potrebu da se zelene i stočne pijace kao i drugi oblici pijačne trgovine u RS osavremene i unaprijede čime bi se pozitivno djelovalo u najmanje dva pravca, jedan pravac je u funkciji dinamiziranja proizvodnje, a drugi u funkciji prometa i kvaliteta snabdijevanja stanovništva.

Ključne riječi: stavovi potrošača i proizvođača, načini prodaje, zelene i stočne pijace

RED PEPPER PRODUCTION CHARACTERISTICS ANALYSIS IN EUROPEAN UNION COUNTRIES

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In this work, red pepper productions, in some, important producers countries in EU, are analysed. The analysis included six countries: Bulgaria, Greece, Spain, France, Italy, and Hungary. The next productions characteristics are analysed, and statistically processed: area of production, yields, and harvested production. Nominated countries consist 80% of total production of red pepper in EU. In research are used official statistical data from „EUROSTAT“ for the period of 13 years, 2000.-12. Descriptive statistical analysis are included accountings of: average and extrem values of characteristics, coefficient of variations, and change rate. The results of analysis show the next: 1. It is present tendency of decreasing the areas of red pepper in all observed countries (except Greece, where is present a slow increasing). The largest areas of red pepper have Spain (about 21.000 ha), Italy (13.000 ha), and Bulgaria (7.500 ha). 2. Contrary of areas, yields of red pepper have tendency of increasing (except Italy). The highest yields has Spain with 48 t/ha. Next are Hungary (39 t/ha) and France (32 t/ha). 3. Tendencies of total production depends of movement in area of production and yields. Tendency of increasing the production has only Greece. Spain shows tendency of stagnation, while in other countries are present tendency of decreasing. The largest producer of red pepper in EU is Spain, with about 1 million tons. The next are Italia (318.000 tons) and Hungary (148.000 tons).

Key words: red pepper, production, analysis, EU countries

ANALIZA PROIZVODNIH OBELEŽJA PAPRIKE U ZEMLJAMA EVROPSKE UNIJE

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U radu je analizirana proizvodnja paprike u značajnijim zemljama – proizvođačima paprike u Evropskoj uniji. Analiza je obuhvatila šest zemalja: Bugarsku, Grčku, Španiju, Francusku, Italiju i Mađarsku. Analizirana su i statistički obrađena sledeća obeležja proizvodnje paprike: žetvena površina, prinos i ukupna proizvodnja. Navedene zemlje čine oko 80% ukupne proizvodnje paprike u Evropskoj uniji. Korišćeni su zvanični statistički podaci EUROSTAT-a za period od 13 godina, 2000-12. Deskriptivna statistika obuhvatila je izračunavanje: prosečnih i ekstremnih vrednosti pojava, koeficijent varijacije i stopu promene. Rezultati analize pokazuju sledeće: 1. Prisutna je tendencija pada površina pod paprikom u svim posmatranim zemljama (sem u Grčkoj, gde površine imaju blagi rast). Najveće površine ima Španija (oko 21 hiljadu hektara), slede Italija (13 hiljada) i Bugarska (7,5 hiljada). 2. Nasuprot površinama, prinosi paprike imaju tendenciju rasta (sem kod Italije). Ubedljivo najveće prinose ima Španija (48 t/ha), slede je Mađarska (39 t/ha) i Francuska (32 t/ha). 3. Tendencije ukupne proizvodnje paprike su posledica tendencija u požetim površinama i ostvarenom prinosu. Tendenciju povećanja proizvodnje ima samo Grčka, u Španiji je tendencija stagnacije, dok u drugim zemljama paprika ima tendenciju pada. Ubedljivo najveći proizvođač paprike u EU je Španija (oko 1 miliona tona) slede Italija (318 hiljada) i Mađarska (148 hiljada).

Ključne reči: paprika, proizvodna analiza, Evropska Unija

AGRICULTURAL INSURANCE IN REPUBLIC OF SERBIA

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Insurance is the most important form of protection against the risk both for individuals and enterprises and it achieves a transfer of risk to insurance companies as the institutionalized risk associations. Although the insurance can not prevent the occurrence of the harmful economic events on the above-mentioned subjects, thanks to insurance it is realized indirect economic protection of them. Agriculture is exposed to a number of risks because of its specific nature. The emergence of those risks could lead to the losses in production and income. The risks can not be completely eliminated, but they can be managed and their impacts can be minimized. The most important role in minimization of risk could have insurance. Insurance in agriculture is a special type of property insurance that is applied to the farmers in order to prevent the loss of income coming from agricultural activities. Agricultural insurance covers the crop and fruit insurance, insurance of livestock and wild animals, buildings and machinery, and can be applied for greenhouses, forestry and aquaculture as well. Agricultural insurance in Serbia is undeveloped, which is corroborated by the following data: the share of the crop insurance and the animal insurance premiums was only about 2.6% of the total non-life insurance premiums in 2011; only about 3% of registered farms and 10% of the cultivable land areas in Serbia are insured. In foreign countries with developed agriculture sector agricultural producers use the managing of business risk on a much larger scale. The highest percentage of the crop insurance was recorded in Germany and Spain and it amounts to 60-70% of the total number of farmers, while ensuring of livestock is used in a greater percentage in the old EU member countries. The governmental authorities can improve utilization of insurance in agricultural sector through: 1) Subsidizing a part of the insurance premium for registered farms, 2) Establishing a reliable system for monitoring and publishing data related to the weather conditions, 3) Development of marketing information systems in the agricultural sector. In the paper it has been analyzed the state of agricultural insurance in Serbia, comparing it with a situation in the neighboring and EU countries. It has been also discussed a possibility of introducing the mandatory insurance for agricultural production, as well as the participation of the stakeholders which have interest for greater use of insurance in Serbian agriculture (insurance companies, food processing enterprises, banks, veterinary and extension services, etc.). Only by synchronized engagement and action of the state sector, the insurance industry and interested business entities it can be carried out the more visible progress in this area.

Key words: agriculture, insurance, risk, compensation of damage, Serbia

OSIGURANJE POLJOPRIVREDE U REPUBLICI SRBIJI

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Osiguranje predstavlja najvažniji oblik zaštite od rizika pojedinca i privrednih subjekata, a ostvaruje se transferom rizika na osiguravajuća društva kao institucionalizovane zajednice rizika. Iako osiguranje ne može sprečiti nastanak ekonomski štetnih događaja na gore pomenute subjekte, zahvaljujući njemu se ostvaruje posredna ekonomska zaštita istih. Poljoprivreda je zbog svoje prirode izložena velikom broju rizika, čiji nastanak može dovesti do gubitaka u proizvodnji i nestabilnosti u poslovanju. Rizici se ne mogu u potpunosti otkloniti, ali se njima može upravljati i njihov uticaj se može minimizirati. U tome najznačajniju ulogu može imati osiguranje. Osiguranje u poljoprivredi predstavlja posebnu vrstu imovinskog osiguranja koja se primenjuje na poljoprivredne proizvođače u cilju sprečavanja gubitka prihoda od agrarne delatnosti. Osiguranje u poljoprivredi obuhvata osiguranje useva i plodova, domaćih i divljih životinja, građevinskih objekata i mehanizacije, a može se primenjivati i na staklenike, u šumarstvu i u akvakulturi. Osiguranje u poljoprivredi Srbije je nerazvijeno, o čemu govore i sledeći podaci: učešće premije osiguranja useva i plodova i osiguranja životinja iznosilo je svega oko 2,6% u ukupnoj premiji neživotnih osiguranja u 2011. godini; u Srbiji je osigurano svega 3% registrovanih gazdinstava i 10% obradivog zemljišta. U inostranim zemljama sa razvijenim poljoprivrednim sektorom upravljenje rizikom poslovanja poljoprivredni proizvođači koriste u znatno većem obimu. Najveći procenat osiguranja useva zabeležen je u Nemačkoj i Španiji i iznosi 60-70% od ukupnog broja farmera, dok osiguranje stoke koriste u većem procentu stare zemlje članice EU. Državni organi mogu unaprediti upotrebu osiguranja u poljoprivrednom sektoru kroz: 1) Subvencionisanje dela premije osiguranja za registrovana poljoprivredna gazdinstva; 2) Uspostavljenje pouzdanog sistema praćenja i objavljivanja podataka vezanih za vremenske uslove; 3) Razvoj marketing informacionih sistema u poljoprivrednom sektoru. U radu je analizirano stanje osiguranja poljoprivrede u Srbiji, uz komparaciju sa susednim zemljama i zemljama EU. Razmotrena je i mogućnost uvođenja zakonske obaveze osiguranja poljoprivredne proizvodnje, kao i mogućnost participiranja različitih aktera koji treba da imaju interes za masovnije korišćenje osiguranja u poljoprivredi Srbije (osiguravajuća društva, prerađivačka industrija, banke, veterinarske i savetodavne službe i dr.). Samo sinhronizovanim angažovanjem i delovanjem državnog sektora, industrije osiguranja i zainteresovanih privrednih subjekata mogu se ostvariti vidljiviji pozitivni pomaci u ovoj oblasti.

Ključne reči: poljoprivreda, osiguranje, rizik, nadoknada štete, Srbija

IMPACT OF INPUT PRICES ON COMPETITIVENESS OF DOMESTIC AGRICULTURE

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Prices of agricultural products are generally formed on the cost plus principle, i.e. adding some margin to the sum of the cost of inputs that are used in the production of that products. Thus, a competitive producer is the one who succeed to produce a certain product at a lower cost than other producers. In terms of open market economy conditions not all producers can achieve confirmation of their individual costs by the market, they are rather forced to sell their products at the market price formed on the basis of supply and demand. Agricultural producers, who fail to compensate their production costs by the sales price, sooner or later, give up that production. To fight competition of imported products, production cost of domestic producers must be lower or at least the same price as imported product. Assuming the same usage of raw materials and other inputs, their production costs depend on the price at which they buy these inputs. Most inputs for agriculture in BaH are imported so they are therefore more expensive than in neighboring and developed countries, where food products imported into BaH are produced. This paper presents the results of the analysis of price trends of some key agricultural products (wheat, corn, soybean, potato, apple, milk, beef, swine, poultry and eggs) and the price of inputs used in their production (seeds, organic and artificial fertilizers, chemicals, fuel, labor, professional services, fattening material, fodder, veterinary medicines and services, electricity) in order to determine whether the relationships in change of prices of final products and inputs have a favorable or unfavorable impact on the competitiveness of domestic agricultural producers. The analysis was conducted at the level of the Republic of Srpska for 2008-2012 period. Based on data of price indexes of final products and the weighted price indexes of inputs used in their production, aggregate indexes of competitiveness for selected agricultural products are calculated.

Keywords: agriculture, competitiveness, inputs, prices.

UTICAJ CIJENA INPUTA NA KONKURENTNOST DOMAĆE POLJOPRIVREDE

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Cijena poljoprivrednih proizvoda se u pravilu formira po principu troškovi plus, tj. dodavanjem određene marže na zbir troškova inputa koji su utrošeni u proizvodnji tog proizvoda. Pri tome je konkurentan onaj proizvođač koji uspije da proizvede određeni proizvod uz niže troškove nego drugi proizvođači. U uslovima otvorenog tržišta svaki proizvođač ne može da dobije tržišnu potvrdu svojih individualnih troškova, nego je prinuđen da svoj proizvod proda po tržišnoj cijeni koja se formira na ravnotežnom nivou između ponude i tražnje. Poljoprivredni proizvođači koji prodajnom cijenom ne uspejaju da nadoknade svoje troškove proizvodnje, prije ili kasnije, odustaju od te proizvodnje. Da bi se domaći proizvođači oduprli konkurenciji uvoznih proizvoda moraju iste proizvode proizvesti jeftinije ili najmanje po cijeni uvoznih proizvoda. Pod pretpostavkom istog utrošaka repromaterijala i drugih inputa, njihovi troškovi proizvodnje zavise od cijena po kojima kupuju te inpute. Većina inputa za potrebe poljoprivrede u BiH se uvozi pa su oni samim tim skuplji nego u zemljama okruženja i razvijenim zemljama u kojima se proizvodi hrana koja se uvozi u BiH. U radu su predstavljeni rezultati analize kretanja cijena nekih ključnih poljoprivrednih proizvoda (pšenica, kukuruz, soja, krumpir, jabuka, mlijeko, junad, svinje, živina i jaja) i cijena inputa koji se koriste u njihovoj proizvodnji (sjeme, organska i vještačka đubriva, hemijska sredstva za zaštitu, gorivo, radna snaga, stručne usluge, tovni materijal, stočna hrana, veterinarski lijekovi i usluge, električna energija) sa ciljem da se utvrdi da li su ovi odnosi promjene cijena finalnih proizvoda i inputa imali povoljan ili nepovoljan uticaj na konkurentnost domaćih poljoprivrednih proizvođača. Analiza je rađena na nivou Republike Srpske za period 2008-2012. godina. Na osnovu podataka o indeksima kretanja cijena finalnih proizvoda i ponderisanih indeksa cijena inputa koji se koriste u njihovoj proizvodnji izračunati su agregatni indeksi konkurentnosti za deset odabranih poljoprivrednih proizvoda.

Ključne riječi: poljoprivreda, konkurentnost, inputi, cijene.

STANJE I PERSPEKTIVA MEĐUNARODNOG TRŽIŠTA PIVA

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U radu je analizirano međunarodno tržište piva. Pivo predstavlja alkoholno piće, posle vode i čaja. Determinisane su promene na međunarodnom tržištu i apostrofirani najveći izvoznici i uvoznici. Izvore podataka predstavlja statistička baza Međunarodnog trgovinskog centra (*International Trade Centre*), a vremenski period istraživanja je 2008-2012. godina. Izvoz piva u svetu prosečno je iznosio 12,5 milijardi litara i imao je trend umerenog rasta po stopi od 2,95% godišnje. Vrednosno iskazano promet je bio na prosečnom nivou od 11,5 milijardi US dolara. Najznačajniji izvoznik je Meksiko čiji prosečan izvoz iznosi dve milijarde litara, što čini 16,0% ukupnog izvoza u svetu. Najznačajnije izvozno pivo je „Corona“, ono spada među najprodavanija piva, izvozi u preko 150 država sveta. Značajni izvoznici su i Holandija, Nemačka, Belgija i Velika Britanija. Navedene zemlje participiraju sa više od polovine (54,4%) u ukupnom izvozu piva. Uvoz piva prosečno je iznosio 11,5 milijardi litara i imao je trend rasta po stopi od 2,73% godišnje. Vrednost uvoza u svetu prosečno je iznosila 11,2 milijarde US dolara. Najznačajniji uvoznik piva su Sjedinjene Američke Države koje prosečno uvezu 3,2 milijarde litara, što predstavlja 27,9% svetskog uvoza. Značajni uvoznici su i Velika Britanija, Francuska, Nemačka i Italija. Navedene zemlje apsorbuju više od polovine (52,3%) svetskog uvoza piva. Pet najvećih svetskih pivara: Anheuser-Busch Inbev, SABMiller, Heineken, Carlsberg i China Resources Enterprise, nakon vlasničkih promena, drže skoro polovinu svetskog tržišta piva. Kina predstavlja tržište sa najvećom potrošnjom piva sa učešćem od 25,6%, sledi SAD sa 12,6%, Brazil 6,7%, Rusija 4,9% i Nemačka sa 4,6% (2011). Prosečna potrošnja piva u svetu izraženo po stanovniku iznosi 30 litara sa umerenim trendom rasta. Najveća potrošnja je u Češkoj Republici (159 litara po stanovniku), slede Irska, Nemačka, Austrija i Australija. Istraživanje pokazuje da prisutan trend povećanja tražnje piva sa različitim ukusima i manjim procentom alkohola, koja se konzumiraju u periodima godine koje karakterišu visoke temperature, kao i približavanje ovog pića ženskoj populaciji.

Cljučne reči: pivo, međunarodni promet, izvoz, uvoz

FAMILY FARMS AND POVERTY

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The aim of the investigation was to focus on family farms, resources and rural poverty in Serbia. Family farms in the southeastern and southern zones of the country were given special reference due to the rising poverty which contributed to the exclusion of farms from numerous activities. However, resources of family farms were noted to be significant. Family farms primarily involved in farming and household members were on-farm employed. Recently, the number of mixed farms was noted to rise thus contributing to the improvement of the living standard of the rural population and decline of rural poverty in the southern and southeastern zones of the country.

Key words: family farms, resources, poverty, rural regions

PORODIČNA POLJOPRIVREDNA GAZDINSTVA I SIROMAŠTVO

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Rad ima za cilj da ukaže na resurse kojima raspolažu porodična poljoprivredna gazdinstva kao osnovni subjekti poljoprivredne proizvodnje, a takođe i na pojavu siromaštva. Poseban osvrt u radu je dat na porodična poljoprivredna gazdinstva regiona jugoistoka i juga zemlje gde se članovi znatno više suočavaju sa pojavom siromaštva što ih isključuje iz niza aktivnosti gazdinstava ovog tipa. Resursi porodičnih poljoprivrednih gazdinstava su značajni. Osnovna delatnost članova porodičnih poljoprivrednih gazdinstava je poljoprivreda. Međutim, sve veći broj gazdinstava je mešovitog tipa, s obzirom na činjenicu da se pored poljoprivrede bave i drugim delatnostima. Ova pojava može da ima značajnu ulogu u poboljšanju životnog standarda samih članova porodičnih poljoprivrednih gazdinstava, a samim tim i ruralnog stanovništva, što može da rezultuje smanjenjem siromaštva u ruralnim područjima na Jugu i Jugoistoku zemlje.

Ključne reči: porodična poljoprivredna gazdinstva, resursi, siromaštvo, ruralna područja.

AGRICULTURAL ASSOCIATIONS IN BOSNIA AND HERZEGOVINA - CURRENT SITUATION

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The purpose of this paper is to diagnose the deficiencies in operation of agricultural associations, which represent an important factor in development of this sector of the national economy- in Bosnia and Herzegovina (BiH), regardless of the level at which these operate- local, cantonal, entity or country-level. Strengthening of these associations, in turn, strengthens local communities, thus positively affecting wider community as a whole. Agricultural associations in BiH have a very short history. Therefore, the lack of experience causes them to suffer problems in their work. A history of agricultural associations in the developed world spans a century, and experiences of those associations should help formation and operation of local associations. Majority of associations in country were formed as a consequence of the development projects sponsored by the international community, which sought non-governmental partners in implementation. These donor-projects, in turn, typically donated equipment and material for agricultural production to these associations. The regulation effective in both entities and the country-wide regulations, enable rapid and low-cost registration of agricultural associations. Unfortunately, only a handful of associations recognize their true purpose. Frequently asked question- "What will I gain from an association"- confirms this observation. Only a few associations formulated their mission and vision. Those statements serve to answer such questions as, why the association was formed, whose benefits it serves, and what is the purpose of its existence. Moreover, defined mission and vision statement serve as a roadmap for attainment of the stated objectives. It must be stressed that reduced presence of international donor projects in BiH did not radically alter practices in organization and operation of agricultural associations. That said, some associations succeeded in development of media recognition, and became successful lobbyists, promoting interests of their membership and business as a whole. Still, even in such associations, the problems of internal organization (such as: infrequent Assembly or Managing Board meetings; poor familiarity of the association members with the organizational statutes; or absence of the process of appointments to the management bodies of the organization, etc.) are acute. These are the reasons for low respect of the organization by the authorities and even the members of the association, which eventually leads to its termination.

Key words: membership, management board, assembly, statute

POLJOPRIVREDNA UDRUŽENJA U BOSNI I HERCEGOVINI- TRENUTNA SITUACIJA

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Cilj ovog rada je da ukaže na sve nedostatke koje prate poljoprivredna udruženja u BiH bilo da su na lokalnom, kantonalnom, entitetskom ili državnom nivou, a bitan su segment razvoja ove grane privrede u BiH. Jačanjem udruženja jačaju se lokalne zajednice a s tim i šira zajednica u cjelini. Poljoprivredna udruženja u BiH imaju veoma kratku istoriju i još uvijek prolaze kroz početničke probleme. Istorijat poljoprivrednih udruženja u razvijenom svijetu ima stogodišnju tradiciju i njihova iskustva su trebala biti od pomoći u formiranju i funkcionisanju udruženja u BiH na svim nivoima. Udruženja su se uglavnom formirala u okviru međunarodnih projekata koji su tražili nevladin sektor kao partnera i donirali opremu i materijale za poljoprivrednu proizvodnju. Zakonska regulativa također omogućava brzo registrovanje sa niskim troškovima registracije u oba entiteta i na nivou BiH. Nažalost, mali broj udruženja na svim nivoima je prepoznao pravu svrhu udruživanja. Često postavljeno pitanje „Šta ću ja dobiti od udruženja“ govori u prilog navedenoj tvrdnji. Vrlo mali broj udruženja ima definisanu Misiju i Viziju koje govore zašto je udruženje formirano, kome služi to udruženje, šta je cilj tog udruženja i putokaz kojim putem će stići do cilja. Potrebno je naglasiti da se sa smanjenjem broja međunarodnih projekata u BiH situacija nije drastično promijenila kad se radi o načinu osnivanja i funkcionisanja udruženja. Neka udruženja su postala prepoznatljiva kroz medije i uspješno zagovaraju interese članstva i razvoj biznisa kojim se bave. Ipak, i kod njih se mogu uočiti unutrašnji problemi funkcionisanja kao što su neredovno održavanje Skupštine i sastanaka Upravnog odbora, nepoznavanje Statuta udruženja od strane članstva, nema reizbora organa upravljanja itd. To su razlozi za nerespektovanje udruženja od strane vlasti i članstva, i zbog toga na kraju dolazi do propadanja udruženja odnosno prestanka rada.

Ključne riječi: Članstvo, Upravni odbor, Skupština, Statut.

**USE OF MULTIVARIATE STATISTICAL METHODS FOR EXPLAINING THE
DIFFERENCES IN THE DEVELOPMENT OF SLOVENIAN MUNICIPALITIES
AND REGIONS**

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The differences in development between Slovenian municipalities and regions are still significant. In order to minimize them and to ensure sustainable development, it is necessary, for good policy planning, to understand the key factors that cause these differences. Analyses presented in this paper are a part of a study of economic and development performance in Slovenia. We tried to extract the key factors on the basis of 40 selected indicators, using the method of principal components analysis that reduce the number of indicators to 11 new independent variables, explaining 76.5% of total variability. On the basis of principal components, municipalities were further classified into four groups that reflect different economic and development performance. We analysed also which group of municipalities can be found in statistical regions and the characteristics of regions according to selected indicators.

Key words: development indicators, factors, economic and development performance, municipalities, regions, Slovenia.

POSITION OF RURAL AREAS IN SERBIA

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Rural development and rural entrepreneurship are a new development philosophy of agribusiness in the European Union. It is a new concept of socio – economic development both in theory and practice of the developed countries. Unfortunately, Serbia has not had a solid and long-term policy of rural development and of entrepreneurship until now, but a long-term strategy of rural development is being created. Its integral part will be the rural entrepreneurship as a modern system of doing business and sustainable development, and a model of multifunctional agriculture. Therefore, it is a model of doing business relating to agriculture and everything else in relation to the agriculture. Multifunctionality is a key word of a new agricultural and rural policy in Serbia. The rural areas in Serbia make up the third fourth of its territory in which a half of Serbian population lives. Taking into account this fact, there is a potential for the development of agricultural entrepreneurship. Serbia has near a million of unemployed people, whereas out of ten workers who lost their job, more than a half of them could find a job in rural areas. However, return to rural areas does not mean turning an employee into a farmer and his returning to a plough, hoe and tractor, but getting employed in various fields of agriculture – forestry, water management, service sectors, craftsmanship, handicraft business, infrastructure and small and middle-size plants. The EU experiences show that a thought-out and financially supported policy of rural development leads to a successful rural economy with possibilities for employment. Return to a village will make it survive, because out of 4,600 villages in Serbia, some 1,200 are on the way to die out! In addition, it is followed by the reaffirmation of old craftsmanship activities and traditional local products, an increasing demand for rural tourism and the interest in a local culture and tradition. It establishes a connection between a traditional and modern. As in the developing countries, in Serbia the concept of rural is very often identified with poverty. Unfortunately, the development of entrepreneurship in general and agricultural entrepreneurship are not sufficiently supported in Serbia, due to which its rural areas increasingly ‘suffer’ from deagrarianization, senility and extinction of villages. It could be proved by the fact that the total of 986 villages have less than 100 inhabitants.

Key words: rural areas, village, agriculture, multifunctionality

POLOŽAJ RURALNIH SREDINA U SRBIJI

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Ruralni razvoj i ruralno preduzetništvo predstavljaju novu razvojnu filozofiju agrobiznisa u Evropskoj uniji. Reč je o novom konceptu društveno - ekonomskog razvoja u teoriji i praksi razvijenih zemalja. U Srbiji na žalost do sada nije postojala konzistentna i dugoročna politika ruralnog, kao ni razvoja preduzetništva, a tek se sad stvara dugoročna strategija ruralnog razvoja. Sastavni deo će biti i ruralno preduzetništvo kao moderan sistem privređivanja i održivog razvoja i modela multifunkcionalne poljoprivrede. Dakle, radi se o modelu privređivanja koji je vezan za poljoprivredu i „oko poljoprivrede“. Zato je multifunkcionalnost ključna reč nove agrarne i ruralne politike u Srbiji. Jer, oko tri četvrtine njene teritorije čine ruralna prostranstva na kojima živi polovina stanovništva. Polazeći od te činjenice postoje potencijali za razvoj agrarnog preduzetništva. U Srbiji je blizu milion nezaposlenih, a od deset radnika koji su ostali bez posla više od polovine moglo bi da se zaposli u ruralnim područjima. Povratak u ruralna područja ne znači, međutim, poseljačenje radnika i njihovo vraćanje ralu, motici i traktoru, već njihovo zapošljavanje u oblasti poljoprivrede - u šumarstvu, vodoprivredi, raznim uslužnim delatnostima, zanatstvu, domaćoj radinosti, infrastrukturi, malim i srednjim pogonima. Iskustva EU ukazuju da osmišljena politika ruralnog razvoja, finansijski podržana, ima za rezultat uspešnu ruralnu ekonomiju, sa mogućnostima za zapošljavanje. Povratkom u selo, ono će opstati i ostati, jer u Srbiji od 4.600 sela na putu nestanka je – 1.200! Uz to ide i reafirmacija starih zanata i tradicionalnih lokalnih proizvoda, sve izraženija tražnja za seoskim turizmom i interesovanje za lokalnu kulturu i tradiciju. Na taj način se uspostavlja veza između tradicionalnog i modernog. Slično kao u zemljama u razvoju ruralnost se i u Srbiji poistovećuje sa siromaštvom. U njoj je, na žalost nedovoljna podrška razvoju preduzetništva uopšte, pa i agrarnog preduzetništva, zbog čega njena ruralna područja sve više „pate“ od deagrarijacije, senilizacije, pa i gašenja čitavih sela. Dokaz tome je da u 986 sela ima manje od po 100 stanovnika.

Ključne riječi: ruralna područja, selo, poljoprivreda, multifunkcionalnost

INSTITUTIONAL ANALYSIS FOR LAG "VRŠATEC"

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This paper analyzes Local Action Group (LAG) Vršatec from Slovakia on the basis of four different dimensions for implementation of the local development strategy: Organizational structure of LAG, Management of LAG, Decision making process for projects and strategy, and Assignment of responsibilities for projects and strategy. Each dimension of the local development strategy implementation is analyzed and evaluated on the basis of six different criteria. Furthermore, paper also identifies the most important stakeholders in work of LAG and their influence at the decision making process within the LAG. Results of the institutional analysis showed well functioning segments of the LAG activities and those that should be improved. Conclusions of the can be of benefit for the LAG concerned, but also for other LAGs in the planning of their development strategies, making them aware of the potential problems that their institutions could have in its functioning. The primary data sources were obtained using the method of interview of stakeholders participating in the work of the LAG and other representatives of LAG area, while the secondary data sources used consist of development strategy for LAG area, working documents of LAG, as well as data from other sources, which are indicated when used.

Keywords: Institutional analysis, LAG, Slovakia, strategy

INSTITUCIONALNA ANALIZA LAG-A "VRŠATEC"

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Ovaj rad analizira Lokalnu Akcionu Grupu (LAG) Vršatec iz Slovačke na bazi četiri različite dimenzije realizovanja razvojne strategije LAG područja: organizacione strukture LAG-a, menadžmenta LAG-a, načina odlučivanja o realizovanju projekata i strategije, i nadležnosti u realizovanju projekata i strategije. Svaka od dimenzija realizovanja razvojne strategije LAG-a je analizirana i evaluirana na bazi šest različitih kriterijuma. Pored toga rad identifikuje i najvažnije učesnike u radu LAG-a kao i njihov uticaj na proces odlučivanja u LAG-u. Rezultati institucionalne analize su pokazali dobre segmente funkcionisanja LAG-a, kao i one koji bi se trebali unaprijediti. Zaključke istraživanja, pored analiziranog LAG-a, mogu primjeniti i drugi LAG-ovi u planiranju svojih razvojnih strategija, tako da budu svjesni problema koje bi njihova institucija mogla imati u svom funkcionisanju. Primarni izvori podataka dobijeni su primjenom metode intervjuisanja aktivnih učesnika u radu LAG-a i drugih predstavnika LAG područja. Za sekundarne izvore podataka korišteni su raspoloživa razvojna strategija LAG-a, radni dokumenti LAG-a, kao i podaci iz drugih izvora, koji su naznačeni prilikom njihovog korištenja.

Ključne riječi: Institucionalna analiza, LAG, Slovačka, strategija

REGIONAL HYDROSYSTEMS TO SUPPORT RURAL DEVELOPMENT IN VOJVODINA PROVINCE

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The research in this paper is focused on quantifying the impact of the construction of the hydrosystem to regional rural development of AP Vojvodina, Serbia. Two operating and five planned regional hydrosystem can significantly contribute to the development: irrigation and drainage, water supply of livestock, development of small and medium enterprises in rural areas, agrotourism development, reducing flood damage, improvement of the environmental conditions etc. Construction and use of water resource systems, in this case, have some multifunctional effects on rural development, which is demonstrated in every hydrosystem: HS "Danube-Tisa-Danube" and HS "Nadela" (already in operation), HS "North Bačka", HS "Srem", HS "Novi Kneževac", HS "Kikinda" and HS "Nova Crnja-Žitište" (are planned for construction). All these systems represent the part of the water infrastructure that is a precondition for rural development in terms of protection from harmful effects of water and utilization of water resources. In this investigation has carried out the improvement of the assessment methodologies of the economic effects in the construction of multi-purpose regional hydrosystem by joining new indicators from the group of dynamic methods of economic efficiency. For calculating of the water price and water services for different purposes of the hydrosystem there were used several methods and principles (cost-benefit, the marginal and the full cost recovery methods-principles). Likewise, the two forms of financing the construction of these systems which can affect the economic impact and cost of services (public-private-partnership and crediting) have been discussed. The estimated economic parameters with the characteristics of technical solutions (scale, installed capacity, power consumption, number of newly employed workers etc.) for the planned regional systems can be ranked to measure the priority of the construction. The methods which can be used in this case are Electra and AHP. The verification of improved methodology was shown in one case study on the example of HS "North Bačka" subsystem "Mali Idoš".

Key words: regional hydrosystems, rural development, effects of construction

Section 4. Fruit Growing and Viticulture

**EXPERIENCES WITH INVIGORATING SWEET CHERRY ROOTSTOCKS IN
CACAK REGION (WESTERN SERBIA) WHEN USED FOR HIGH DENSITY
PLANTING SYSTEM**

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The objective of this study was to compare the tree growth, precocity, yield and main physico-chemical properties of seven sweet cherry cultivars grafted on Mazzard (*Prunus avium* L.) seedlings and Colt rootstocks which are grown in Cacak region (Western Serbia) under high density planting system. These parameters were measured in the 'Stark Hardy Giant', 'June Early', 'Hedelfinger', 'New Star', 'Summit', 'Lapins' and 'Sunburst'. Results showed that rootstocks significantly affected tree growth and yield characteristics (yield per tree and unit area, cumulative yield and yield efficiency), being higher in trees on Mazzard than on Colt. Beside rootstocks, great variations of these values were observed in cultivars at the same rootstock. On Mazzard, the most vigor trees had 'New Star', and the lowest was found in 'Stark Hardy Giant'. On Colt, the highest and statistically similar tree vigor was detected in 'Summit' and 'Lapins', and the lowest also in 'Stark Hardy Giant'. 'Sunburst' on Mazzard exhibited the best yield performances, whereas the poorest was produced by 'New Star'. On Colt rootstock, 'Stark Hardy Giant' possessed the best yield traits, whereas the poorest was observed in 'New Star', and also in 'Summit' and 'Lapins' with no significant differences among them. The best yield efficiency was found in 'Stark Hardy Giant' on both rootstocks. As regards physical features, Colt significantly improved fruit and stone weight, fruit dimensions, size and shape, whereas Mazzard promoted better flesh rate. Differences among cultivars for these traits were also significant. It seems that 'New Star' on both rootstocks and 'June Early' on Mazzard had the best fruit physical performances, while on Colt, beside 'New Star', 'Lapins' had good values evaluated in more cases. No significant differences were observed between rootstocks for soluble solids content; however Mazzard induced higher levels of acidity, whereas Colt promoted better ripening index. As regards cultivars, the highest these values were found in 'Hedelfinger' on both rootstocks, and the lowest in 'Stark Hardy Giant' in general.

Key words: *Prunus avium* L., cultivars, tree growth, yield, fruit physical-chemical traits.

ISKUSTVA SA BUJNIM PODLOGAMA ZA TREŠNJU U OBLASTI ČAČKA (ZAPADNA SRBIJA) KADA SU KORIŠĆENE ZA GUSTU SADNJU

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Cilj rada je bio da se uporedi rast stabla, prorodevanje, prinos i glavne fizičko-hemijske osobine ploda sedam sorti trešnje kalemljenih na podlogama od sejanac divlje trešnje (*Prunus avium* L.) i Kolt gajenih u oblasti Čačka (Zapadna Srbija) u gustoj sadnji. Parametri su mereni na sortama 'Stark Hardy Giant', 'June Early', 'Hedelfinger', 'New Star', 'Summit', 'Lapins' i 'Sunburst'. Rezultati su pokazali da su podloge značajno uticale na rast stabla i osobine prinosa (prinos po stablu i jedinici površine, kumulativni prinos i koeficijent rodnosti); bili su veći na sejancima divlje trešnje nego na Koltu. Osim podloga, velika variranja ovih vrednosti su zapažena između sorti na istoj podlozi. Na divljoj trešnji, najbujnije stablo je imao 'New Star', a najmanje bujno je imao 'Stark Hardy Giant'. Na Koltu, najveća i statistički slična bujnost stabla je otkrivena kod sorti 'Summit' i 'Lapins', a najmanja takodje kod sorte 'Stark Hardy Giant'. 'Sunburst' na divljoj trešnji je ispoljio najbolje karakteristike prinosa, dok su najlošije bile kod sorte 'New Star'. Na Koltu, najbolje osobine prinosa je posedovao 'Stark Hardy Giant', dok su najslabije zapažene kod sorte 'New Star' i takodje kod sorti 'Summit' i 'Lapins' ali bez značajnih razlika između njih. Najbolji koeficijent rodnosti je zapažen kod sorte 'Stark Hardy Giant' na obe podloge. Što se tiče fizičkih osobina, Kolt je značajno pospešio masu ploda i koštice, dimenzije i oblik ploda, dok su sejanci divlje trešnje izazvali bolji randman mezokarpa. Razlike između sorti za ove osobine su takodje značajne. Čini se da su 'New Star' na obema podlogama i 'Junska Rana' na divljoj trešnji imali najbolje fizičke osobine ploda, dok je na Koltu, osim 'New Star', 'Lapins' imao dobre ispitivane vrednosti u mnogim slučajevima. Nisu zapažene značajne razlike između podloga za rastvorljive suve materije, međjutim, divlja trešnja je izazvala veće nivoe kiselosti, dok je Kolt izazvao bolji indeks zrenja. U pogledu sorti, generalno najveće vrednosti su uočene kod sorte 'Hedelfinger' na obema podlogama, a najmanje kod sorte 'Stark Hardy Giant'.

Ključne reči: *Prunus avium* L., sorte, rast stabla, prinos, fizičko-hemijske osobine ploda.

THE USE OF MYCORRHYZA IN FRUIT GROWING

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The aim of this work is to present mycorrhiza in fruit growing and its effect on the growth and yield of fruit trees based on previously published studies. Mycorrhiza is symbiosis of higher plant roots and fungi. There are three types of mycorrhiza: endomycorrhiza, ectomycorrhiza and endoectomycorrhiza. This symbiotic association brings many benefits to plants such as resistance to abiotic and biotic stresses (drought, salinity, toxic elements, the lack of light and nutrients, high temperature, pathogens) and increase of growth and yield. Mycorrhization of fruit trees irrigated with saline water significantly reduces harmful effect of salt on plant growth and development, but it also increases productivity. Mycorrhiza helps the uptake of plant nutrients. It allows better growth, development and yield when the fruit trees have suffered thermal stress caused by high temperatures, but at temperatures below the biological minimum its beneficial effect is reduced. It was noted that mycorrhiza significantly increases the rate of fruit photosynthetic activity and thus directly affects the growth and yield. Mycorrhiza can significantly reduce the harmful effects of heavy metals. It is effective against pathogens and can be used instead of pesticides. In some cases, the yield increase can be as high as 50%.

Key words: mycorrhiza, biotic stress, abiotic stress, tree productivity, fruit quality

DOES THE MICROCLIMATE UNDER HAIL PROTECTION NET INFLUENCE PRODUCTIVITY AND FRUIT QUALITY OF BLUEBERRY CV. 'DUKE'?

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A higher frequency of hail storms, possibly due to climate change, has led to increased installation of hail nets in blueberry orchards. The objective of the present work was to investigate potential effects of the microclimate under or without gray colored hail protection net on ripening time, yield components, biometrical fruit characteristics (fruit weight, index of fruit shape, and seed number per fruit) and nutritional value (soluble solids content, titratable acidity, total anthocyanins - TACY, total phenolics - TPH and total antioxidant capacity - TAC) of 'Duke' highbush blueberry (*Vaccinium corymbosum* L.). The study was conducted in 2013. at commercial three-year-old orchard located in Mladenovac (Serbia). The planting density is 3.300 bushes per ha. During the research period, intensity of solar radiation was measured once a week at 12.00 hr using digital lux-meter 'Peak teck' PT-5025 (Germany). The DT-171 climate data logger used for measuring and recording air temperatures and humidity levels both under hail net and in the open field (control treatment). Hail protection net decreased intensity of solar radiation from 11% to 30% in comparison with the control treatment. Reductions in radiation resulting from netting also affected air temperatures and relative humidity. In the ripening period, the average day-time temperatures were 2.2°C lower under hail net, whereas night-time mean temperatures were 2.3°C higher compared to those registered in the open field. Conversely, relative humidity during the day was increased under netting and become lower at night than outside. Yields from plants under hail net were significantly higher than those from uncovered bushes (5.2 and 4.1 kg/bush, respectively). The increased yield was the result of larger fruit weight rather than enhanced fruit set. Fruit dimensions and number of seeds per fruit were unaffected by the net, while the highest levels of TPH (11.32 mg GA/g FW) and TAC (1.15 mg asc/g FW) as an important attributes of nutritional fruit quality were achieved in the treatment under the hail net.

Key words: intensity of solar radiation, air temperature, relative humidity, yield, physical and chemical fruit characteristics.

THE ANTI-HAIL NETS AS A FACTOR RISK REDUCTION IN APPLE PRODUCTION

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Although the established planting of apples require high investment per unit of capacity, though high investments find their justification in the relatively long period of full and profitable cropping which can last over 20 years. Apple is very intensive fruit species with regard to investments of labour and material per unit of capacity. From 4000 to 4500 seedling per hectare, ranging from quality of soil preparation, supply of quality planting material (knip seedling), through setting up anti-hail nets and irrigation investments in raising modern apple orchards range from 40,000 to 50,000 euro. Unfavourable meteorological factors cause considerable damages in fruit production. Fruit production can be affected by low and high temperatures, storm winds, hail and strong sunlight. The factors that cause great damages, but can be prevented by constructing anti-hail nets, are hail (ice) and strong sunlight. In native plantings the greatest damage occurring due to loss of yield and reduce fruit quality. The plantations in the genus greatest damage occurring due to loss of yield and reduce fruit quality. The degree of damage to the fruits from the hail depends on the time when the damage occurred and the time harvest. So, in addition to direct damages arising from the loss of fruits and their quality, the hail may cause secondary effects. Hail may intensify extortion fruit loss due to assimilation surface and thus reduce the resistance of fruit trees by winter frost, increase the alternation of birth, increase susceptibility to plant diseases and pests, and thus increase the cost of applying pesticides to protect their plants. The prices of anti-hail nets differ depending on the length of poles, row spacing and the types of the poles. On the basis of inter-row spacing of 3.5 meters, wooden poles length of 4.5 meters and a relatively flat terrain price components for 1 ha, with installation, is about 16500 euro (VAT included). Production of apple under hail nets means a high percentage of the fruits of the first class, more than 90%. Assuming that the in I, II and III year of building plantation apples can make a profit of 10,875 euro / ha, and in regular production gain of 9000 euro / ha, the funds were invested in the construction of anti-hail nets per hectare plantation of apples can be effectuated (return) after the fourth year.

Key words: hail, risk, anti-hail nets, planting of apples

PROTIVGRADNE MREŽE KAO FAKTOR SMANJENJA RIZIKA U PROIZVODNJI JABUKE

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Iako su za podizanje zasada jabuke potrebna visoka ulaganja po jedinici kapaciteta, ipak visoka ulaganja nalaze svoju opravdanost u relativno dugom i profitabilnom periodu pune rodnosti koji može da traje i preko 20 godina. Jabuka je veoma intenzivna voćna vrsta sa gledišta ulaganja rada i materijala po jedinici kapaciteta. Sa 4000 do 4.500 sadnica po hektaru, počev od kvalitetne pripreme zemljišta, nabavke kvalitetnog sadnog materijala (knip sadnice), preko postavljanja protivgradne mreže i navodnjavanja, investiciona ulaganja u podizanje savremenih zasada jabuke iznose od 40.000 do 50.000 eura. Nepovoljni meteorološki činioci nanose velike štete voćarskoj proizvodnji u Srbiji. Proizvodnja voća je ugrožena dejstvom niskih temperatura, olujnim vetrovima, gradom, visokom temperaturom, jakim sunčevim zračenjem. Činioci koji nanose velike štete, a mogu biti sprečeni postavljanjem protivgradnih mreža su grad(led) i jako sunčevo zračenje. U zasadima u rodu najveće štete nastaju usled gubitka prinosa i smanjenja kvaliteta plodova. Stepenn oštećenja plodova od grada zavisi od vremena kada je došlo do oštećenja i vremena berbe plodova. Znači, pored direktne štete koja nastaje gubitkom plodova ili njihovog kvaliteta, grad može izazvati i sekundarne posledice. Grad može pojačati iznirivanje voćaka usled gubitka asimilacione površine i samim tim smanjiti otpornost voćaka prema zimskim mrazevima, povećati alternativnosti u rađanju, povećati osetljivosti prema biljnim bolestima i štetočinama, a samim tim i povećati troškove primene pesticida u zaštiti voćaka. Cene sistema protivgradnih mreža se razlikuju u zavisnosti od dužine stubova, međurednog razmaka, vrste stubova. Na bazi međurednog razmaka od 3,5 metara, drvenih stubova dužine od 4,5 metara i relativno ravnog terena cena komponenata za 1 ha, sa montažom, iznosi oko 16500 eura (sa uračunatim pdv-om). Proizvodnja jabuke pod protivgradnim mrežama podrazumeva visoki procenat plodova prve klase, iznad 90 %. Pod pretpostavkom, da se u I, II i III godini podizanja zasada jabuke može ostvariti dobit od 10.875 eura/ha, a u redovnoj proizvodnji dobit od 9000 eura/ha, sredstva koja su uložena u izgradnju protivgradne mreže po hektaru zasada jabuke mogu se efektuirati (vratiti) posle četvrte godine.

Ključne reči: grad, rizik, protivgradne mreže, zasad jabuke

**EVALUATION OF SOME WALNUT CULTIVARS UNDER CLIMATIC
CONDITIONS OF SOUTH BULGARIA**

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In this study was carried out introduced walnut cultivars from the countries where they are grown as a main cultivars and with climatic conditions are different of the Bulgarians. Among the study were two cultivars origin from USA-Serr and Hartley, two from France - Fernor and Lara, one Hungarian - Tiszacsecsi 83 and two Bulgarian- Izvor 10 and Sheynovo. This evaluation aimed to select walnut cultivars with suitable biological and pomological characteristic under climatic conditions of South Bulgaria. The walnut cultivar trial was set at Fruit Growing Institute in Plovdiv, South Bulgaria. This cultivars are propagated through grafting on *Juglans regia* L. seedlings. Observations carried out from 7 to 11 years old trees. This trial have demonstrated that French cultivars Fernor and Lara are late blooming, than other cultivars as Serr, Hartley, Tiszacsecsi 83, Izvor 10 and Sheynovo. This phenological character is very important to avoid from spring frost damages. During this period of evaluation the results show that from cultivars Izvor 10, Serr, Hartley, Fernor and Lara the yields are more high comparing Sheynovo and Tiszacsecsi 83. This is a reason that we recommended now to grow the first group of walnut cultivars under climatic conditions of South Bulgaria.

SOLUBLE SOLID CONTENT IN THE CELL JUICE OF PEAR FRUIT FLESH DEPENDING ON THE POSITION ON THE TREE

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Soluble solids content in the cell juice of the fruit flesh can be significantly different during ripening and harvest between different fruit trees of one variety and between the fruits from the same tree which is important in screening harvest, depending on their purpose (storage or consumption after harvest). Studying the influence of fruit position on content of the soluble solids of pears fruits in this study were made in 2010th and 2011th in pear orchards in Jurkovića - Gradiska municipality, with 4 varieties of pears: Santa Maria, Williams, Abate Fetel and Kieffer seedling (Kieffer seedling in our area known as Citronka). The trees of the studied cultivar are planted in a north - south direction, grown in the slender spindle training system on the wild pear seedlings. Time of harvest was determined based on the previous average parameters of ripening level. Analysis were done on 25 fruits of each variety from the three zones of the tree (base, middle, top) from opposite side of the world (East and West), so 150 fruits samples were taken from each variety. Soluble solids content was determined by table refractometer, in the laboratory immediately after harvest on each fruit. Data analysis was performed by calculating the mean values with associated measures of variability and analysis of variance in the three factor experiment 2×2×3 (year × exposure × area), and the significance of differences was determined by Lsd test. Analysis of variance showed that content of soluble solids in the flesh fruit significantly caused by position or exposition fruit on the tree. The fruits from the top zone had the highest content of soluble solids while fruits from western exposure had lowest value of the same. However, interaction effects analysis showed differences in the variety Abate Fetel, where the highest content of soluble solids in the cell juice of the fruit flesh was recorded in fruits from the base zone, as with fruits varieties Kieffer seedling with eastern exposure had the lowest the values content of the examined parameters.

Key words: pear, fruit ripening, harvest, refractometric measurements.

SADRŽAJ RASTVORLJIVE SUVE MATERIJE U ĆELIJSKOM SOKU MESA PLODOVA KRUŠKE U ZAVISNOSTI OD POLOŽAJA NA STABLU

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Sadržaj rastvorljive suve materije u ćelijskom soku mesa ploda značajno se razlikuje, kako kod plodova između različitih stabala jedne sorte tako i između plodova na istom stablu, što je značajno kod probirne berbe plodova, zavisno od njihove namjene (skladištenje ili potrošnja nakon berbe). Proučavanje uticaja položaja ploda na sadržaj rastvorljive suve materije u plodovima kruške u ovom istraživanju obavljena su tokom 2010. i 2011. godine u zasadu kruške u Jurkovići - opština Gradiška, na 4 sorte kruške: Santa Marija (Santa Maria), Viljamovka (Williams), Fetelova (Abate Fetel) i Kiferov sijanac (Kieffer seedling, u našem području poznata pod nazivom Citronka). Stabla analiziranih sorti zasadena su u pravcu sjever - jug a gajena u uzgojnom obluku vitko vreteno na sijancu divlje kruške. Vrijeme berbe je određeno na osnovu ranijih prosječnih parametara stepena zrelosti. Za analize je uzeto po 25 plodova svake sorte iz tri zone krošnje (bazna, centralna i vršna) sa dvije strane svijeta (istočna i zapadna), odnosno za svaku sortu uzeto je ukupno 150 plodova. Sadržaj rastvorljive suve materije određen je stonim refraktometrom, neposredno nakon donošenja plodova u laboratoriju, na svakom plodu pojedinačno. Statistička obrada podataka izvršena je računanjem srednjih vrijednosti sa pripadajućim mjerama varijabiliteta i analizom varijanse u trofaktorijalnom ogledu $2 \times 2 \times 3$ (godina \times ekspozicija \times pozicija), a značajnost razlika utvrđena je testom najmanje značajne razlike. Analiza varijanse je pokazala da je sadržaj rastvorljive suve materije u ćelijskom soku mesa ploda značajno uslovljen pozicijom odnosno ekpozicijom ploda na stablu. Tako su plodovi vršne zone imali najveći sadržaj rastvorljive suve materije dok su plodovi sa zapadne ekpozicije imali najmanju vrijednost istog. Međutim, analiza ispoljenih interakcijskih efekata pokazala je odstupanja kod sorte Abate Fetel gdje je najveći sadržaj rastvorljive suve materije zabilježen kod plodova iz bazne zone, kao i kod plodova sorte Kiferov sijanac sa istočne ekpozicije koji su imali najmanju vrijednosti sadržaja ispitivanog parametra.

Ključne riječi: kruška, sazrijevanje plodova, berba, refraktometrijska mjerenja.

**PRESENT SITUATION AND PROBLEMS OF WALNUT PROPAGATION
METHODS**

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During the recent years we have a good prospect for increasing of new walnut orchards in our country. We can explain this phenomena, because the European Union has a priority to produce a healthy foods for his people. It is well known the wide variety antioxidant and anti-inflammatory nutrient in the walnut kernels as an anti-cancer benefits (high content of Omega 3 fatty acid). At present budding and grafting are the most widely used approaches in the production of grafted walnut trees. Poor callus formation in walnut made it a difficult to propagate. As a method walnut propagation by cuttings was difficult to be realized. The presence of high concentration of phenolic compounds in its tissue and their oxidation was the major reason of micropropagation as a method. The most commonly used technique is patch budding. Other used methods are “Omega bench grafting” and “Hot callus” During the last years hot callus as a technique has been successfully used for propagation of walnut cultivars, but the high of the trees is not enough at the end of the season. The new walnut propagation method was called “Epicotil grafting”. In this overview all methods for walnut propagation will be discussed.

PHENOLIC COMPOUNDS AND ANTIOXIDANT ACTIVITY OF PINOT NOIR GRAPEVINE VARIETY

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Phenolic compounds as antioxidants can be found in different parts of grape bunch and berries and at different concentrations. The concentration and composition of phenolics depends on the relationship of different factors such as: grapevine variety, ecological conditions of the locality (climate and soil), maturity stage of grapes, applied viticulture practices. High content of some phenolic compounds in berries is especially desired when grapes are grown for the production of red wines, since phenolics contribute to sensory characteristics and beneficial health effects. This paper shows the results of elements of phenolic composition of grapes for Pinot Noir variety grown in the vineyard of Experimental field "Radmilovac" at Faculty of Agriculture in Belgrade. In the period from 2009-2011 the following were tested: content of total phenol (mg GAE/g), esters of tartaric acid (mg CAE/g), content of monomeric and polymeric anthocyanin (mg malvidin-3-glucoside/g), in the skin, pulp, berry seeds and bunch stem, as well as antioxidant activity (%). The measured data were statistically analyzed using the software package SPSS version 17.0. The highest content of total phenolic compounds determined in the grape seeds (306.09 mg GAE/g) and the lowest in the pulp (128.85 mg GAE/g). The content of esters of tartaric acid varied from 0.51 mg CAE/g (pulp) to 2.66 mg CAE/g (grape seeds). The content of monomeric and polymeric anthocyanins in grape berry skin were 10.29 and 79.07 mg of malvidin-3-glucoside/g. The extract of grape seed had the highest antioxidant activity (92.43%). The study on the relationship between total phenolic content and their influence on antioxidant activity is of significant importance. The correlative relationship (Pearsons' correlation coefficient) between phenolic content and antioxidant activity of berry skin was $r = 0.376$, $n = 36$, $p < 0.0005$ while of the correlative relationship between phenolic content and antioxidant activity of grape seeds was $r = 0.579$, $n = 36$, $p < 0.0001$. Different composition and concentration of phenolic compounds and antioxidant activity of parts of grape bunch and berries was determined for grapevine variety Pinot Noir which was grown in the vineyard of Experimental field "Radmilovac" in Serbia.

Key words: Pinot Noir, phenolic compounds, antioxidant activity

Section 5. Vegetable Growing, Medicinal Plants

INVENTORIZATIION, COLLECTING AND CONSERVATION OF POTATO GENETIC RESOURCES IN MONTENEGRO

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Potato growing in Montenegro started in late eighteenth century. There are no data to which feature belonged first seed of potato, brought in 1786 as well as other seeds continuously brought in Montenegro over a long period of cultivation. Due to constant cultivation on the same locality, influenced by local climatic and soil conditions and specific production technology, over time new local population were procreated. Due to the continuous growing in very different agro-ecological regions and micro-regions - from the sea coast to the mountains, potato differentiated through time in early, mid and late forms. In first inventoring, which was done by academic Pavićević in 1950-ties, in the area of Old Montenegro, 8 local potato varieties were inventoried: pitomi or ruski krompir, rani bijeli, rani žuti, bijelikasni, žuti kasni, italijanski, naški krompir and švabica. During the period of highly intensive introduction of new varieties and technologies in Montenegro, activities related to the inventoring, collecting and conservation of genetic resources of potatoes started as well. In order to preserve some positive traits accumulated in traditional cultivars (disease, low temperature and drought resistance), detailed research and collecting was initiated. Whole activities were done within SEEDNet project in the period from 2008 to 2010. During 8 collection expeditions 141 Montenegrin villages were visited and 52 potato accessions were inventoried and collected. The main way of *ex situ* conservation of plant genetic resources is the genebank. In the Montenegro gene bank *ex situ* potato conservation is done in two ways: in the field gene bank and *in vitro* conservation. Very important way of conservation is also *in situ* conservation - maintaining the potato in agricultural fields.

Key words: Montenegro gene bank, potato genetic resources, inventoring, collecting, conservation

ASSORTMENT OF DRY BEAN IN BOSNIA AND HERZEGOVINA

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Dry bean is the main food of many peoples of the world, including people from our region. In Bosnia and Herzegovina the beans are most often sown at the smaller fields, at gardens or in maize as a companion crop. Nowadays, bush beans more and more often grown in large fields as a pure crop. A large number of varieties and landraces of beans allowed to be growing in Bosnia and Herzegovina. In official List of varieties, there are two species of the genus *Phaseolus*: runner bean *Phaseolus coccineus* L. and common bean *Phaseolus vulgaris* L.. There are two runner bean landraces and two new runner bean varieties, selected in FAInstitute Sarajevo, BiH. Much more has varieties and landraces of the common bean, about 45. This number gives the approximate because some of them can not be clearly classified as dry bean or snap bean. Many of these varieties nowadays there are only in genetic collections of the Institute in Serbia, Bosnia and Herzegovina, or in other gene banks. Seed production of dry beans is not developed in Bosnia and Herzegovina. The seed is imported and distributed mostly from Serbia. Most of varieties are also from Serbia, especially the new ones. The seed landraces or old varieties from the territory of BiH may be to start producing again. The paper presents descriptions and mutual comparison of most varieties of the List of varieties.

Key words: *Phaseolus*, BiH, List of varieties, varieties, landraces

SORTIMENT PASULJA (GRAHA) U BIH

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Pasulj je jedna od glavnih namirnica mnogih naroda sveta, pa i naroda sa naših prostora. U Bosni i Hercegovini većinom se uzgaja na manjim površinama, u baštama i na okućnicama. Poslednjih godina niski pasulji sve češće se gaje na većim površinama, u njivskoj proizvodnji. Na spisku sortni pasulja dozvoljenih za gajenje u Bosni i Hercegovini nalazi se veliki broj sorata i populacija. Na Sortnoj listi se nalaze dve vrste iz roda *Phaseolus*: mnogocvetni pasulj, *Phaseolus coccineus* L., i obični pasulj *Phaseolus vulgaris* L.. Od mnogocvetnog pasulja ima dve odomaćene populacije i dve novostvorene sorte. Mnogo više ima sorata i populacija običnog pasulja (graha), oko 45. Ovaj broj se daje okvirno jer neke od njih ne možemo jasno svrstati u pasulj ili boraniju. Mnoge od nabrojanih sorata danas se nalaze samo u genetskim kolekcijama Instituta. U samoj BiH proizvodnja semena graha nije razvijena. Seme se uvozi i distribuira najčešće iz Srbije odakle je i većina sorata. Po potrebi može se ponovo početi umnožavati i seme odomaćenih populacija ili starih sorata sa teritorije BiH. U radu će biti dati opisi i međusobna poređenja većine sorata sa Sortne liste Bosne i Hercegovine.

Ključne reči: *Phaseolus*, BiH, Sortna lista, sorte, odomaćene populacije

**THE EFFECT OF PLANT DENSITY ON PHOTOSYNTHESIS PRODUCTIVITY
AND YIELD OF SPRING GARLIC (*ALLIUM SATIVUM* L.)**

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Garlic was examined in field experiments, conducted in central Serbia (Belgrade). Spring garlic (native cultivar) was examined. The objective was to examine the effect of plant density on photosynthesis productivity (LAR-Leaf Area Ratio, NAR- Net Assimilation Rate) and the yield of garlic. The analysis involved the following plant densities: 300 (G1), 450 (G2), 600 (G3), 750 (G4) and 900 (G5) thousand plants ha⁻¹. Garlic exhibited better results in denser crop establishment. It is clearly indicated by the yield of garlic attained in experiments. Average yield rates range from 5.6 (300 thousand plants ha⁻¹) to 12.5 t ha⁻¹ (900 thousand plants ha⁻¹). The results demonstrate that the garlic should be grown in high density establishment (600-900 thousand plants ha⁻¹).

Key words: garlic, plant density, LAR, NAR, yield.

UTICAJ GUSTINE USEVA NA PRODUKTIVNOST FOTOSINTEZE I PRINOS BELOG LUKA PROLETNJAKA (*ALLIUM SATIVUM* L.)

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Beli luk je ispitan u poljskim ogledima, koji su izvedeni u centralnom delu Srbije (Beograd). Ispitan je beli luk proletnjak (domaća sorta). Postavljen je cilj da se ispita uticaj gustine useva na produktivnost fotosinteze (LAR-Leaf Area Ratio, NAR- Net Assimilation Rate) i prinos belog luka. Ispitivanjima su bile obuhvaćene sledeće gustine useva: 300 (G1), 450 (G2), 600 (G3), 750 (G4) i 900 (G5) hiljada biljaka ha⁻¹. Beli luk je ostvarivao bolje rezultate u gušćim usevima. Na to jasno ukazuje prinos koji je beli luk ostvarivao u ogledima. Prosečne vrednosti prinosa kreću se u rasponu od 5,6 (300 hiljada biljaka ha⁻¹) do 12,5 t ha⁻¹ (900 hiljada biljaka ha⁻¹). Rezultati pokazuju da beli luk treba gajiti u usevima veće gustine (600-900 hiljada biljaka/ ha⁻¹).

Ključne reči: beli luk, gustina useva LAR, NAR, prinos.

THE INFLUENCE OF GRAFTING ON YIELD AND QUALITY OF WATERMELON

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The main objective of the watermelon producers is high yield and good quality which is conditional with the right selection of hybrids, fertilization, irrigation, grafting. The target of this study was to investigate the effect of grafting watermelon on the yield and quality of watermelon compared to conventional production without grafting. The experiment used a watermelon varieties Fantasy F1 and rootstock watermelon Emphasis F1. Grafting as agro-technical measures has long been famous in watermelon producing. Important reasons for grafting watermelon on pumpkin (*Lagenaria vulgaris* Ser.) have greater resistance to pests and diseases, greater resistance to adverse conditions of growth, higher yields. The research referred to the total yield of watermelon t/ha and fruit quality of watermelon. The studies carried out indicate that the grafting yield increases and affects the quality of the fruit.

Keywords: grafting, watermelon

UTICAJ KALEMLJENJA NA PRINOS I KVALITET LUBENICE

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Osnovni cilj proizvođača lubenice je visok prinos i dobar kvalitet što je uslovljeno između ostalog pravilnim izborom hibrida, gnojdbom, navodnjavanjem, kalemljenjem. Cilj ovog istraživanja bio je ispitati uticaj kalemljenja lubenice na prinos i kvalitet lubenice u odnosu na klasičnu proizvodnju bez kalemljenja. U pokusu je korištena lubenica sorte Fantasy F1 i podloga lubenice Emphasis F1. Kalemljenje kao agrotehnička mjera odavno je poznata u proizvodnji vrježastih kultura. Značajni razlozi za kalemljenje lubenica na tikvu vrg (*Lagenaria vulgaris* Ser.) su veća otpornost na bolesti i štetnike, veća otpornost na nepovoljne uslove rasta, veći prinosi. Istraživanja su se odnosila na ukupna prinos lubenice t/ha i kvalitetu ploda lubenice. Provedena istraživanja ukazuju na to da kalemljenje povećava prinos i utiče na kvalitet ploda.

Ključne riječi: kalemljenje, lubenica

**CAPINFOOD-IMPROVING THE ENABLING ENVIRONMENT AND PUBLIC
AWARENESS FOR INNOVATION IN THE SOUTH-EAST-EUROPEAN FOOD
SECTOR THROUGH TRANSNATIONAL COLLABORATION**

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The CAPINFOOD project is funded by the South East Europe Transnational Cooperation (SEE) programme. It aims to strengthen the capacity of institutions to support the innovations in the food sector and to promote public awareness on benefits of innovations making the sectorial innovation easier through transnational cooperation. The specific objective of CAPINFOOD project is to develop national innovation strategies following a common framework for improving the competitiveness of food sector, particularly small and medium enterprises (SMEs), to help the economic growth of South-East Europe (SEE), creation of jobs and ensure sustainable development; - to improve coordination mechanism of efforts for enhancing innovation through new approach of collaboration of governance institutions and other stakeholders - to develop skills of SEE institutions in using effective tools to foster innovation: food chain management, transdisciplinary collaboration with ICT sector, knowledge transfer and practices of using industry panels, based on collective learning and shared costs; - to promote the use of ICT based tools for fostering innovation. In addition, this project will provide practical tools for innovation supporting institutions for transferring knowledge generated by research and development (R&D); - to improve the social appreciation of food innovation and entrepreneurship, to disseminate the results of the project to a wider community – especially to young people and also beyond the food sector to integrate non EU countries into the development of south East Europe, to concert efforts and share successful approaches related to food innovation by establishing a regional forum in the South East European area for exchanging experiences and successful practices of the National technology Platforms of the ETP Food for Life and other voluntary initiatives of the stakeholders.

Keywords: Food innovation strategies, collective support for SMEs, capacity building of innovation supporting institutions

Section 6. Plant Protection

FUNGI ASSOCIATED WITH RASPBERRY DISEASES IN SERBIA

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Raspberry is an important, high-value horticultural crop grown without subsidy in many European countries. Over the last ten years Serbia is among top world producers and exporters of raspberry. Average production in the period 2001/2010 was 79,542 tons on the area of about 15,000 ha. The whole production is realized on properties of individual farmers and only a negligible amount is produced on properties of small or medium companies. Fungal diseases severely affect raspberry production. To establish more appropriate disease management, over the last several years, occurrence of fungal diseases in raspberry fields in Serbia was monitored and the causal agents were investigated. Gray mold, caused by the fungus *Botrytis cinerea*, was the major fruit rot disease found in all fields. It was most damaging during periods of prolonged wet weather during the bloom and the fruiting seasons. Root rot disease, characterized by rotted and lack fibrous roots, wilted canes and leaves on mature plants that turn yellow and die, was noticed in numerous fields. In some cases, plants appeared to recover, but new roots were often weak and lack lateral development was observed. The most frequently found cane disease was spur blight. Dark red, purple or chocolate brown lesions below the spur on young bark around buds of new shoots were observed. Afterwards, diseased areas enlarged and girdled the stem, as a result the leaves fall off, especially on the lower parts of stem. The highest infection levels were detected in old dense plantations. Dark brown lesions that appear on the leaf tips spread in late summer to the canes, especially in their lower half. The axillary buds at affected nodes are smaller than at uninfected nodes and usually fail to develop into lateral shoots. The cane lesions become silvered in winter. From the infected canes *Didymella applanata*, causal agent of spur blight, was isolated and identified based on both morphological characteristics of the colony and the sequence analysis of the ITS region of the rDNA. Project III 46008

Keywords: *Rubus idaeus*, *Botrytis cinerea*, *Didymella applanata*, root rot, spur blight

THE EFFECT OF THE INTERACTION OF FUNGICIDES ON THE PATHOLOGICAL CHANGES OF SUGAR BEET SEEDLINGS

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The effect of different fungicides on the pathological changes of seedlings of the sugar beet Nesvisky 2 variety was analyzed in this paper. Seed testing was conducted according to ISTA rules and with the application of the Rulebook for the assessment of germination of certain plant species. The investigation included four size fractions of sugar beet seed (3.25 to 3.50 mm, 3.50-3.75 mm, 3.75-4.00 mm; 4.00 to 4.25 mm) treated with various fungicides. The following seed treatment variants were analyzed: I – water washing out – control, II - treated with Royal Flo fungicide, III - treated with a combination of Royal Flo and Tachigaren fungicides and IV - treated with Royal Flo fungicide, coated and then Tachigaren was applied on dry pellets. Germination energy and total germination were determined on a pleated filter paper at variable temperature conditions (20/30°C). The average germination energy ranged from 56.7 % in the variant III to 90.6 % in the variant II. Total germination of the tested seed fractions and treatments ranged from 66.2 % in the variant III to 93.4 % in the variant II. Analysis of the incidence of abnormal and diseased seedlings, as well as non-germinated seed, indicates pathological changes caused by the interaction of the aforementioned fungicides. The negative effect of the combination of fungicides is different, and it depends on the thickness of corky seed layer and coating mass layer, which have a role in reducing the direct negative effects of fungicides on germs.

Keywords: germination, seed, sugar beet, fungicides

UTICAJ INTERAKCIJE FUNGICIDA NA PATOLOŠKE PROMENE KLIJANACA ŠEĆERNE REPE

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U radu je analiziran uticaj različitih fungicida na patološke promene klijanaca šećerne repe sorte Nesviški 2. Ispitivanje kvaliteta semena je obavljeno po ISTA pravilima uz primenu Pravilnika za ocenjivanje klijavosti određenih biljnih vrsta. Istraživanje je obuhvatilo četiri frakcije semena šećerne repe (3,25-3,50 mm; 3,50-3,75 mm; 3,75-4,00 mm; 4,00-4,25 mm) koje su tretirane različitim varijantama fungicida. Analizirane su sledeće varijante tretmana semena: I-ispiranje vodom-kontrola, II-tretirano fungicidom Royal flo, III-tretirano kombinacijom fungicida Royal flo i Tachigaren i IV tretirano fungicidom Royal flo, zatim pilirano i na suhu piletu nanešen Tachigaren. Energija klijanja i ukupna klijavost su određivane na filter papiru u uslovima promenljive temeperature (20/30oC). Prosečna energija klijanja se kretala od 56,7% kod varijante III do 90,6% kod varijante II. Ukupna klijavost za sve ispitivane frakcije semena i tretmane se kretala od 66,2% kod varijante III, do 93,4% kod varijante II. Analiza učestalosti nenormalnih i bolesnih klijanaca, kao i nekljalog semena ukazuje na patološke promene izazvane interakcijom navedenih fungicida. Negativan uticaj kombinacije fungicida je različit u zavisnosti od debljine plutastog omptača semena, kao i sloja pilet mase, koji imaju ulogu smanjivanja direktnog štetnog dejstva fungicida na klicu.

Ključne reči: klijavost, seme, šećerna repa, fungicidi

MOLECULAR IDENTIFICATION OF *CITRUS TRISTEZA VIRUS*

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Citrus production in Bosnia and Herzegovina (B&H) is concentrated to the confluence of the river Neretva with predominance of mandarins and lemons varieties. During June 2012, twenty-five citrus samples were collected in Mostar, Čapljina and Ljubuški. Samples were tested by ELISA and RT-PCR for the presence of Citrus tristeza virus (CTV). This survey confirmed the presence of CTV in 14 out of 25 field samples that were mostly asymptomatic, as expected in plants grafted onto trifoliolate rootstocks. In addition CTV positive PCR products were send for the sequence analysis of the CP gene. Sequence analyses showed that majority of B&H isolates had nucleotide identities (99%) with Croatian and Montenegro CTV isolates.

Keywords. Citrus, Bosnia and Herzegovina, ELISA, RT-PCR, sequencing.

MOLEKULARNA IDENTIFIKACIJA *CITRUS TRISTEZA VIRUS*

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Proizvodnja citrusa u Bosni i Hercegovina (BiH) je skoncentrisana u dolini rijeke Neretve gdje dominiraju različiti varijeteti mandarina i limuna. Tokom juna 2012. godine 25 uzoraka citrusa je sakupljeno na području Mostara, Čapljine i Ljubuškog. Uzorci su testirani na prisustvo Citrus tristeza virus (CTV) pomoću ELISA i RT-PCR metoda. Analizom je potvrđeno prisustvo CTV u 14 od 25 uzetih uzoraka koji su bili uglavnom asimptomatični, što je bilo i za očekivati s obzirom da su uglavnom kalemljeni na podlogu trolisne narandže. Pored navedenih analiza CTV pozitivni PCR produkti su poslani na analizu sekvenci CP gena. Analiza sekvenci pokazala je da većina BiH izolata ima identičnu (99%) nukleotidnu sekvencu sa CTV izolatima iz Hrvatske i Crne Gore.

Ključne riječi. Citrusi, Bosna i Hercegovina, ELISA, RT-PCR, analiza sekvenci.

**THE TWO-YEAR STUDY OF MAIZE REDNESS DISEASE IN BOSNIA AND
HERZEGOVINA**

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In Bosnia and Herzegovina maize redness (MR) induced by stolbur phytoplasma ('Candidatus Phytoplasma solani', subgroup 16SrXII-A) is reported for the first time in Semberija region in 2012. Stolbur phytoplasma was identified in symptomatic maize plants, johnsongrass plants (*Sorghum halepense* L.) and *Reptalus panzeri* (L \ddot{o} w) specimens. Maize is one of the most important agriculture crops in Bosnia and Herzegovina thus survey for the maize redness incidence also was conducted in 2013. Monitoring and sampling in 2013 were extended on three regions: Semberia, Brčko District and Posavina. Collected samples were molecularly analyzed for the phytoplasma presence. Stolbur phytoplasma was detected in symptomatic maize plants in all three surveyed regions.

Key words: Stolbur phytoplasma, Semberia, Brčko District, Posavina

DVOGODIŠNJA ISTRAŽIVANJA CRVENILA KUKURUZA U BOSNI I HERCEGOVINI

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Bolest crvenila kukuruza prouzrokovana stolbur fitoplazmom ('Candidatus Phytoplasma solani', podgrupa 16SrXII-A) je prvi put potvrđena u Bosni i Hercegovini 2012. godine na području Semberije. Pored simptomatičnih biljaka kukuruza, stolbur fitoplazma je identifikovana u sirku (*Sorghum halepense* L.) i cikadi *Reptalus panzeri* (Löw). Kukuruz je jedna od ekonomski najznačajnijih poljoprivrednih vrsta u Bosni i Hercegovini, te je istraživanje pojave crvenila kukuruza sprovedeno i 2013. godine. Praćenje i uzorkovanje u 2013. godini je prošireno na tri regiona: Semberija, Brčko Distrikt i Posavina. Molekularnim analizama je izvršena analiza prisustva fitoplazme u sakupljenim uzorcima. Stolbur fitoplazma je identifikovana u simptomatičnim uzorcima kukuruza u sva tri regiona.

Ključne riječi: Stolbur fitoplazma, Semberia, Brčko Distrikt, Posavina

THE PRIORITIZATION PROCESS FOR INVASIVE ALIEN PLANTS

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The problem of invasive alien species (IAS) spread, and primarily the problem of plant invasions, are some of the major challenges the contemporary world faces nowadays. The problem of IAS is a very complex and serious issue, due to its wide-reaching influence and major direct and indirect consequences on all avenues of life. Major investments needed for the research of this phenomenon, new legislation and management practices are just some of the aspects of this problem. Plant protection is one of the areas directly connected to the issue of IAS, as it has a crucial role in the identification of the problem species, prevention of their further spread and development of appropriate control measures. European and Mediterranean Plant Protection Organization (EPPO) is on a mission to enhance the mutual cooperation between European and Mediterranean countries and better organize their plant protection activities. Consequently, one of the most important goals EPPO has is the development of an international strategy to prevent further introduction and spread of pests (including invasive species) and reduce their harmful impacts on cultivars and natural plants, and both natural and agricultural habitats. The first step in creating this strategy is registering the presence of invasive alien species, i.e. creating national IAS lists. It is then necessary to compare the national IAS lists with the lists of the surrounding countries, in order to determine their similarities and differences, suggesting the patterns of IAS spread, their potential harmful effects etc. However, the way in which these IAS lists are formulated is very complex, and defining the criteria which would determine the invasiveness of a certain species in a given area is key to properly estimating their status and determining their level of invasion. This is exactly why EPPO has developed the Prioritization process for invasive alien plants, now defined as an EPPO Standard, aiming to create lists of invasive alien plants and recognize the species of priority for conducting the Pest Risk Analysis (PRA). The application of this process makes the exchange of data possible and harmonizes the results from different countries, thus making the complicated process of developing an international strategy feasible. The Prioritization process for invasive alien plants involves the use of CAPRA software and GIBF (Global Biodiversity Information Facility Niche Model), and directs researchers towards using a complex, but standardized model, with a statistical analysis of the input data. When an individual plant species, which could be seen as invasive, is processed in this way a reliable answer on its current status is garnered, informing the researcher whether it should be categorized as invasive, potentially invasive, or harmless in the given area. This seemingly simple answer is key to developing a proper strategy for tackling the problem of invasive alien plants, and emphasizes the importance of applying the Prioritization process as a new standard in practice.

Key words: invasive alien plants, EPPO, prioritization process, CAPRA

PROCES PRIORIZACIJE INVAZIVNIH BILJAKA

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Problem širenja invazivnih vrsta uopšte a posebno invazivnih biljaka je jedan od fenomena sa kojim se savremeni svet u poslednjim decenijama suočava. Kompleksnost problematike, uticaj na sve sfere života, ogromne direktne i indirektno štete, velike investicije u istraživanja ovih pojava, zakonska regulativa, mere borbe i dr. samo su neki u nizu aspekata ovog problema. Zaštita bilja je jedna od direktno povezanih oblasti sa ovom problematikom i ima značajnu ulogu u identifikaciji ovih vrsta, sprečavanju njihovog širenja i u njihovoj kontroli. Evropska i mediteranska organizacija za zaštitu bilja (EPPO - European and Mediterian Plant Protection Organization) ima zadatak da međusobno povezuje i organizuje aktivnosti između Evropskih i zemalja Mediterana u oblasti zaštite bilja a jedan od osnovnih ciljeva EPPO je razvijanje međunarodne strategije za borbu protiv unošenja i širenja štetnih organizama (uključujući i invazivne vrste) i sprečavanje štetnog uticaja na gajene biljke i biljke u prirodi, tj. na prirodna i agroekološka staništa. Prvi korak u formiranju strategije je identifikacija prisustva invazivnih vrsta tj. formiranje nacionalnih lista. Zatim, neophodno je nacionalne liste uporediti sa listama zemalja u okruženju kako bi se utvrdile sličnosti i razlike, koje ukazuju na pravce širenja, potencijalnu opasnost i dr. Međutim, način formiranja lista invazivnih biljaka je veom kompleksan i definisanje kriterijuma koje određuju invazivnost određene vrste na određenom području je ključ u njihovoj pravilnoj oceni i utvrđivanju njihove invazivnosti. Uparavo na ovom problemu je od strane EPPO razrađen proces priorizacije za invazivne biljne vrste definisan kao EPPO Standard a sa ciljem formiranja lista invazivnih vrsta biljaka i identifikacije vrsta koje su prioritetne za analizu rizika (PRA – pest risk analysis). Njegova primena omogućava razmenu podataka i harmonizaciju rezultata različitih zemalja što u mnogome olakšava u standardizuje ovaj kompleksan proces. Proces priorizacije invazivnih biljaka uključuje korišćenje CAPRA softvera i GIBF (Global Biodiversity information facility Niche Model), i usmerava istraživače na kompleksan ali standardizovan postupak sa uključenom statističkom obradom unešenih podataka. Kada se ovako obrade pojedinačne biljne vrste za koje se smatra da mogu biti svrstane u kategoriju invazivnih dobija se pouzdan odgovor o trenutnoj oceni stanja tj da li vrstu treba svrstati u invazivne na datom području, staviti je na listu biljaka koje treba pratiti kao potencijalno invazivne ili je svrstati u kategoriju vrsta koje su bezopasne. Taj naizgled jedgestavan odgovor je ključ pravilne strategije u borbi protiv invazivnih biljaka i to je ono što procesu priorizacije invazivnih biljaka kao novom standardu daje veliki značaj u praksi.

Ključne reči: invazivne biljke, EPPO, priorizacija, CAPRA

FITNESS OF TRIBENURON-METHYL RESISTANT SUNFLOWER HYBRID

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Fitness of tribenuron-methyl resistant (Rsu) and susceptible (S) sunflower hybrids was investigated in field experiments 2008 and 2009. Tribenuron-methyl applied at two-three pairs of leaves at amounts 0, 11.25, 22.50 and 33.75 g a.i. ha⁻¹. Plant height, fresh weight, leaf area and relative chlorophyll content were recorded four times (2008: 0, 15, 29 and 48 days after herbicide treatment (DAHT); 2009: 0, 16, 32 and 50 DAHT) on 16 plants. The sunflower seed yield was also measured and seed germination tests were done in Petri dishes at 25 °C. Each experiment was conducted twice. Based on the results it was found that application of tribenuron-methyl to Rsu hybrid did not cause visible changes in the fitness (plant height, fresh weight, leaf area and relative chlorophyll content, yield, seed germination, seedlings length and weight) of the treated plants. Herbicide application has affected the leaf area and relative chlorophyll content, only. The highest rate of tribenuron-methyl reduced leaf area 2-8% depending on year and time of measurement, while herbicide application mainly increased relative chlorophyll content in comparison with untreated plants of Rsu hybrid. Although herbicide application affected leaf area and relative chlorophyll content, there is no impact on the yield, which confirms the high resistance level of Rsu hybrid to tribenuron-methyl. Contrary to effect on Rsu, tribenuron-methyl caused significant damage (> 70%) of S hybrid. Therefore, statistically very significant (p<0.01) differences between Rsu and S plants were confirmed for all measured fitness parameters.

Keywords: Fitness, resistant, sunflower, susceptible, tribenuron-methyl.

Authors thank the Ministry of Education and Science of Serbia for support in this investigation (Project III46008) and EU project FP7-REGPOT-AREA 316004.

**POSSIBILITIES OF CONTROL OF PLUM SAWFLIES *HOPLOCAMPA MINUTA*
AND *H. FLAVA* BY ENTOMOPATOGENIC NEMATODES**

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Plum sawflies *Hoplocampa minuta* and *H. flava* are among the most important plum pests, and by now they are controlled only by insecticides. Entomopathogenic nematodes (EPN) have shown high efficacy against some soil dwelling pests. Up to date results on control of plum sawflies by EPN will be presented in the paper. Commercial products (Company E-nema, Germany) of 3 species of EPN *Steinernema feltiae*, *Steinernema carpocapsae* i *Heterorhabditis bacteriophora* were used. In laboratory conditions in petry dishes efficacy of EPN against 1, 10, 20 and 40 days old larvae were tested with 500, 1000 and 2 000 of nematodes per 10 larvae, per dish. In field efficacy against adult plum sawflies was tested. 12 trees of plum was covered by insect proof net to make a cage and divided again by the net to 4 compartments of 3 trees. Treatments were three nematode species and control without nematodes. EPN were apply at 1.5 million per square meter. Results of field trials against young larvae will be known in May 2014. Efficacy of EPN against 1 day old larvae was 95-100 %, whereas there was no observed mortality of older larvae. In field conditions efficacy against adult plum sawflies was *S. feltiae* 97,4 %, *S. carpocapsae* 94,6% and *H. bacteriophora* 88,9%. These results reveal potential of EPN in control of plum sawflies. According to our knowledge this is first example of control of plum sawflies by EPN.

MOGUĆNOSTI KONTROLE OSICA ŠLJIVE *HOPLOCAMPA MINUTA* I *H. FLAVA* ENTOMOPATOGENIM NEMATODAMA

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Šljivine osice predstavljaju jedne od najznačajnijih štetočina šljive i do sada su poznate isključivo hemijske mjere njihove kontrole. Entomopatogene nematode (EPN) su se pokazale kao veoma efikasne u kontroli štetnih insekata koji cio ili dio životnog ciklusa provode u zemlji. U ovom radu biće prikazani dosadašnji rezultati u kontroli šljivinih osica sa EPN. U radu su korišteni komercijalni preparati 3 vrste EPN *Steinernema feltiae*, *S. carpocapsae* i *Heterorhabditis bacteriophora* proizvođača E-nema, Njemačka. U laboratorijskim uslovima u petrijevim posudama testirana je efikasnost EPN u kontroli larvi šljivinih osica 1, 20 i 40 dana nakon napuštanja zaraženog ploda, sa 500, 1000 i 2000 nematoda na 10 larvi osica. U poljskim uslovima testirana je efikasnost EPN u kontroli imaga šljivinih osica. 12 stabala šljive prekriveno je mrežom za zaštitu od insekata i podijeljeno na 4 komore sa po 3 stabla. Tretmani su bili kontrola bez nematoda i 3 vrste EPN. EPN su aplicirane u dozi od 1,5 miliona po metru kvadratnom. Postavljen je poljski ogled i za tretman larvi osice, a rezultati će biti poznati nakon izljetanja imaga u proljeće 2014. godine. Utvrđeno je da EPN izazivaju mortalitet 95-100% larvi šljivinih osica kada se primjenjuju prvog dana nakon njihovog napuštanja zaraženog ploda, dok je kod starijih larvi mortalitet iznosio 0%. U poljskim uslovima utvrđena je sljedeća efikasnost EPN u kontroli imaga šljivinih osica *S. feltiae* 97,4 %, *S. carpocapsae* 94,6% i *Heterorhabditis bacteriophora* 88,9%. Dosadašnji rezultati laboratorijski i poljskih oglada pokazuju veliki potencijal EPN u kontroli šljivinih osica što predstavlja prvi uspješan primjer kontrole ovih štetočina sa EPN.

Section 7. Agroecology, Organic Agriculture, Soil Science

ORGANIC AGRICULTURE AS A PRODUCTION CHALLENGE IN PRESERVATION OF THE ENVIRONMENT

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In the twentieth century, the conventional agriculture improved the overall food production, but did not provide the necessary self-sufficiency and the expected health security. This production is based on high investments and in complete dependence on external inputs (oil, fertilizers, pesticides), and became unsustainable in terms of energy. Today, this dependency is such that conventional farming is completely powerless without the technical and technological support provided by men. In addition, it has a big impact on the environment and the rural economy. Contemporary (conventional) agriculture has transformed production fields in the egoistic form of industrial production, which only goal is profit. The continuous increase in population on the planet and increasing demand for food, which is conventionally produced, have consciously or unconsciously caused the exceeding of environmental limits. Nowadays, we are in such a position that the production of food in a modern way has become a concern for the state of the environment. Only in individual appeals provided by the scientific community it is indicated that progress in food production, which was achieved at the expense of natural resources, caused a threat to the ecosystem of the planet to the impermissible limits. It is clear that modern agriculture has become such a significant environmental contaminator and entered into the "conflict" with the natural environment. During the 1980s, organic farming came into the agriculture quietly and unobtrusively. It was presented to the public by supporters as a new approach to solving many problems in environmental protection, and those who opposed the organic farming presented it as a utopia that is far from reality. The division into supporters and opponents of organic agriculture has remained until today, and scientific truth that was supposed to solve this dilemma was stopped between the "power of truth", the multinational chemical companies and cruel reality. The aim of this paper is to try to eliminate some of the dilemmas between conventional and organic farming, as well as to try to find a path that will enable the development and progress in food production based on scientific and expert evidence, and at the same time not entering into a conflict with the natural environment.

Keywords: organic farming, conventional farming, environment, ecosystem, food production.

ORGANSKA POLJOPRIVREDA KAO PROIZVODNI IZAZOV U OČUVANJU ŽIVOTNE SREDINE

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Konvencionalna poljoprivreda je u dvadesetom vijeku unapredila ukupnu proizvodnju hrane, ali nije osigurala potrebnu samodovoljnost i očekivanu zdravstvenu bezbjednost. Ova proizvodnja zasnovana je na visokim ulaganjima i nalazi se u potpunoj zavisnosti od eksternih inputa (nafta, mineralna đubriva, pesticidi), te je postala energetski neodrživa. Danas je ta zavisnost tolika da je konvencionalna poljoprivreda potpuno bespomoćna bez tehničke i tehnološke podrške čovjeka. Pored toga ona ima veliki uticaj na životnu sredinu i ruralnu ekonomiju. Savremena (konvencionalna) poljoprivreda pretvorila je proizvodna polja u egoistični oblik industrijske proizvodnje čiji je jedini cilj profit. Stalno povećanje stanovništva na zemlji i rast potreba za hranom, koja se proizvodi na konvencionaln način uticali su na to da se svjesno ili nesvjesno prekorače ekološke granice. Danas smo u takvom položaju da je proizvodnja hrane na savremen način postala zabrinjavajuća za stanje životne sredine. Samo u pojedinačnim apelima naučna i stručna javnost ukazuje da je napredak u proizvodnji hrane ostvaren na račun prirodnih resursa izazvao ugrožavanje ekosistema planete do nedozvoljenih granica. Jasno je da je tako savremena poljoprivreda postala značajan kontaminator životne sredine i ušla u „sukob“ sa prirodnim okruženjem. Osamdesetih godina prošlog vijeka u poljoprivredu tiho i nenametljivo ulazi organska poljoprivreda. U javnosti je od pristalice predstavljena kao novi put u rješavanju mnogih problema zaštite životne sredine, a od onih koji je osporavaju kao utopija koja je daleko od realnosti. Podjela na pristalice i protivnike organske poljoprivrede ostala je sve do danas, a naučna istina koja je trebala da riješi dilemu zastala je između „moćne istine“, multinacionalnih hemijskih kompanija i surove realosti. Cilj rada je da se pokušaju otkloniti neke dileme između konvencionalne i organske poljoprivrede, te da se na osnovu naučnih i stručnih dokaza pronađe put koji će omogućiti razvitak i napredak u proizvodnji hrane, a da se pri tome ne ulazi u sukob sa prirodnim okruženjem.

Ključne riječi: organska poljoprivreda, konvencionalna poljoprivreda, životna sredina, ekosistem, proizvodnja hrane.

MEASURING ENVIRONMENTAL WORLDVIEW AMONG STUDENTS OF AGRICULTURE¹

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Measuring environmental awareness is an area that is receiving more and more attention in scientific research. To this end, different measurement scales have been designed and developed. In this paper the emphasis is on NEP scale (New Ecological/Environmental Paradigm) as one of the most popular and generally accepted instruments for the measurement of pro-environmental worldview. Having in mind that agricultural production must be developed on the principles of sustainable development, a high level of environmental awareness and holding pro-environmental attitudes are prerequisite for high-quality and sustainable agricultural production. The study was conducted in order to determine the adoption of pro-environmental worldview among the students of Faculty of Agriculture in Novi Sad, as they are the ones who will be future decision makers in agribusiness. A sample of 800 undergraduate students from Faculty of Agriculture in Novi Sad was selected for the study. The applied method of research was survey and the instrument used was the revised NEP scale constructed by Dunlap et al., (2000) which consists of 15 claims. The findings have shown that the majority of students of Faculty of Agriculture (55.5%) hold pro-NEP views. Dominant Social Paradigm, which is inconsistent with the New Ecological Paradigm, is supported by 37% of the students and 17.5% of them do not hold a definite view. According to these findings, it could be concluded that the majority of students hold pro-NEP views. However, a more accurate analysis has shown that, although the majority of students (75%) strongly or moderately agree with the pro-NEP views, there is a big proportion (45%) of those who strongly or moderately agree with the DSP views, which is completely opposite to the new ecological paradigm. The simultaneous presence of pro-environmental claims and those that are in conflict with them is intentional and is intended to measure the commitment of the participants to one or the other paradigm. The results show that a clear orientation of the students of Faculty of Agriculture has not yet been detected. The purpose of the study was to test the reliability and dimensionality of the revised New Ecological Paradigm (NEP) scale through assessing students' environmental worldviews. The present study has revealed that the NEP scale has more than one dimension and, therefore, it is necessary to interpret it in relation with the cultural context and specifics of the language of the population under study.

Key words: new ecological paradigm, measurement, environmental awareness

¹This research is part of the projects No III 46006 and OI 179028 financed by Serbian Ministry of Education, Science and Technological Development

MERENJE PROEKOLOŠKE ORIJENTISANOSTI STUDENATA POLJOPRIVREDE PRIMENOM NEP SKALE¹

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Merenje ekološke svesti predstavlja oblast koja zauzima sve više prostora u naučnim istraživanjima. U tom cilju razvijaju se i kreiraju različiti instrumenti za njeno merenje. U ovom radu akcenat je stavljen na tzv. NEP skalu (New Ecological/Environmental Paradigm), kao opšteprihvaćenom instrumentu za merenje proekološkog pogleda na svet pojedinaca. Imajući u vidu nužnost razvoja poljoprivredne proizvodnje koji se zasniva na principima održivog razvoja, visok stepen ekološke svesti i zastupanje proekoloških stavova preduslov su za kvalitetnu i održivu poljoprivrednu proizvodnju. Istraživanje je sprovedeno u cilju utvrđivanja usvojenosti proekološkog pogleda na svet studenata Poljoprivrednog fakulteta u Novom Sadu, kao budućih donosilaca odluka u oblasti agrobiznisa. Na uzorku od 800 studenata, primenjen je metod anketiranja, a kao sredstvo merenja proekoloških stavova korišćena je revidirana NEP (New Ecological / Environmental Paradigm) skala koja se sastoji iz 15 tvrdnji (Dunlap et al., 2000). Kako su dobijeni rezultati pokazali, većina studenata Poljoprivrednog fakulteta (55,5%) podržava proekološki pogled na svet. Dominantnu društvenu paradigmu, koja je u suprotnosti novoj ekološkoj paradigmi, podržava 27% anketiranih studenata, dok 17,5% studenata nema definisan stav po ovom pitanju. Na osnovu ovih rezultata moglo bi se zaključiti da je mereno NEP skalom, većina studenata proekološki orijentisana. Međutim, dublja analiza je pokazala da iako se većina (75%) u potpunosti ili delimično slaže sa proekološkim tvrdnjama, veliki je broj (45%) i onih koji se u potpunosti ili delimično slažu sa tvrdnjama koje su u suprotnosti sa novom ekološkom paradigmom. Istovremena prisutnost u NEP skali i proekoloških tvrdnji i onih koje su u suprotnosti sa njima, namerna je i ima za cilj da izmeri opredeljenost ispitanika ka jednoj ili drugoj paradigmi. Dobijeni rezultati pokazuju da do jasne opredeljenosti kod studenata Poljoprivrednog fakulteta još uvek nije došlo. Kako je, pored težnje da se utvrdi stepen proekološke orijentacije studenata poljoprivrede, cilj ovog rada bio i ispitivanje pouzdanosti i dimenzionalnosti NEP skale može se zaključiti, da NEP skala na ovom uzorku ne meri pro-ekološku orijentisanost kao jednu dimenziju već kao više različitih i da je njena primena i tumačenje uslovljeno kulturološkim i jezičkim specifičnostima populacije koja je izabrana za uzorak.

Ključne reči: nova ekološka paradigma, merenje, ekološka svest

¹Rad je deo istraživanja na projektima III 46006 i OI 179028 finansiranih od strane Ministarstva za nauku i tehnološki razvoj Republike Srbije

THE EFFECT OF ADDITIVES IN HEAVY FUEL OIL ON THE ECOLOGICAL AND ECONOMIC CHARACTERISTICS

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Pollutants contained in air, water and earth represent the physiological and economic damage. There are huge numbers of chemical agents that due to the nature and number of human activities pollute the environment. Sulfur dioxide is the most prevalent pollutant in the unpolluted atmosphere that arises from natural sources (about 1.2% annually enters the atmosphere, and the remaining 90-99% comes from human activities). In the atmosphere, there are also present nitrogen oxides, hydrocarbons, particulates, etc. In this paper, the authors examined the impact of the use of additives on combustion of fossil fuel emissions, reducing the consumption of fuel oil as well as achieving cost-effectiveness by applying it in the fuel oil boiler room. The study was conducted in two cycles (period of 2009. and 2010, heating season between XI - III month). In conclusion, the authors emphasize that the consumption of fuel oil without additives in 2009. amounted to 1420 t and in 2010 with the additive consumption ranged T 1350 per heating season, which means that the difference is noticeable, we had a reduction of 70 tons per heating season. The use of a catalyst increases the rate of a chemical reaction of combustion, allows complete combustion, and eliminates the appearance of particles of coke on and below the nozzle burner. You can say that the use of additives has economic (big saving about 5%) and environmental justification (reducing the percentage of CO and SO₃ in the air) and should be used for fuel additives.

Keywords: additiv, emission, combustion, energy, environmental effects.

**MONITORING OF THE DEVELOPMENT AND CHANGES OF THE
MORPHOLOGICAL CHARACTERISTICS OF MISCANTHUS GIGANTEUS ON
THE EXPERIMENTAL FIELD WITH THE APPLICATION OF ELEVEN
DIFFERENT TREATMENTS**

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Bioenergy has central role in the national action plans of energy development in Europe. Current researches are directed towards the valorization of environmental benefits of growing and using agro-energetic crops as biofuels driven by the increasing price of oil and derivatives in particular and the necessity of reducing the production of greenhouse gases in order to decrease global warming. Miscanthus - *Miscanthus giganteus* - the highly productive perennial grass with C4 photosynthesis, from East Asia. Experimental fields and production plantations have been planted in Europe . Miscanthus production is characterized by low demand in fertilizers and pesticides as well as the possibility of production of bioenergy crops on degraded areas .In order to monitor the possibilities of adaptation , development and changes in morpho-physiological characteristics of Miscanthus, we formed the experimental field in the village Nočaj with 11 different treatments which are accompanied by the following morphological characteristics such as emergence, number of plants, plant height , forming sheets, bio-cover area, tillering capabilities and overwintering crops which were analyzed every month. The results obtained by the monitoring parameters such as different planting density, different terms and fertilizer doses, the treatment of a variety of herbicides and different amounts of irrigation are aimed at defining the optimal agro-ecological conditions necessary for achieving high yield and quality of biomass with the most rational economic investment and agro-technical measures .

Key word: Miscanthus, agroenergetic corp, morpho-physiological characteristics.

**PRAĆENJE RAZVOJA I PROMENA MORFOLOŠKIH OSOBINA BILJKE
MISCANTHUS GIGANTEUS NA OGLEDNOM POLJU PRIMENOM JEDANAEST
RAZLIČITIH TRETMANA**

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Bioenergija ima centralnu ulogu u nacionalnim akcionim planovima razvoja energetike u Evropi. Aktuelna istraživanja su usmerena ka valorizaciji ekoloških prednosti gajenja i korišćenja agroenergetskih useva kao biogoriva podstaknuta sve većom cenom nafte i derivata a naročito neophodnošću smanjenja produkcije gasova staklene bašte u cilju usporenja globalnog zagrevanja. Miskantus – *Miscanthus giganteus* je visokoproduktivna višegodišnja rizomatozna trava, sa S₄ fotosintezom, koja potiče iz istočne Azije. Poljski ogledi, a kasnije i proizvodne plantaže, su zasnovani širom Evrope. Proizvodnju miskantusa odlikuju niske potrebe u đubrivima i pesticidima kao i mogućnost produkcije bioenergetskog useva na degradiranim površinama. U cilju praćenja mogućnosti adaptacije, razvoja i promena morfo-fizioloških karakteristika miskantusa, formirano je ogledno polje u ataru sela Nočaj, sa 11 različitih tretmana. Na mesečnom nivou su praćene sledeće morfološke osobine: nicanje, broj stabala, visina stabla, formiranje listova, bio-pokrovnost površine, snaga bokorenja i prezimljavanje useva. Rezultati dobijeni praćenjem parametara kao što su: različita gustina sadnje, različiti termini i doze đubrenja, tretiranje različitim herbicidima, različite količine navodnjavanja, imaju za cilj definisanje optimalnih agroekoloških uslova potrebnih za ostvarenje visokog prinosa i kvaliteta biomase, uz najracionalnija ekonomska ulaganja i primenu agrotehničkih mera.

Ključne reči: Miskantus, agroenergetski usev, morfološke osobine.

**SUCCESSES AND BARRIERS TO IRRIGATION DEVELOPMENT:
COMPARATIVE STUDY OF SLOVENIA AND REPUBLIC OF SRPSKA**

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The presented study compares large-scale irrigation development models of two countries on the basis of the formation of the development initiative. The selected areas were Slovenia and Republic of Srpska, which in summer face severe water stress. Large-scale irrigation development models were divided in three groups: (i) *top-down* (development initiatives originating from government), (ii) *meso* (development initiatives originating from regional government, non-government organisations, extension service), and (iii) *bottom-up* (development initiatives originating from local government, or farmers). Study of Slovenia in period 2007-2013 provides example of a bottom-up approach that traversed to meso development model. During the bottom-up approach the government provided grants (EU Rural Development Programme), however did not participate in formation of development initiatives. These self-formed from local municipalities, private business entities, farmers' cooperatives, and groups of farmers. Slow process resulted in lengthily project preparation. Most applied for development grants only at the very end of the period. The evaluation of the model followed resulting in development model reform – for easier project preparation the legislation simplified and regional development support groups were established. These provide project preparation guidelines and mediate formation of development initiatives at regional and local level. The reform is expected to accelerate development to reach large-scale irrigation area increase from 9.650 to 13.650 ha in period 2014-2020. Study of Republic of Srpska in post-war period provides example of mezo approach that traversed to top-down development model. War resulted in many development barriers and irrigation system wreck. Lacking pre-war top-down development structures, a post-war meso-approach evolved led by non-government organisations (EU funds). These provide farmers with organisational, administrative and educational irrigation development support. Firmer top-down approach re-established in 2007 with the “Study on sustainable development of irrigation areas on the Republic of Srpska territory” (World Bank support). Based on this the Action plan for period 2008-2017 involves revitalization of existing (7262 ha) and development of new irrigation systems (72250 ha). The Action plan started on field only in 2013 thus the full policy implementation is highly unlikely.

Key word: irrigation, development, Slovenia, Republic of Srpska

**CLASSIFICATION OF THE ALBANIAN CLIMATE BASED ON THE
COMBINATION BETWEEN POTENTIAL EVAPOTRANSPIRATION AND
RAINFALL**

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The sum of all climatic parameters known until now, in a strict understanding, cannot be the same as climate itself. The climate itself is much more than precipitation, sun radiation, temperature and relative humidity. The climate parameter we miss is evapotranspiration which represents an upward flow of water getting transformed into vapor exactly at the contact surface between plant leaves (field in the common sense) and atmosphere. In substance, the evaporation is the inverse of rainfall. If the rainfall brings water to the field, evaporation takes the water away from the field to the atmosphere. In general, researchers are well known with the distribution of the rain in time and space; namely the change of rainfall from one year to another and from one place to the other one. Even the devices by which the amount, intensity of rainfall are measured, are well known and extensively used. But, from another side, many times, the potential evapotranspiration is not accepted as a climate parameter and the information on its magnitude and its distribution in time and space is not known. In these conditions, it becomes impossible to classify a given climate whether it is dry or humid. To determine this one, we must know whether the rainfall is less or greater than evapotranspiration or vice versa. The present study is focused on quantifying the evapotranspiration based on the Penman-Monteith formulae and comparing it with the rainfall in various points (56 meteorologic stations) spread throughout Albania. The humidity factor, as it is determined by Thornthwaite, is quantified and based on it, the Albanian area is divided in humid, subhumid and arid areas. The appropriate map, in order to reflect the findings of this study, will be created as well.

APPLICABILITY OF AGENT-BASED MODELLING IN PREDICTING LAND USE CHANGES IN THE MUNICIPALITY OF KOPER IN SLOVENIA

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The economic performance of agriculture is largely dependent on the available agricultural land and its quality. Therefore the protection of highly productive agricultural land is gaining in importance, both at the national and local level. In this regard numbers of questions are being raised, such as how effectively the management of best agricultural land is, or can we achieve more sustainable use of agricultural land and whether effective tools, contributing to more efficient land use planning and therefore more efficient use of agricultural land, exist. The main aim of this study was to explore the influences of different stakeholder groups on the future land-use change within pre-designed development scenarios for the Municipality of Koper in Slovenia using agent-based modelling approach. First three different groups of stakeholders were defined, e.g. agents: residents, residential developers and non-residential developers. In order to run the agent-based model a set of resident utilities, representing the preferences of the agents (N=150) as they are making their location decisions, were analysed using conjoint analysis and imported into the model. Beside agents, seven land uses (agriculture, commercial, industrial, low density residential, high density residential, town centre and mineral extraction) and four land covers (forests, open space, water and wetlands) were introduced into the model with the help of spatial data. In order to predict the land use change process four different scenarios of socio-economic and climate development from IPCC (A1: "Hyper-tech", A2: "Extreme water", B1: "Peak oil", B2: "Fragmentation") were downscaled to the study area and implemented into the model. In addition farmers' behaviour and their impact on the future use of agricultural land in the case study area were examined using theoretical agent-based model. In this case three different hypothetical options of future agricultural land use were taken into account. The results showed that the amount of the best agricultural land decreases in inverse proportion to the increase in artificial surfaces for all the scenarios, with the highest loss in scenario A1 and the lowest loss in B1. The results of theoretical agent based model indicated the increase of artificial surfaces in the case of two scenarios.

Key words: stakeholders, Koper, land use change, IPCC-SRES scenarios, agent-based modelling

LIVESTOCK MANURE AS A RENEWABLE ENERGY RESOURCE

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A growing need for energy and increasing problems with environmental protection impose the necessity for electricity produced from renewable resources. One of those renewable resources is biogas, which is a kind of gas containing a large amount of methane resulting from a fermentation of organic substances in sewage, municipal waste, biomass, manure and any other biodegradable materials in anaerobic conditions. Lazar Company Limited from the town of Blace owns a farm with 500 milch cows, a dairy plant which processes 60000 litres of milk per day, as well as a power plant which utilises biogas. The biogas digesters of this plant utilise biodegradable substances such as manure, whey and biomass. The capacity of the digester is 480 Nm³/h of biogas and it is powered by a 4182 horsepower Otto engine. It produces up to 1000kW/h of electricity, the by-product of which is fermented bio-fertiliser of superior quality. In addition to reducing emissions of methane which is responsible for increasing the greenhouse effect, and aside from reducing the propagation of odour and preventing soil and groundwater pollution, achieving positive economic effects is also a possibility. The paper presents the data relating to an investment in a biogas plant, to the amount of the produced electricity and heat depending on the mixture which is thrown into the digester, as well as to the income from the sale of electricity at a preferential tariff.

Key words: manure, biogas, renewable resources, energy, digester

STAJSKO ĐUBRIVO KAO OBNOVLJIVI IZVOR ENERGIJE

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Sve izraženija potreba za energijom i sve veći problemi sa zaštitom životne sredine, nameću potrebu za proizvodnju električne energije iz obnovljivih izvora. Jedan od obnovljivih izvora je i biogas, gas sa velikom količinom metana koji nastaje fermentacijom organskih supstanci iz otpadnih voda, gradskog otpada, biomase, stajnjaka i bilo koje druge biorazgradive materije u anearobnim uslovima. Kompanija d.o.o."Lazar" Blace u svom sastavu poseduje farmu sa 500 muznih krava, mlekaru sa dnevnom preradom od 60.000 l/dan kao i postrojenje električne elektrane na biogas. Biogasni digestori ove elektrane koriste biorazgradive materije poput stajnjaka, surutke i biomase. Kapacitet digestora je 480 Nm³/h biogasa koji pokreće Otto motor snage 4182 KS i proizvodi do 1000 kW/h električne energije pri čemu se kao sporedni proizvod dobija fermentisano biodubrivo vrhunskog kvaliteta. Pored smanjenja emisije metana koji utiče na povećanje efekta staklene bašte, smanjenja rasprostriranja neprijatnog mirisa, sprečavanja zagađenja zemljišta i podzemnih voda moguće je ostvariti pozitivne ekonomske efekte. U radu su prikazani podaci o investicionim ulaganjima u biogasno postrojenje, količini proizvedene električne i toplotne energije u zavisnosti od smeše koja je ubacivana u digestor kao i prihode od prodaje električne energije po povlašćenoj tarifi.

Ključne reči: stajnjak, biogas, obnovljivi izvori, energija, digestor

POSTER PRESENTATION

Section 1. Animal Production

THE EFFECT OF LOW AND HIGH ENVIRONMENTAL TEMPERATURE TO THE MOVEMENT ACTIVITY OF CZECH FLECKVIEH DAIRY COWS

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In this thesis, the influence of environmental temperature to the movement activity of Czech Fleckvieh dairy cows, was examined. The observations were performed in private farm PROAGRO Radešínská Svratka, a.s. in period from 2013-07-02 to 2013-09-06. The temperature of environment was measured by using HOBO sensors in regular 15 minute intervals. For determination of movement activity, the average values from pedometers were used. For statistical evaluation, measured values were divided according to the temperature in the stable: low temperature ($< 21^{\circ}\text{C}$) and high temperature ($> 21^{\circ}\text{C}$). The highest movement activity (average 143.77 steps/hour) was recorded in days with low temperature and the lowest movement activity (139.33 steps/hour) was observed in days with high temperature. In this case, highly statistically significant difference ($P < 0.01$) was proved. Based on our results we can conclude, that the highest movement activity was determined in days with environmental temperature below 21°C . It was probably due to the fact that cows were in heat stress. This difference amounted to an average of 96 steps per day. In conclusion we can say that movement activity may indicative of animal welfare to the point.

Key words: temperature environment, physical activity, Czech Fleckvieh

Acknowledgments: This research was supported by grant project FA MENDELU IGA TP 2014

THE EFFECT OF MILK YIELD ON RESTING BEHAVIOUR OF CZECH FLECKVIEH COWS IN FREE-STALL STABLE

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The aim of study, the effect of milk yield on resting behaviour of Czech Fleckvieh cows was evaluated. The frequency of standing cows and cows lying on the right and left side (laterality) was determined. Experiment was conducted in farm GenAgro Ricany a. s. (49°12'30.370"N, 16°23'43.092"E). Observations were carried out at weekly intervals from 2011-06-08 to 2012-05-30, at 10.00 am (48 observations). The one section - one quarter of stable was observed (n = 98 cows). Cows were divided into 3 groups (1st group < 25 kg; 2nd group 25.1 – 32 kg; 3rd group 32.1 < kg) according to actual milk yield. In case of all groups (< 25 kg to 32.1 < kg), the higher amount of lying than standing dairy cow was observed. Highly statistically significant difference was proved (p < 0.01). Next highly statistically significant differences were found in 2nd group (from 25.1 to 32 kg), as well as 3rd group (32.1 < kg), when higher quantity of cows was lying on the left side (p < 0.01). In 1st group (< 25 kg), statistically significant difference (p < 0.05) was observed in case of cows with left-laterality. Dairy cows with lowest milk yield (< 25 kg milk) were more standing than dairy cows with higher milk yield (25.1 < kg). In this case, the highly statistically significant difference was proved (p < 0.01). Based on the our results we can conclude, that the milk yield had great influence on the resting behaviour of dairy cows.

Key words: cows, laterality, standing, lying, milk yield

Acknowledgments: This research was supported by grant project FA MENDELU IGA TP 2014.

CHANGES IN PROTEIN CONTENT IN THE SUMMER AND ITS IMPACT ON THE COMPOSITION AND QUALITY PARAMETERS OF MILK FROM HOLSTEIN COWS

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In order to determine the influences on milk protein content in the milk of Holstein cows were analyzed 92 bulk milk samples. The research was conducted from 1 June to 31 August 2013. The barn was located at Mendel University farm in Žabčice (Czech Republic: GPS49°0'51.786"N, 16°36'14.809"E). Temperature in stable was measured by 3 sensors in intervals 15 minutes. Samples were taken daily from morning milking then were frozen, transported and analysed in laboratory on Department of Animal Breeding. Monitored parameters were follows: fat content, lactose content, solids non fat content, rennet coagulation time, curd quality class, titratable acidity and freezing point of milk. Statistically significant ($P < 0.05$) were evaluated dependence: with increasing average temperature and relative humidity in stable content of protein in milk samples decreases ($r = -0.25$; $r = -0.23$). With increasing protein content freezing point of milk decreases ($r = -0.24$). Also were found statistically insignificant ($P \geq 0.05$) tendency that increasing protein content increases active acidity ($r = 0.13$) and increases the time required for coagulation of protein ($r = 0.14$). Statistically insignificant tendency was observed also in the relationship of protein content and quality of curd ($r = -0.14$). This work confirms the assumption that seasonality is one of the factors that affect the protein content of the milk. The percentage of protein is reduced in the summer. Low content of protein has a negative effect on the freezing point of milk, rennet coagulation time and curd quality.

Key words: milk protein, milk composition, quality parameters, Holstein cows

Acknowledgment: This research was supported by grant project FA MENDELU IGA TP 2014

**EFFECT OF MILK PROTEIN CONTENT ON TECHNOLOGICAL PROPERTIES
OF BULK MILK SAMPLES FROM CZECH FLECKVIEH COWS IN WINTER
PERIOD**

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Objective of this research was monitored effect of milk protein content on technological properties of bulk milk samples from Czech Fleckvieh cows in winter period. During the period of 24.1. 2013 to 11.3. 2013 were analysed 47 bulk milk samples obtained in herd of Czech Fleckvieh cows from Moravian farm GenAgro Říčany, a.s (GPS 49°12'32.319"N, 16°23'42.666"E) in the altitude of 349 m. Samples were taken daily from morning milking and analysed in laboratory on Department of Animal Breeding. Average values of monitored parameters were follows: average daily temperature (0.71 °C), protein content (3.17 %), titratable acidity (6.47 °SH), specific density (1.029 kg.l⁻¹), freezing point (-0.523 °C), rennet coagulation time (209 sec.) and curd quality class (1.8). Based on the correlation coefficients was found statistically not significant relationship between average daily temperature and protein content in milk ($P \geq 0.05$). Statistically significant difference was found between protein content and titratable acidity ($r = 0.63$; $P < 0.001$), specific density ($r = 0.88$; $P < 0.001$), freezing point of milk ($r = -0.92$; $P < 0.001$), rennet coagulation time ($r = -0.71$; $P < 0.001$) and curd quality class ($r = -0.39$; $P < 0.01$). Based on the results, we can conclude that in this case the average daily temperature (in winter period) on protein content had no significant effect. On the contrary it was found that the protein content significantly affects the selected technological properties of milk.

Key words: bulk milk, technological properties, protein content, temperature, Czech Fleckvieh cow

Acknowledgment: This research was supported by grant project FA MENDELU IGA TP 2014

SOMATIC CELL COUNT VARIATION IN DIFFERENT DAIRY HERD

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In this paper the somatic cell count variation were examined in different dairy herd. In the period of 2010- 2014, 1,214 somatic cell count (SCC) records were obtained from 10 Holstein-frisian dairy herd. The herds were divided into two group: 1. less than 50 cows (5 herd, A,B,C,D,E) and 2. more than 50 cows (5 herd, A,B,C,D,E). The farms within each groups has a very similar milking, feeding and housing system. In the group 1. the average value of CV=48,06% shows significant variation among the monitored farms. The highest variation was found at the farm E (CV=87,48%), and the lowest at the farm A (CV=11,10%). The (SCC) mean in group 1. was 276 320. Through the experiment, statistical significance ($P < 0,05$) has been determined on the farm E. The (SCC) mean of group 2. was 374 291. In the group 2. the average value of CV=30,13% shows also significant variation between examined herds. The highest variation was found at the farm C (CV=49,70%), and the lowest at the farm A (CV=9,04%). Our results indicate that herd size could have an influence for milk quality and (SCC).

Key words: SCC, dairy herd, Holstein frisian

RELATIONSHEEP AMONG COW AGE MILK PRODUCTION AND QUALITY IN DAIRY CATTLE

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The objective of this study was to represent the influence of cow age on milk production in dairy herds. The experiment was carried out by 4 randomly selected Holstein frisian herd (100 cows per farm), in which the feeding system were very similar all the year round. The data of milk production (kg) and fat (%) were collected during first, second and third lactation. The average milk production on all examined farm was 6595,08 kg with 3,74% of milk fat. The average cow age through 1., 2. and 3. Lactation was 2,15, 3,36 and 4,56 year respectively. Significant variation $LSD_{0,05}$ was found in milk production between first (6015 kg) and third (7014 kg) lactation. The milk fat coefficient of variation was $CV=10,62\%$ and lower than value of produced milk ($CV=26,95\%$), which indicate the homogeneous feature of milk fat content in the milk. The coefficient of correlation value ($r = 0,10$) did not reach the significant functionality level between the milk production and milk fat content. It was observed that depending on the stage of lactation and cow age the milk production increased.

Key words: Holstein Frisian, cow age, lactation.

INFLUENCE OF THE QUANTITY AND CONTAMINATION OF MILK ON CONCENTRATION OF ANTIBIOTICS IN MIXED MILK

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In the laboratory we mixed the same quantities and different two or more quantities of raw milk which are contaminated with the same and different concentrations of certain antibiotics. Concentration of

antibiotic per ml of mixed milk was calculated using the formula: $C_m = \frac{M_1 \times C_1 + M_2 \times C_2 \dots}{M_1 + M_2 \dots}$

(Vuković, 2008). In this way, encompassing all possible combinations, the impact of these factor that influence the concentration of antibiotics in mixed milk is fully determined.

Key words: milk, contamination, antibiotics, mixing, milk quantity

**BACTERIAL BIOFILMS – IMPORTANCE FOR THE ETIOLOGY OF BOVINE
MASTITIS AND THEIR IMPACT ON THE THERAPY BASED ON THE RESULTS
OF ANTIMICROBIAL SUSCEPTIBILITY TESTING OF AGENTS**

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Despite permanent efforts put in prevention, early detection and control measures, mastitis in dairy cows remains the major and highly prevalent disease causing severe health and economic problems, while bacteria are the most prevalent etiological agent of these infections. Appropriate therapy relies on accurate laboratory identification of the agent and selection of effective antimicrobial drugs according to the antibiogram findings. However, though agents manifest antimicrobial susceptibility *in vitro*, in some cases, the therapy offers only limited improvement during the acute stage of the disease and recurrent infection develops rapidly after therapy cessation. The probable causes for such phenomenon have been considered from various aspects and since recently, there is growing evidence suggesting that ability of bacteria to persist in udder tissue in the form of a biofilm strongly improves their antimicrobial resistance. In this paper, we present an overview of some relevant data from the literature as well as the results of our research on the ability of biofilm formation in particular bacterial species of importance for the aetiology of bovine mastitis: *Staphylococcus aureus*, *Streptococcus uberis*, *Escherichia coli* and *Trueperella (Arcanobacterium) pyogenes*. The data pertain to the identification of genes responsible for bacterial biofilm formation, their prevalence in bacterial strains isolated from milk of affected cows, the role of extracellular polymeric substance (slime) and possibilities to investigate its production *in vitro*. Investigation of biofilms is inevitably associated with a radical abandoning of generally adopted approach to bacteria as single-cell organisms. Recently established facts that bacteria persist in mammary gland owing to their arrangement into the multicellular functional and structural communities impose the need for a different approach in the research and understanding of pathogenesis of mastitis, as well as identifying novel prophylactic, therapeutic and control methods and strategies. Antibiotics that proved effective against bacterial suspensions *in vitro* are often insufficiently effective against the same bacteria if they are arranged in a biofilm. Standard disc diffusion or dilution tests (according to guidelines of *Clinical and Laboratory Standard Institute - CLSI*) are thus neither applicable to bacteria living in a biofilm nor are an adequate basis to assessing the success of the therapy of bacterial mastitis. Determination of the minimum biofilm eradication concentration (MBEC) is considered more adequate method for selecting antibiotics and developing novel drugs effective against bacterial biofilms.

Key words: bovine mastitis, bacterial biofilms

**BAKTERIJSKI BIOFILMOVI – ZNAČAJ U ETIOLOGIJI MASTITISA KRAVA I
UTICAJ NA EFEKAT LEČENJA BAZIRANOG NA REZULTATIMA ISPITIVANJA
OSETLJIVOSTI UZROČNIKA NA ANTIBIOTIKE**

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Uprkos kontinuiranim naporima koji se ulažu u prevenciju, blagovremeno otkrivanje i kontrolu širenja, mastitisi su i dalje glavni zdravstveni i ekonomski problem u zapaćtima mlećnih krava, a bakterije najučestaliji etiološki agens ovih infekcija. Adekvatna terapija se bazira na korektnoj identifikaciji uzročnika u laboratoriji i odabiru antibiotika na osnovu rezultata antibiograma. Međutim, i pored toga što uzročnici pokazuju osetljivost na antibiotike u in vitro ispitivanjima, u izvesnom broju slučajeva terapijom se postiže samo delimićno poboljšanje u akutnom toku bolesti, a posle prestanka primene antibiotika, infekcije recidiviraju. Razlozi ove pojave razmatrani su sa razlićitih aspekata, a u novije vreme sve je više dokaza da rezistenciji bakterija znaćajno doprinosi njihova sposobnost da u tkivu vimena perzistiraju u formi biofilma. U ovom radu iznosimo neke od relevantnih literaturnih podataka, kao i rezultate sopstvenih istraživanja, o sposobnosti formiranja biofilma kod pojedinih vrsta bakterija od posebnog znaćaja u etiologiji mastitisa krava: *Staphylococcus aureus*, *Streptococcus uberis*, *Escherichia coli* i *Trueperella (Arcanobacterium) pyogenes*. Podaci se odnose na identifikaciju gena koji su ključni za organizovanje bakterija u biofilm, njihovu prevalencu kod sojeva izolovanih iz mleka krava, ulogu ekstracelularne polimerićne supstancije (slime) i mogućnosti in vitro ispitivanja njene produkcije. Izućavanje biofilмова suštinski nalaže radikalno odstupanje od opšte prihvaćenog pogleda na bakterije kao jednoćelijske mikroorganizme. Dosadašnja saznanja da bakterije perzistiraju u mlećnoj žlezdi zahvaljujući organizaciji u višećelijske funkcionalne i strukturne zajednice, nameću potrebu za drugaćijim pristupom u izućavanju i razumevanju patogeneze mastitisa, kao i iznalaženju novih načina profilakse, kontrole i terapije. Koncentracije antibiotika koje ustanovljuvamo u in vitro ispitivanjima kao efikasne prema suspenziji bakterija, nedovoljne su za uništavanje istih bakterija organizovanih u biofilm. Standardni disk difuzioni ili dilucionni testovi (prema preporukama Clinical and Laboratory Standard Institute - CLSI) zbog toga nisu aplikativni za bakterije koje rastu u biofilmu, niti su adekvatna osnova za procenu uspeha terapije mastitisa izazvanih bakterijama. Određivanje minimalne biofilm eradikacione koncentracije (MBEC) predstavlja adekvatniju metodu za odabir antibiotika i razvoj novih lekova efikasnih protiv bakterija koje rastu u biofilmu.

Ključne reći: mastitisi krava, bakterijski biofilm

**EFFICIENCY AND USING POSSIBILITIES OF HEAT RECOVERY PROCESS
FROM MILK COOLING SYSTEM WITH PRECOOLING**

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Contemporary, farm oriented, milk production involves obtaining of highly valuable, hygienically safe product. At the same time, farmers are under constant pressure to find new ways to reduce production costs. One of the most important factor in the total structure of costs are costs of energy. This paper presents the analysis of possibilities and effectiveness of usage of the system for recovering heat obtained by milk cooling process. The system consists of a heat pump " milk - water ", plate type pre-cooler with counter flow of water and milk and storage vessel. The heat obtained from milk cooling process, is used to heat water instead of being wasted to the environment. Warm water is required on the farm for many reasons. Significant energy savings can be made by using this system. Experimental investigation was carried out on the family farm, where the milking was performed twice a day. After each milking, milking equipment is washed with warm water. The results showed that the application of this system can realize significant cost savings, as well as the potential of improving the efficiency of individual components of the system.

Key words: heat pump, milk, cooling, recovery, efficiency.

EFIKASNOST I MOGUĆNOST PRIMENE PROCESA REKUPERACIJE TOPLOTE IZ SISTEMA ZA HLAĐENJE MLEKA SA PREDHLAĐENJEM

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Savremena, farmerska, proizvodnja mleka podrazumeva dobijanje visoko vrednog, higijenski ispravnog proizvoda. Istovremeno, farmeri su pod stalnim pritiskom nalaženja novih načina da se smanje troškovi proizvodnje. Bitna stavka u strukturi troškova proizvodnje su troškovi energije. U ovom radu je predstavljena analiza mogućnosti i efikasnosti primene sistema za rekuperaciju toplote dobijene hlađenjem mleka. Sistem se sastoji od toplotne pumpe „mleko-voda“, pločastog predhladnjaka sa suprotnosmernim kretanjem vode i mleka i skladišnika. Toplota, dobijena hlađenjem mleka, umesto da se emituje u okolnu sredinu, koristi se za zagrevanje vode. Topla voda neophodna je na farmi iz više razloga. Primenom ovakvog sistema mogu se postići značajne uštede energije. Eksperimentalno istraživanje obavljeno je na porodičnoj farmi, na kojoj se muža obavlja dvokratno. Posle svake muže, oprema za mužu se pere toplom vodom. Rezultati istraživanja pokazali su da je primenom ovog sistema moguće ostvariti značajne uštede, kao i potencijal poboljšanja efikasnosti pojedinih komponenti sistema.

Ključne reči: toplotna pumpa, mleko, hlađenje, rekuperacija, efikasnost.

**UTILIZATION RATE OF MILK IN AUTOCHTHONOUS PRODUCTION OF
SJENICA CHEESE AND ITS DISTRIBUTION**

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Sjenica cheese is our representative white cheese product in brine. It is produced by indigenous technology on Sjenica-Pester plateau, and latterly in the dairy industry. The aim of researches is to show comparative advantages of sheep milk through utilization rate, as well as the utilization rate of milk ingredients and economical aspects of cheese production. It also shows correctness of technological process through distribution of milk components into cheese. Utilization rate, during cheese production, is 32.15% of sheep milk, and 15.17% of cow milk. Distribution of basic ingredients in cheese production is good, with pure content of 61.14% from sheep milk, and 48.68% from cow milk; milk fat is 90.91% in sheep milk and 93.55% in cow milk. Proteins percentage is 75.86% in sheep milk and 71.69% in cow milk.

Key words: Sjenica cheese, utilization rate, distribution, milk ingredients

**RANDMAN PROIZVODNJE I DISTRIBUCIJA SASTOJAKA MLEKA U SIR PRI
AUTOHTONOJ PROIZVODNJI SJENIČKOG SIRA**

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Sjenički sir je jedan od naših najpoznatijih sireva iz grupe belih sireva u salamuri. Proizvodi se autohtonom tehnologijom na području Sjenicko-Pešterske visoravni, a u poslednje vreme i industrijski u mlekarama. Istrazivanja imaju za cilj da se kroz randman proizvodnje sira pokažu komparativne prednosti ovčijeg mleka za proizvodnju sira, stepen iskorišćenosti sastojaka mleka i ekonomski aspekti izrade sira, a kroz distribuciju sastojaka mleka u sir pokaže pravilnost uvođenju tehnološkog procesa. Randman je pri izradi sira od ovčijeg mleka iznosio 32.15%, a kod kravljeg 15.17%. Distribucija osnovnih sastojaka mleka u sir bila je dobra i to suve materije kod ovčjeg mleka je 61.14%, a kod kravljeg 48.68%, mlečne masti kod ovčjeg mleka 90.91% i 93.55% kod kravljeg mleka, proteina kod ovčjeg mleka 75.86% i 71.69% pri izradi sira od kravljeg mleka.

Ključne reči: Sjenički sir, Randman, Distribucija, Sastojci mleka

BASIC MORPHOMETRIC ANALYSIS OF KARAKACHAN SHEEP IN SERBIA

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Karakachan sheep (karakacanska pramenka, crna vlaska ovca) represents one of the oldest sheep breeds in Europe. It was created as a result of selection on the primitive living conditions in area of today's South East Balkans. This breed belongs to a primitive type of mountain sheep with a rough constitution and it's also characterized by pronounced vitality and resistance. Today, during the intense sheep breeding, Karakachan sheep lost its importance in modern production. Consequently, now is endangered breed in Serbia and other countries in region. There is relatively little information about the racial characteristics of this sheep breed in the domestic scientific literature. Nevertheless, Karakachan sheep has significance for the history, traditions and development of domestic sheep breeding and falls into one of the most important genetic resources. Basic morphometric measurements of 105 Karakachan sheep (97 ewes and 8 rams) from area of the Stara planina mountain nature park in Serbia were conducted. The parameters that were included in measurements were: body length, height at withers, chest circumference, chest depth, chest width, head length, head width, cannon circumference and tail length. Zootechnical ribbon (250 cm) was used for measuring, and data were descriptive and comparative statistically analysed. In addition, indices of body composition were calculated. Results were as follows: body length 70.93 ± 4.77 , height at withers 61.48 ± 2.37 , chest circumference 79.21 ± 4.51 , chest depth 30.65 ± 2.19 ; chest width 21.69 ± 1.40 , head length 27.59 ± 1.34 , head width 13.09 ± 0.75 ; shin circumference 8.22 ± 0.38 and tail length 28.99 ± 4.11 . There was a statistically significant difference of examined traits in relation to age and to sex. Following physical indexes were calculated: body format 86.94 ± 5.16 , body compactness 111.90 ± 6.00 , chest 70.95 ± 4.71 and head width 47.48 ± 2.72 . Based on these morphometric measurements, it can be concluded that the Karakachan sheep is one of the smaller sheep breeds in Serbia. Basic measures and indices show a small format of the body, which again points to a rough constitution. Morphological characteristics are the hallmark of natural selection, which supports the theory of the Karakachan sheep origin. These results contribute to a better understanding of the morphological characteristics of the breed with the aim of forcing permanent desired characteristics of this sheep. This survey is one of the first steps in learning about and preserving the Karakachan sheep in South East Balkans.

Key words: Karakachan sheep, morphometry, Serbia

OSNOVNA MORFOMETRIJSKA ANALIZA KARAKAČANSKE OVCE U SRBIJI

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Karakačanska ovca (karakačanska pramenka, crna vlaška ovca) predstavlja jednu od najstarijih rasa ovaca u Evropi. Nastala je viševekovnom selekcijom na primitivne uslove života na području današnjih zemalja jugoistočnog Balkana. Spada u planininske tipove ovaca sa malom produktivnošću, ali isto tako je odlikuje izrazita otpornost i vitalnost. U današnje vreme intenzivnog ovčarstva karakačanska ovca ne zauzima važno mesto u domaćoj proizvodnji. Zbog toga pripada ugroženim rasama ovaca u Srbiji, ali i regionu. U domaćoj stručnoj literaturi ne postoji mnogo podataka o rasnim karakteristikama karakačanske ovce. Ipak karakačanska ovca ima značaj za istoriju, tradiciju i razvijanje domaćeg ovčarstva i spada u jedne od značajnih genetičkih resursa. Sprovedena su osnovna morfometrijska merenja na 105 (97 ovaca i 8 ovnova) ovaca Karakačanske ovce na području parka prirode Stara planinina u Srbiji. Parametri koji su obuhvaćeni merenjem bili su: dužina tela, visina u grebenu, obim grudí, dubina grudí, širina grudí, dužina glave, širina glave, obim prednje cevanice (metakarpus) i dužina repa. Za merenje je korišćena zootehnička pantljička (250 cm), a svi podaci su deskriptivno i komparativno statistički analizirani. Dodatno su izračunati indeksi telesne građe. Dobijeni su sledeći rezultati: dužina tela 70,93±4,77 cm; visina u grebenu 61,48±2,37 cm; obim grudí 79,21±4,51 cm; dubina grudí 30,65±2,19 cm; širina grudí 21,69±1,40; dužina glave 27,59±1,34; širina glave 13,09±0,75; obim cevanice 8,22±0,38 i dužina repa 28,99±4,11. Utvrđena je statistički značajna razlika svih ispitivanih parametara u odnosu na starost i pol karakačanske ovce. Izračunati su sledeći telesni indeksi: indeks formata tela 86,94 ±5,16 cm, indeks zbijenosti trupa 111,90±6,00, indeks grudnog koša 70,95 ±4,71 i indeks širine glave 47,48 ±2,72 cm. Na osnovu morfometrijskih merenja se može zaključiti da je karakačanska ovca jedan od manjih sojeva pramenki u Srbiji. Osnovne mere i indeksi pokazuju mali format tela ove ovce što ponovo ukazuje na grubu konstituciju. Morfološke osobine su znak prirodne selekcije, što podržava teoriju o nastanku karakačanske ovce. Dobijeni rezultati doprinose boljem poznavanju morfoloških osobina ove rase sa krajnim ciljem forsiranja njenih poželjnih karakteristika. Sprovedeno istraživanje je jedan od prvih koraka u plan upoznavanju i očuvanju karakačanske ovce na našim prostorima.

Ključne reči: karakačanska ovca, morfometrija, Srbija

VARIABILITY IN HEIGHT AT WITHERS OF RHODESIAN RIDGEBACK

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Only a few dog breeds officially recognized by the FCI originate from Africa. One of these breeds is the Rhodesian Ridgeback. This breed is recognized by other cynological organizations around the world, which are not members of the FCI, but have signed agreement on cooperation and understanding. These organizations include American Kennel Club (AKC) Kennel Club of Great Britain (KCGB) and Canadian Kennel Club (CCK). Each of these organizations issued a standard for this breed which precisely specifies height at withers of this dog. The research was undertaken in the period from 1989. to 2012. on a total of 722 dogs (253 males and 469 bitches) of the Rhodesian Ridgeback. The height at withers was measured. All measured dogs were between 1 and 5 years of age. Measuring was done by means of Lithin stick, while dogs were positioned to stand squarely and still, from the ground to the top of the shoulder blade. Mean values of parameters and indexes are shown, as well as maximal and minimal value and descriptive statistical parameters: standard deviation, standard error and Cv. T-test was used to calculate statistical significance of the difference in parameters between males and bitches, as well as among the groups. The percentage of males and bitches that were outside the boundaries specified by the breed standard was also calculated. The mean height at withers in males of all three groups was 68.4 cm. Range was from 63.00 to 73.00 cm. There were no recorded values below the lowest height determined by the FCI standard in males, while the highest recorded value exceeded the upper FCI Standard boundary by 4,00 cm and German Ridgeback Club boundary by 3,00 cm. Standard error in males was 0,11. Abberations in bitches went both above and below limits set by the FCI standard. The lowest recorded height was 58,50 cm, which is 3,50 cm lower than the lower limit set by the FCI Standard. Maximal observed value was 71,80 cm, while the FCI Standard sets the upper limit at 66,00 cm. Standard error in bitches was 0,09. Comparison of obtained values between sexes showed that there is very high statistical importance ($P < 0.001$).

Keywords: Rhodesian ridgeback, height at withers, standard

VARIJACIJE VISINE GREBENA RODEZIJSKOG RIDŽBEKA

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Afrika je domicilna zemlja za svega nekoliko rasa pasa, koje su zvanično priznate od strane Međunarodne kinološke federacije (FCI). Jedna od njih je rodezijski ridžbek (Rhodesian Ridgeback). Rasa je priznata i od drugih kinoloških organizacija u svetu koje nisu članice FCI, ali imaju potpisane memorandume o razumevanju i saradnji. Ta kinološke organizacije su Kinološki savez Amerike (AKC), Kinološki savez Velike britanije (KC) i Kanadski kinološki save (KCK). Svaka od ovih organizacija propisala je standard za ovu rasu u kome je precizno definisana visina grebena psa. Istraživanje je sprovedeno u period od 1989. do 2012. na ukupno 722 psa (253 mužjaka i 469 ženki) rase rodezijski ridžbek. Merena je visina grebena. Svi mereni psi su bili u starosti od 1 do 5 godina. Mere su uzete Lithinovim štapom, u poziciji pravilnog stava prednjih i zadnjih nogu, od podloge do vrha lopatice. Prikazane su srednje vrednosti merenih parametara i indeksa, maksimalna i minimalna vrednost, kao i deskriptivni statistički parametri standardna devijacija, standardna greška i koeficijent varijacije. Primenom t-testa izračunata je statistička značajnost razlike merenih parametra između mužjaka i ženki, kao i unutar grupa. Izračunat je i procenat mužjaka i ženki koje se nalaze mimo vrednosti propisanih standardom. Kod mužjaka iz sve tri grupe prosečna visina grebena je 68.40 cm. Intervak variranja je od 63.00 do 73.00 cm. Kod mužjaka nije zabeleženo odstupanje ispod donje granice koju proisuju standardi, dok je gornja granica bila veća za 4.00 cm od vrednosti propisane FCI standardom, a za 3.00 cm od one koju toleriše klub u Nemačkoj. Standardna greška kod mužjaka je bila 0.11. Kod ženki je zabeleženo odstupanje i u gornjoj i u donjoj vrednosti koju predviđaju standardi. Donja granica je bila 58.50 cm što je za 3.50 cm niže od standardom dozvoljene. Maksimalna vrednost je 71.80 cm, dok je standardom predviđena gornja granica od 66.00 cm. Standardna greška kod ženki je bila manja i iznosi 0.09. Pređenjem dobijenih vrednosti između polova ustanovljena je vrlo velika stistička značajnost ($P < 0.001$).

Ključne reči: Rodezijski ridžbek, visina grebena, standard

**BROJNOST SRPSKIH GONIČA I SRPSKIH TROBOJNIH GONIČA U SRBIJI U
PERIODU OD 2002. DO 2012. GODINE**

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Goniči predstavljaju veoma staru grupu lovačkih pasa koji kao lovački pomoćnici imaju zadatak da pronađu divljač po tragu, dignu je i gone uz oblajavanje kako bi je isterali pred lovca. Srpske autohtone rase goniča su srpski gonič i srpski trobojni gonič koji spadaju u relativno mlade rase, a priznate su od strane Međunarodne kinološke federacije polovinom dvadesetog veka. Cilj rada je da prikaže kretanja u brojnosti populacije srpskih i srpskih trobojnih goniča, kao autohtonih rasa goniča u Srbiji, u periodu od 2002. do 2012. godine.

Ključne reči: Srpski gonič, Srpski trobojni gonič, autohtone rase goniča, lovački psi

SOME BIOCHEMICAL BLOOD PARAMETERS OF SOWS IN LACTATION

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The aim of study was to examine the values of selected blood biochemistry parameters of sows at the beginning (day 2nd) and the end (day 28th) of lactation. The study included a total of 21 commercial hybrid sows (Large White x Landrace) from industrial swine farm, fed and housed under usual farm conditions. Blood samples were taken by puncture of *v. cava cranialis*, and by the concentration of total protein, albumin, globulin, total bilirubin, calcium and phosphorus were determined. The decline in the absolute values of the studied parameters at the end of lactation in relation to its beginning has been found for the concentrations of total protein (88.24 ± 2.23 versus 83.53 ± 1.45 g/L), albumin (41.95 ± 1.21 versus 38.68 ± 0.88 g/L), globulin (46.33 ± 2.35 versus 44.79 ± 1.89 g/L) and inorganic phosphorus (3.27 ± 0.14 versus 2.94 ± 0.13 mmol/L), while total bilirubin and calcium increased (4.75 ± 0.44 versus 6.81 ± 0.57 $\mu\text{mol/L}$, 2.88 ± 0.10 versus 2.99 ± 0.13 mmol/L, respectively). The results indicate enhanced blood protein catabolism and distortion of liver functional capacity, most likely caused by activation of homeostatic mechanisms, which, accompanied with a reduction of inorganic phosphorus concentration can adversely affect the establishment of postpartum ovarian activity and extend the weaning - estrus interval.

Key words: sow, lactation, blood, biochemical parameters

NEKI BIOHEMIJSKI PARAMETRI KRVI KRMAČA U LAKTACIJI

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Cilj rada bio je da se ispituju vrijednosti odabranih biohemijskih parametara krvi krmača na početku (drugi dan) i kraju (28. dan) laktacije. Istraživanjem je obuhvaćena ukupno 21 krmača komercijalnog hibrida (veliki jorkšir x landras) sa farme svinja industrijskog tipa, hranjenih i držanih u uobičajenim farmskim uslovima, a uzorci krvi uzeti su punkcijom *v. cava cranialis*. U uzetim uzorcima krvi određene su koncentracije ukupnih proteina, albumina, globulina, ukupnog bilirubina, kalcijuma i neorganskog fosfora. Opadanje apsolutnih vrijednosti ispitanih parametara na kraju laktacije u odnosu na njen početak ustanovljeno je za koncentracije ukupnih proteina (88.24 ± 2.23 naprema 83.53 ± 1.45 g/L), albumina (41.95 ± 1.21 naprema 38.68 ± 0.88 g/L), globulina (46.33 ± 2.35 naprema 44.79 ± 1.89 g/L) i neorganskog fosfora (3.27 ± 0.14 naprema 2.94 ± 0.13 mmol/L), dok su koncentracije ukupnog bilirubina i kalcijuma porasle (4.75 ± 0.44 naprema 6.81 ± 0.57 $\mu\text{mol/L}$, 2.88 ± 0.10 naprema 2.99 ± 0.13 mmol/L, respektivno). Dobijeni rezultati ukazuju na pojačan katabolizam proteina krvi i narušavanje funkcionalne sposobnosti jetre, najvjerovatnije uslovljene aktivacijom homeoretskih mehanizama podrške laktaciji, što se, zajedno sa smanjenjem koncentracije fosfora može nepovoljno odraziti na upostavljanje postpartalne ovarijalne aktivnosti i produženjem trajanja intervala zalučenja-estrusa.

Ključne riječi: krmača, laktacija, krv, biohemijski parametri

VAGINAL MUCUS IMPEDANCE IN SOWS AND GILTS IN ESTRUS

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This paper presents the results of study on the value of the vaginal mucus impedance in sows and gilts in estrus and its impact on the value (%) of pregnancy. To determine the value of vaginal mucus impedance Draminski Detector estrus (Olsztyn, Poland) was used. The survey included 104 hybrids sows and 67 gilts of different combinations. Sows aged from one to three years, were in reproductive condition, with an average parity of 2,25 (2-4 farrowings) and gilts were aged from five to eight months. Sows and gilts were inseminated with fresh diluted boar sperm. Sows were inseminated after an average of 2,5 days and gilts after 2,3 days after the first observed signs of estrus. Value (%) of pregnancy in all inseminated sows were 76,92% and 52,22% in gilts. In 73,08% of sows and 52,24% of gilts we found values of vaginal mucus impedance between 250 and 400 units (average values $321,75 \pm 4,74$ and $338,38 \pm 5,73$ units, respectively), with the percentage of pregnancy of 86,84% in sows and 51,43% in gilts, respectively. Values of vaginal mucus impedance over 400 units were found in 25,00% sows and 47,76% gilts (average values $467,95 \pm 13,66$ and $468,15 \pm 12,66$ units, respectively), with a percentage of pregnancy rate of 46,15% in sows and 59,37% in gilts. Only few sows (1,92%) were in a group with values of vaginal mucus impedance less than 249 (average 246,67) units, with the percentage of pregnancy of 100 % .

Key words: sow, vaginal mucus, impedance, oestrus

ISPITIVANJE OTPORA VAGINALNE SLUZI U ESTRIČNIH KRMAČA I NAZIMICA

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U radu su prikazani rezultati istraživanja o vrijednosti otpora vaginalne sluzi krmača i nazimica u estrusu i njenom uticaju na vrijednost (%) graviditeta. Za određivanje vrijednosti otpora vaginalne sluzi korišćen je detektor estrusa proizvođača Draminski (Olsztyn, Poland). Istraživanjem je obuhvaćeno 104 krmače i 67 nazimice u tipu križanaca različitih kombinacija. Krmače starosti od jedne do tri godine, bila su u priplodnoj kondiciji, sa prosječnim paritetom od 2,25 (2-4 prasenja), a nazimice dobi od pet do osam mjeseci. Krmače i nazimice su osjemenjene svježe razređenom spermom nerasta. Krmače su osjemenjene nakon prosječno 2,5 dana, a nazimice nakon 2,3 dana od prvih uočenih znakova estrusa. Vrijednost (%) graviditeta svih osjemenjenih krmača iznosila je 76,92% a nazimica 52,22%. Kod 73,08% krmača i 52,24% nazimica ustanovljena je vrijednost otpora vaginalne sluzi od od 250 do 400 (prosječno $321,75 \pm 4.74$ i $338,38 \pm 5.73$) jedinica i procenat graviditeta od 86,84% kod krmača i 51,43% kod nazimica. Otpor vaginalne sluzi veći od 400 (prosječno $467,95 \pm 13.66$ i $468,15 \pm 12.66$) jedinice zabilježen je kod 25,00% krmača i 47,76% nazimica, sa procentom graviditeta od 46,15% kod krmača i 59,37% kod nazimica. Najmanji broj krmača (1,92%) nalazio se u grupi sa vrijednošću otpora vaginalne sluzi manjom od 249 (prosječno 246.67) jedinica, a procenat graviditeta bio je 100%.

Ključne riječi: krmače, vaginalna sluz, otpor, estrus

THE EFFECT OF VARIOUS FORMS OF SELENIUM ON THE QUALITY OF THE EJACULATE OF BOARS

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The experiment was based on feeding the organic and inorganic forms of selenium and the assessment of their effects on the laboratory values of the ejaculate (total count of sperm, sperm motility, ejaculate volume, sperm concentration and per cent of pathological sperm) in breeding boars. The experiment involved 18 boars divided into two equal groups. The individual groups received feed mixtures with the supplement of 0.3 Se/kg of feed mixture in organic form, and 0.3 Se/kg of feed mixture in inorganic form. The experiment lasted 20 weeks. The selenium supplement significantly decreased the sperm concentration in boars supplemented by 0.3 mg Se/kg of feed mixture ($P < 0.05$) in inorganic form; this group of boars also had a lower total count of sperm produced ($P < 0.05$). Boars with an income of 0.3 mg Se/kg of feed mixture in an organic form had improved semen quality compared to inorganic forms

Keywords: ejaculate, selenium, boar

Acknowledgment: This research was supported by grant project FA MENDELU IGA TP 2014

THE ECONOMIC CHARACTERISTICS OF SPECIALIZED FATTENING PIG BREEDS

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The aim of this study was to determine the economic characteristics of fattening pigs, obtained by dams mating of F1 (LxY) generation with terminal Pietrain and Duroc sires in intensive system production. In addition to determining the influence of sires on fattening traits (feeding duration, gained body weight, weight gain and feed conversion ratio) in the production that should provide economic indicators, ie. the cost of production and raw material for the production of traditional fermented sausages, or specific products with protected origin. Monitoring production output and calculation of economic performance was recorded by entering the fattening period of about 36 kg from Duroc sires and 26 fattening pigs from Pietrain sires, till the final body weight of about 107 kg in Duroc progeny, ie. 101 kg of Pietrain offspring. The above calculation includes the cost of materials or supplies, the cost of energy, the cost of external services, the cost of salaries and depreciation of facilities and used equipment. In this way it is possible to reach the profit per kilogram of live weight. Profit for the fattening pigs of Duroc sires was € 0.52/kg, while the gain for pigs of Pietrain sires was € 0.19/kg. Therefore, based on the economic characteristics, it can be concluded that the Duroc sires as terminal breeds are superior than Pietrain sires, and one of the best choices as a terminal breed in commercial fattening pigs production.

Keywords: Pig fattening, economic gain, pietrain, duroc

EKONOMSKA OBELEŽJA TOVA SPECIJALIZOVANIH RASA SVINJA

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Cilj rada je utvrđivanje ekonomskih obeležja tovljenika, dobijenih parenjem krmača $F_{1(L,Y)}$ generacije sa terminalnim nerastovima pietrena i duroka u intenzivnom sistemu tova. Pored utvrđivanja uticaja očeve rase na tovnne osobina (trajanje tova, ostvarena masa, prirast i konverzija hrane) u posmatrana proizvodnje treba da pruži ekonomske pokazatelje, tj. ekonomičnost same proizvodnje i sirovinsku osnovu za izradu tradicionalnih fermentisanih kobasica, odnosno specifičnih proizvoda sa zaštićenim poreklom. Praćenje proizvodnih rezultata i obračun ekonomskih rezultata tova vršeno je od ulaska u tov sa oko 36 kg kod tovljenika očeve rase durok i 26 kod tovljenika očeve rase pietren, do završne telesne maso od oko 107 kg kod durok potomaka, odnosno 101 kg pietren potomaka. Navedeni obračun uključuje troškove osnovnog i pomoćnog materijala, troškove energije, troškove eksternih usluga, troškove zarada i amortizacije korišćenih objekata i opreme. Na ovaj način moguće je doći do dobiti po kilogramu žive mase. Dobit pri tovu za tovljenike očeve rase durok je iznosila 0,52 €/kg, dok je dobit za tovljenike očeve rase pietren iznosila 0,19 €/kg. Dakle, na osnovu ekonomskih obeležja tova, možemo zaključiti da su durok nerastovi kao terminalna rasa superiorniji od pietren nerastova i jedana od najboljih izbora kao terminalna rasa u komercijalnim proizvodnim sistemima proizvodnje tovljenika.

Ključne reči: tov svinja, ekonomska dobit, pietren, durok

**RELATED INCIDENCE OF FOOT PAD LESIONS AND BODY WEIGHT OF
BROILERS OF MODERATE GROWTH IN DIFFERENT REARING SYSTEMS**

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The incidence of foot pad lesions of Redbro broilers was investigated in order to establish correlations with body weight. Broilers were reared until the age of 42 days in the floor system in the poultry house and then were divided into two groups. The first group was continued growing in the poultry house until the age of 84 days and the second group was growing in the free range system until the same age. Individual measurements of body weight and evaluation of the incidence of foot pad lesions of broilers was carried out at the end of the experiment. In a correlation analysis of previously transformed data on the percentage of broilers with lesions and body weight within each weight group, data was obtained that showed an association between these traits depending on the rearing system. System of rearing had significant impact on the strength and direction of correlation between body weight and the incidence of foot pad lesions, in light of the determined correlation coefficient $r = -0.95$ at the significance level $p=0.01$ in the free range system, and $r=0.56$ ($p>0.05$) in chickens reared in the poultry house.

Key words: broilers, lesions, body weight, rearing system

**NUTRITIONAL VALUE AND QUALITY OF EGG SHELL FROM DIFFERENT
GENOTYPES OF CHICKENS**

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Many participants in the chain of production of table eggs, and on the basis of new legislation - Directives relating to the welfare of laying hens, the origin of the eggs and the consumers' opinions, have developed very serious strategies of production and sale of table eggs. Features of some alternative systems are particularly in the use of different genotypes of layer hens. This paper presents data on nutritive value and results of a study of the egg shell quality of conventional hen hybrid Tetra SL and three pure breeds: Svrlijig hen, Sombor kaporka and Naked neck hens. The following egg quality properties were tested: colour, deformities, breaking force, mass and thickness of the egg shell and egg mass and shape index. A comparative analysis of the basic chemical composition of the contents of the egg was performed as well as shell fatty acid profile determined. The differences were statistically significant. Eggs obtained from Svrlijig hen had the lowest egg mass (45.90 g), the brightest colour of the shell (2.22 points), the greatest deformation of the shell (0.0324 mm), the lowest breaking force (3.25 kg) and the thinnest shell (0.261mm).

Key words: layer hens, genotypes, quality of table eggs

**KORELACIONA ZAVISNOST IZMEĐU MASE PRIJE KLANJA ODNOSNO MASE
OBRAĐENOG TRUPA ZA ROŠTILJ I VRIJEDNIJIH DIJELOVA TRUPA
BROJLERA RAZLIČITIH PROVENIJENCI**

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Cilj rada je da se utvrdi jačina korelacione povezanosti između mase prije klanja i mase obrađenog trupa u odnosu na vrijednije dijelove trupa (grudi, bataci i karabataci) brojlerskih pilića dvije provenijence (Coob 500 i Hubbard) u različitom uzrastu, što je opet povezano sa trenutnom potražnjom na tržištu BiH (RS) i okoline. Definisanjem koeficijenata korelacije i značajnosti istih, u radu, dalo je izvjestan doprinos u utvrđivanju potencijala ispitivanih genotipova, odnosno rentabilnosti dužine trajanja tova.

Ključne riječi: fenotipska korelacija, masa prije klanja, udio vrijednijih dijelova trupa, Coob 500, Hubbard

BIOLOGICAL QUALITY TEST OF MIXTURE FOR BROILERS ON THE SERBIAN MARKET

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The aim of this paper is, in order to consider the actual situation, and by conducting an independent bioassay, to determine the nutritional quality and economic aspects of the use of purchased complete feed mixtures for broilers of leading manufacturers present in the market of the Republic of Serbia, as well as to compare it during the test with 2 standard diet programs. The quality of 8 different feeding programs was studied, from beginning to end of fattening of broilers (6 market nutrition programs and 2 control programs of broiler nutrition present in the Institute for Animal Husbandry, Belgrade), i.e. a total of 18 different mixtures of 4 different manufacturers from the market and 6 control mixtures produced by the Institute were tested (the control starter, grower and finisher mixtures produced according to: a. minimum requirements of current legislation, b. recommendations of the latest technology of broiler hybrids used in the test). 4000 one-day old broiler chickens of Cobb 500 were used as the sample material, housed in 36 boxes according to the trial plan. During the test, the mortality and food consumption were monitored daily and body weight of chickens in the experiment was measured at the beginning, at the end of the experiment, and when changes in the diet were introduced. During the experiment, samples were taken when diet for broilers was changed for the purpose of a complete analysis of the chemical and microbiological composition. The results obtained in this study showed that in our market nutritional quality of complete feed mixtures for broilers can vary significantly among different programs and/or different manufacturers, and consequently the economic aspects of nutrition using such food.

Key words: broilers, nutrition, mixture quality, market

EFFECT OF RAW SOY BEANS IN MIXTURES FOR LAYER HENS ON EGG QUALITY AND EGG SHELL QUALITY

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The study was conducted on layer hens of 48 – 57 weeks of age, to identify opportunities for replacing thermally processed soybean variety Lana with reduced trypsin inhibitor and standard variety Lydia, with raw grains. The effect of using different levels of both raw soybean varieties in mixtures for laying hens Isa Brown hybrid on the quality of eggs and eggshell quality was examined. The research was conducted according to the principle of two factorial experiment 2 x 4 (2 varieties x 4 levels of raw grain in the mixture) with a total of 8 treatments diet. With the increase in the share of raw soybeans in mixtures gradually the egg mass decreased. The obtained average values of properties of external and internal egg quality were under statistically significant impact of the level of raw grain in the mixture. Share of 8 % of raw soybean of both varieties in diets for laying hens influenced significantly lower values of egg shape index, albumen height and Haugh units in relation to the mixture with a lower level of raw soybeans. Yolk color and egg shell strength indicators: shell deformation, breaking force, mass and egg shell thickness were not significantly influenced by both investigated factors as well as by their interaction.

Key words: soybean, trypsin inhibitor, layer hens, egg quality, egg shell quality

**THE EFFECTS OF ZEOLITES AND CLAYS ON PARAQUAT INDUCED
OXIDATIVE STRESS IN KIDNEY AND SPLEEN OF BROILERS**

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Paraquat is a contact herbicide used worldwide. It may be a cause of incidental and accidental poisoning, most of which are fatal. Pathological changes were observed in the lungs, kidneys, liver, heart and other organs. The proposed mechanism of paraquat toxicity is based on its ability to undergo one-electron reduction catalyzed by microsomal cytochrome P-450 reductase and NADPH, with subsequent reoxidation of paraquat radical and formation of superoxide anion. It can lead to formation of hydrogen peroxide and highly toxic hydroxyl radical. In this study experiments with the paraquat were carried out on broilers. The activity of enzymes of antioxidative protection: superoxide dismutase (SOD), catalase (CAT), guaiacol peroxidase (GPx) and pyrogallol peroxidase (PPx), and intensity of lipid peroxidation (LP) in kidney and spleen of broilers chronically exposed to paraquat was examined. The influence of feed additive (AntiToksic Nutrient-ATN) based on natural occurring aluminosilicates (zeolites and clays), on paraquat-induced changes in selected organs was also examined. Oral intake of paraquat induce oxidative stress in renal tissue. SOD activity was increased, while activity of CAT and GPx were decreased. Intensity of LP in kidney was also significantly increased. Paraquat did not induce oxidative stress in the spleen. Aluminosilicates alone did not provoke any adverse effect and did not disturb normal biochemical homeostasis in kidney and spleen. The combined data showed that chicken fed aluminosilicates received significant protection against the effects of the paraquat for measured parameters.

Key words: broilers, clays, kidney, oxidative stress, zeolites

UTICAJ ZEOLITA I GLINA NA PARAMETRE OKSIDATIVNOG STRESA IZAZVANOG PARAKAVATOM U BUBREZIMA I SLEZINI BROJLERA

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Parakvat je kontaktni herbicid koji je u širokoj upotrebi u mnogim zemljama sveta. On je čest uzrok slučajnim ili namernim trovanjima od koji je većina sa fatalnim ishodom. Patološke promene kao posledica delovanja ove supstance su uočene na plućima, bubrezima, jetri, srcu i drugim organima. Predloženi mehanizam toksičnog delovanja parakvata se bazira na njegovoj sposobnosti da podleđe redukciji koju katališu mikrozomalna citohrom P450 reduktaza i NADPH, što dovodi do kasnije reoksidacije radikala parakvata i formiranja superoksid anjona. Kao posledica svega toga je formiranje vodonik peroksida i visokotoksičnog hidroksil radikala. U ovoj studiji kao eksperimentalne životinje za ispitivanje delovanja parakvata na žive sisteme su korišćeni pilići brojlerske rase. Ispitivana je aktivnost enzima antioksidativne zaštite (superoksid dismutaza-SOD, katalaza-CAT, gvajakol peroksidaza-GPx i pirogalol peroksidaza-PPx), ako i intenzitet lipidne peroksidacije (LP) u bubrezima i slezini brojlera izloženih hroničnom delovanju parakvata. Uticaj aditiva ATN-a (AntiToxic Nutrient), baziranog na prirodnim aluminosilikatima (zeolitima i glinama), na ublažavanje negativnog delovanja parakvata u ispitivanim organima je takođe ispitivan. Oralni unos parakvata dovodi do izraženog oksidativnog stresa u bubrežnom tkivu. Aktivnost SOD je bila statistički značajno povećana, a kativnosti CAT i GPx smanjene u ovom organu nakon hroničnog izlaganja delovanju parakvata. Intenzitet LP je takođe bio statistički značajno povećan i bubrezima. Parakvat nije doveo do pojave oksidativnog stresa u slezini. Aluminosilikati (ATN) nisu ostavili bilo kakve negativne posledice i nisu poremetili normalnu biohemijsku homeostazu u bubrezima i slezini. Kod pilića koji su pored parakvata oralno unosili i preparat na bazi aluminosilikata negativni efekti delovanja parakvata nisu bili izraženi što ukazuje na to da su zeoliti i gline sposobni da zaštite organizam od toksičnog delovanja ovog herbicida.

Ključne reči: brojleri, bubrezi, gline, oksidativni stres, zeoliti

QUALITY OF TABLE EGGS OF DIFFERENT WEIGHT CLASSES

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The aim of this study was to examine the internal and external quality of table eggs from class S, M and L. A total of 90 eggs from "A" class, were divided by weight into three groups of 30 eggs. The first group consists of eggs weighing up to 53 grams (S class). The second group of eggs weighing 53 to 63 grams (M) and the third group are eggs from 63 to 73 grams (L). The following quality indicators were determined: egg weight, egg height, egg width, egg shape index, albumen weight, albumen percentage, albumen height, albumen index, albumen diameter, yolk weight, yolk index, yolk percentage, yolk color, shell weight and shell percentage. Based on the results of research, it can be concluded that the average egg weight classes was 42.15, 58.29, and 67.12 g for the class S, M, L. Yolk index was 44.05 (S), 39.76 (M) and 37.79 (L). Yolk color of eggs according weight groups was 13.5; 12.53 and 12, respectively. Albumen index among groups S, M, and L was 5.96; 5.52 and 6.09, respectively. Albumen, yolk and shell percentage were: 61.53: 26.24: 12.23 (S); 60.12: 30.21: 9.67 (M) and 59.53: 28.87; 11.6 (L).

Key words: egg weight, egg quality, table eggs

KVALITET KONZUMNIH JAJA RAZLIČITE MASE

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Cilj rada bio je da se ispita unutrašnji i spoljašnji kvalitet konzumnih jaja klase S, M i L. Ispitivano je ukupno 90 jaja „A“ klase, rasvrstanih po masi u tri grupe po 30 komada. Prvu grupu sačinjavaju jaja mase do 53 g (S klasa). Druga grupa su jaja mase od 53 do 63 g (M klasa) i u trećoj grupi su jaja veličine od 63 do 73 g (L klasa). Određeni su sljedeći pokazatelji kvaliteta konzumnih jaja: masa jaja, visina jaja, širina jaja, indeks oblika, visina bjelanca, masa bjelanca, udio bjelanca, indeks bjelanca, dijametar bjelanca, masa žumanca, indeks žumanca, udio žumanca, boja žumanca, masa ljuske i udio ljuske. Na osnovu dobijenih rezultata, prosječna masa jaja po klasama bila je 42,15; 58,29 i 67,12 g, respektivno. Indeks oblika kod S klase bio najviši (78,03%), potom kod M (77,21%) i kod L klase (77,28%). Indeks žumanca bio je 44,05 (S); 39,76 (M) i 37,79 (L). Boja žumanca kod S klase iznosila 13,50, M klase 12,53 i kod L klase 12,20. Indeks bjelanca imao je vrijednosti od 5,96 za S, 5,52 za M i 6,09 za L klasu. Udio bjelanca za S iznosio je 61,53, za M 60,12 i za L klasu 59,530%. Udio žumanca bio je najmanji u S klasi (26,24), najveći u M klasi (30,21) i srednji u L klasi (28,870). Udio ljuske bio je najveći kod S (12,23%), potom kod M (9,67%), i kod L klase (11,600%).

Ključne riječi: masa jaja, kvalitet jaja, jaja za konzum

EFFECT OF SHORT-TERM STORAGE ON SOME INCUBATION RESULTS OF BROILER HATCHING EGGS

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The objective of this research was to investigate the effect of short-term storage of broiler hatching eggs on some incubation results. Hatching eggs were collected on commercial farm of broiler breeder flock Cobb 500 in 30 weeks of age. Total of 900 hatching eggs oviposited during one day was divided into three equal storage groups of 300 eggs. Each group consisted of 10 repetitions with 30 eggs. Depending on the duration, eggs were stored two, four or six days in the same storage ambient conditions. The eggs fertility, hatchability of all eggs, hatchability of fertile eggs and embryonic mortality were examined. The eggs are incubated under conditions of commercial hatchery. According to obtained results, the fertility of eggs was 97.9, 98.3 and 97.0%, respectively. Hatchability of all eggs and hatchability of fertile eggs was 86.3, 91.3 and 88%, and 88.2, 93.5 and 90.8%, respectively. Total embryonic mortality between the groups was 11.5, 7.2 and 8.9%, respectively. The differences in incubation results between different storage groups were not statistically significant.

Key words: hatching egg, storage, hatchability

UTICAJ KRATKOG PERIODA ČUVANJA NA INKUBACIONE REZULTATE JAJA ZA NASAD TEŠKOG LINIJSKOG HIBRIDA

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U radu su prikazani rezultati ispitivanja uticaja kratkog perioda čuvanja jaja za nasad teškog linijskog hibrida na neke inkubacione rezultate. Jaja za nasad su sakupljena na komercijalnoj farmi roditeljskog jata teškog linijskog tipa Cobb 500 u 30. nedjelji života. Ukupno 900 jaja snesenih tokom jednog dana podijeljeno je u tri jednake grupe po 300 jaja. Svaka grupa se sastojala od 10 ponavljanja sa 30 jaja. U zavisnosti od dužine čuvanja, jaja su čuvana dva, četiri ili šest dana u istim ambijentalnim uslovima čuvanja. Ispitivani su oplodjenost jaja, valivost svih ulozenih jaja, valivost oplodjenih jaja i embrionalni mortalitet. Jaja su inkubirana u uslovima rada komercijalne inkubatorske stanice. Prema dobijenim rezultatima, oplodjenost jaja prema grupama čuvanja bila je 97,9; 98,3 i 97,0%, respektivno. Valivost svih ulozenih jaja i valivost oplodjenih jaja bila je 86,3, 91,3 i 88%, odnosno 88,2; 93,5 i 90,8%, respektivno. Ukupan embrionalni mortalitet među grupama bio je 11,5; 7,2 i 8,9%, respektivno. Razlike u ispitivanim inkubacionim rezultatima među različitim grupama čuvanja jaja nisu bile statistički značajne.

Ključne riječi: jaje za nasad, čuvanje, valivost

**ANALYSIS OF INCUBATION RESULTS IN EARLY AND MIDDLE PHASE OF
EXPLOITATION OF BROILER BREEDER FLOCK**

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The aim of this investigation was to present achieved incubation results of the two broiler breeder flocks Ross 308 (flock 1 and flock 2) from 27 to 43 weeks of age. Flocks were raised on one farm, and divided on two farms during exploitation. The following incubation indicators were analyzed: fresh egg weight, egg weight loss, chicken yield, day-old chicken weight, results of egg candling (unfertilized eggs, early death in first 24 and 48 h of incubation, blood ring, black eye), analysis of the hatch debris (early, middle and late mortality, pipped dead, culls), malformations and deformations of embryos and day-old chickens. Based on the obtained results, we can conclude the following: flock 1 had first setting in 27 week (total hatchability 48.7%), and peak in 33 week of age (total hatchability 87.9%). A flock 2 had also the first setting in 27 week (total hatchability 38%), and the peak in 39 week of age (total hatchability 92.07%). Average total hatchability for flocks 1 and 2 was 81.7% and 83.7%, respectively. Average number of unfertilized eggs in flock 1 and 2 was 10.39 and 10.00%, respectively. The average egg weight loss of flock 1 was 11.4%, while in flock 2 was 11.3%. The average chick yield in flock 1 and 2 was the same (67%). The average early, middle and late embryonic mortality was in flock 1: 1.81%, 1.42 and 2.95%, in flock 2: 1.85, 1.05 and 2.65%, respectively. The average percentage of culls in flock 1 and 2 was 1.05 and 0.80%, respectively. The frequency of malformations and deformations of embryos and day-old chicks was in accordance with the manufacturer's hybrid standards.

Key words: broiler breeder, hatching egg, incubation, hatchability

ANALIZA INKUBACIONIH REZULTATA U RANOJ I SREDNJOJ FAZI EKSPLOATACIJE RODITELJSKOG JATA TEŠKOG LINIJSKOG HIBRIDA

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U radu su prikazani ostvareni inkubacioni rezultati dva roditeljska jata (jato 1 i jato 2) teškog linijskog hibrida Ross 308 od 27. do 43. nedjelje života iz jednog odgoja, a gajena na dvije farme za eksploataciju. Analizirani su sljedeći pokazatelji inkubacije: masa jaja na početku inkubacije, masa jaja na prelaganju, gubitak mase jaja, randman pilića, masa pilića, rezultati analize prosvetljavanja jaja (neoplođena jaja, rano uginuće 24 h, rano uginuće 48 h, krvavi prsten, crno oko), analiza valioničkog ostatka (rano, srednje i kasno uginuće, vanjski naključak jaja, škart pilići), malformacije i deformacije embriona i pilića. Na osnovu rezultata istraživanja, može se zaključiti sljedeće: jato 1 je imalo prvo ulaganje u 27. nedjelji (ukupna valivost jaja 48,7%), a vrhunac u 33. nedjelji (ukupna valivost jaja 87,9%). Jato 2 je, takođe, prvo ulaganje imalo u 27. nedjelji (ukupna valivost jaja 38%), a vrhunac valivosti u 39. nedjelji (ukupna valivost 92,07%). Prosječna ukupna valivost jata 1 i 2 bila je 81,7%, odnosno 83,7%. Prosječno neoplođenih jaja u jato 1 bilo je 10,39%, u jatu 2 10,00%. Prosječan gubitak mase jaja u jatu 1 bio je 11,4%, dok je u jatu 2 bio 11,3%. Prosječan randman u jatu 1 i 2 bio je isti (67%). Prosječan procenat ranog, srednjeg i kasnog embrionalnog mortaliteta bio je kod jata 1: 1,81, 1,42 i 2,95%, u jatu 2: 1,85, 1,05 i 2,65%, respektivno. Prosječan procenat škart pilića u jatu 1 i 2 bio je 1,05, odnosno 0,80%. Pojava malformacija i deformacija embriona i jednodnevnih pilića bila je u skladu sa normativima proizvođača ispitivanog hibrida.

Ključne riječi: roditeljsko jato, jaje za nasad, inkubacija, valivost

MEASURING TECHNICAL EFFICIENCY OF BROILER FARMS IN VOJVODINA USING DATA ENVELOPE ANALYSIS

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Measurement of the efficiency of agriculture production is very important issue especially in developing countries. If the farmers are inefficient in their practices, then it implies that inputs could be decreased by producing the same amount of output or output could be increased by using the same amount of inputs. The objective of this analysis is to evaluate the technical efficiency of resource utilization of broiler farms in Vojvodina. The Data Envelopment Analysis approach (DEA) was used to estimate the technical efficiency by determining which broiler producers are located on the production frontier and which are not. This is one of new methods of operations research and is used very successfully in the last several years for assessing relative efficiency of organizational units having multiple inputs to produce multiple outputs. It is an efficiency estimation technique but it can be used for solving many problems of management such as ranking Decision Making Units (DMU). Survey data from 30 broiler farms were obtained using well structured questionnaire. The multiple-input, single-output production units (the broiler farms) were evaluated with the individual farms being referred to as individual Decision Making Unit (DMU). For the purpose of efficiency analysis, input-oriented model have been used and output (y) was one category, produced broiler meat (in kg), and inputs were aggregated into four categories, namely, feed, day-old chickens, labor and used energy. The results of the study reveal that under constant return to scale (CRS) and variable returns to scale (VRS), on average, the farms technical efficiency were 92.96% and 99.19% respectively. Moreover, findings imply that according to technical efficiency index inputs from broiler production could be decrease by 7.04 (CRS) and 0.81 (VRS) percent using available technology.

Key words: Broiler production, technical efficiency, DEA method, Vojvodina

**BIOLOGICAL DEVELOPMENT OF BEE COLONIES RELATED TO DIFFERENT
TYPES OF ARTIFICIAL SWARMING**

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This paper presents the results of the biological development of natural and artificial swarms and their activity on the speed of building honeycomb, surface brood, pollen, nectar, and their fight against Varroa. At the end of the experiment and the data obtained it can be concluded: Speed of construction is most intense in the honeycomb version of natural swarming and ranged from 20-40%. Cotter honeycomb in the construction of variant natural swarms is the greatest in variants of the 5 +2 frames of 1-45%. In the spring, pollen size increased by 3%, the amount of honey has not changed and brood size decreased by 50%. The varieties of artificial swarming 5 +2 frames, the number of beeswax were not changed, pollen increased from 40% to 50%, honey decreased from 36.6% to 10%, and the surface of brood 73.53% decreased to 50%.

Key words: honey bee, swarms, survival, varroa.

SORGHUM IN CARP (*CYPRINUS CARPIO* L.) DIET

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Common carp (*Cyprinus carpio* L.) is one of the most widely cultured freshwater fish in the world. Cereals are basic energy sources for common carp and other cyprinids. Commercially important cereals (particularly wheat and maize) are largely used for human consumption and industrial purposes. In recent decades, great attention has been focused on cereals such as rye, barley, oats, common millet, sorghum and other cereals as alternative sources of carbohydrates and, partially, protein and lipids for livestock and fish feeds. Sorghum (particular *Sorghum bicolor*) is one of the most important cereals used for fodder, human diet (in some world regions), alcohol and biofuel production and other industrial purposes. Due to its tolerance to heat, drought and nutrient deficiency, sorghum is favoured over other cereals in terms of cultivation on poorly structured soils. The levels of protein (12.5% on average) and nitrogen free extracts (above 60% dry matter basis) indicate a relatively high biological value of sorghum grain. Milling and/or flaking processes increase grain digestibility and usability. The nutritional value of sorghum grain is generally lower than in most cereals, including maize (the most commercially important cereal crop in the Balkan). However, its higher level of tolerance to the above mentioned unfavourable agroecological conditions and its resistance to western corn rootworm (*Diabrotica virgifera virgifera*) suggest that sorghum has emerged as a potential substitute for maize in its marginal production regions. An experiment was conducted using rye, wheat bran and sorghum in feeds for pre-consumable carp categories (500-800 g body weight). These cereals accounted for 47.5% of the feed in each of the 3 experimental groups, whereas the remaining 52.5% was constant, with soybean meal as a key ingredient (25%). Digestibility of major organic components was monitored. The highest digestibility values for protein (91.89%), lipids (79.84%) and nitrogen free extracts (55.35%) were obtained in the experimental rye-based diet, and the lowest (71.86%, 76.71% and 22.10%, respectively) in sorghum-based diet. Although cereals are primarily energy sources, protein and lipid digestibility suggests that these plants, including sorghum, can be used in cyprinid fish feeds.

Key words: cereals, sorghum, carp, digestibility, nutrition

**TESTING ENERGY EFFICIENCY OF MIXERS FOR ANIMAL FEED
PRODUCTION**

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In animal feed industry mixing refers to merging various components (of individual animal feed). Mixing is one of the most important as well as one of the most critical points of the operation in the production process of concentrated animal feed and therefore all aspects of machinery operation need to be carefully considered in order to gain correct mixture of all nutritive ingredients, so mixers are the center and the heart of a factory. Energy, in percentage, makes a small share in the cost of animal feed production, but it still is changeable operative cost. As the pressure in animal feed business is rising, this paper is improved by the knowledge in how to control one of the cost centers with the quality work of machines for mixing animal feed. In our country, both privately owned agricultural households and large factories use vertical and horizontal concurrent mixers. The paper therefore reflects on the both types of mixers examining the performance and specific energy consumption (kWh/t). The horizontal mixer Pomak/Kraljevo HMO1 and the vertical mixer Metalac ServisMSV Badovinci VMM/500. On the basis of the research conducted we can conclude that the choice of a mixer is quite a complex issue that requires a set of careful considerations apart from energy efficiency within the concrete working conditions.

Key words: mixing, energy, feed mixer.

ISPITIVANJE ENERGETSKE EFIKASNOSTI MEŠALICA ZA PROIZVODNJU STOČNE HRANE

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U industriji stocne hrane pod mešanjem se podrazumeva sjedinjavanje razlicitih komponenata (pojedinačnih stočnih hraniva). Mešanje je jedan od najbitnijih i najkritičnijih tačaka operacije u procesu proizvodnje koncentrovane stocne hrane, zato treba razmotriti sve aspekte rada mašina za pravilnu umešanost svih hranljivih materija, jer su mešaone centar i srce fabrike. Energija je mali procentualni udeo u troškovima proizvodnje stočne hrane ali predstavlja promenljive i operative troškove. Kako se nastavljaju pritisci u poslovanju stočnom hranom, ovaj rad poboljšava znanje kako kontrolisati jedan od centara troškova uz kvalitetan rad mašina za mešanje stočne hrane. U našoj zemlji kako na privatnim poljoprivrednim gazdinstvima tako i u velikim fabrikama uglavnom se koriste vertikalne i horizontalne protivstrujne mešaone. U radu je zato dat osvrt na ova dva tipa mešaona uz ispitivanje učinka i specifičnog utroška energije (kwh/t). Horizontalna mešaona Pomak/Kraljevo HMO1 i vertikalna mešaona Metalac Servis MSV/Badovinci VMM/500. Na osnovu sprovedenih istraživanja može da se zaključi da je izbor adekvatne mešaone kompleksna problematika i podrazumeva čitav niz razmatranja pored energetske efikasnosti u konkretnim radnim uslovima.

Ključne reči: mešanje, energija, mešaone stocne hrane.

THE QUALITY OF SILAGE AND ALFALFA ORCHARD GRASS EQUAL SHAVES

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Silage on most of its properties is the closest substitute green food in the diet of ruminants. Convenience grasses for silage is determined on the basis of sugar minimum. An important moment in ensiling and buffering power (capacity) plants. Silage quality green plants is extremely, rich and inexpensive source of beta carotene from which there is a specific alfalfa silage. In this study we investigated the influence of addition of corn (0,3 and 6% biomass) and inoculants (with without inoculants) in the fermentation process and nutritive value of silage biomass with equal proportion of cocksfoot and lucerne. Samples for analysis of parameters of biomass and silage first cut of alfalfa and cocksfoot were taken for all treatments. Higher doses of corn, in the fermentation process of tested silage increased the amount of dry matter and lower pH compared to a lower dose of corn and control. Inoculation has contributed to reducing the pH and increasing the content of lactic acid. With tasted silage with equal proportion of cocksfoot and lucerne (50%:50%) applying inoculants showed a positive effect on the studied parameters compared to uninoculated silage.

Key words: silage, orchard grass, alfalfa, inoculants, maize

STATE OF COMPLIANCE OF REPUBLIC OF SRPSKA LEGISLATIVE WITH EU DIRECTIVES RELATING TO THE FIELD OF ENVIRONMENTAL PROTECTION

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Trends and standards imposed by European legislation resulted to harmonization of national legislation with the EU legislation in the formal legal sense, but they are not fully implemented in the practice . This paper includes the section of present regulations and the field state of environmental protection, nature protection, monitoring and protection of air monitoring, protection and water conservation, protection, development and use of agricultural land, and waste management in the Republic of Srpska . The paper detailly presents downloaded provisions of European directives and their incorporation into domestic law. This paper analyzes the following regulations: Law on Environmental Protection , Law on Nature Protection , Law on Air Protection , Water Act , the Agricultural Land Law and the Law on Waste Management. Especially discussed is the connection between the state of the environment and the possibility of its restoration, protection, conservation and sustainable development of plants, animals and their habitats, soil, water, and other natural components, as a part of the environment. In the field, we record the results in the monitoring, as monitoring of land had established permanent monitoring stations on land contamination in the system of intensive agricultural production in the territory of RS, monitoring of water quality for all water bodies in the RS, the monitoring of air quality on the territory of RS, while for waste management database for all local landfills in the territory of RS has been made. Republic of Srpska has recently made harmonization of national legislation with EU directives and other international regulations especially in the area of environmental protection, but regulations adopted has not yet been fully implemented, ie adopted regulations have to be finalized in practice, because their application depends on many factors, primarily the economic power of Republic and the living standards of citizens, as well as other limiting factors .

Key words: environment, laws, directives, Republic of Srpska

PRESJEK STANJA USKLAĐENOSTI ZAKONA REPUBLIKE SRPSKE SA DIREKTIVAMA EVROPSKE UNIJE IZ OBLASTI ZAŠTITE ŽIVOTNE SREDINE

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Trendovi i standardi koje nameće Evropsko zakonodavstvo su rezultirali harmonizacijom domaćih propisa sa EU zakonodavstvom u formalno pravnom smislu, međutim isti nisu u cjelosti implementirani na terenu. Rad obuhvata presjek stanja propisa i stanja na terenu iz oblasti zaštite životne sredine, zaštite prirode, monitoringa i zaštite vazduha, monitoringa, zaštite i očuvanja voda, zaštita, uređenje i korišćenje poljoprivrednog zemljišta, te upravljanja otpadom u Republici Srpskoj. U radu je detaljno predočeno preuzimanje pojedinih odredbi iz evropskih direktiva i ugrađivanje istih u domaće zakonodavstvo. U radu su analizirani sljedeći propisi: Zakon o zaštiti životne sredine, Zakon o zaštiti prirode, Zakon o zaštiti vazduha, Zakon o vodama, Zakon o poljoprivrednom zemljištu i Zakon o upravljanju otpadom. Posebno je razmatrana povezanost stanja životne sredine i mogućnosti obnove, zaštite, očuvanja i održivog razvoja biljaka, životinja i njihovih staništa, zemljišta, vode, i drugih komponenti prirode, koje čine dio životne sredine. Na terenu bilježimo rezultate gdje se u okviru monitoringa, za monitoring zemljišta uspostavljaju trajne stanice monitoringa zagađenja na zemljištu u sistemu intenzivne poljoprivredne proizvodnje na teritoriji RS, za monitoring voda praćenje stanje kvaliteta voda za sve vodotoke u RS, za monitoring vazduha, praćenje stanje kvaliteta vazduha na teritoriji RS, dok je sa aspektom upravljanja otpadom napravljena baza podataka za sve lokalne i divlje deponije na teritoriji RS. Republika Srpska je u proteklom periodu izvršila usklađivanje domaćeg zakonodavstva sa direktivama Evropske unije i ostalim međunarodnim propisima u oblasti zaštite životne sredine, međutim još uvijek nije izvršena implementacija donesenih propisa u cjelosti, tj. doneseni propisi nisu zaživjeli u praksi, jer njihova primjena zavisi od niza faktora, prije svega od ekonomske moći Republike i životnog standarda građana, ali i ostalih ograničavajućih faktora.

Ključne riječi: životna sredine, zakoni, direktive, Republika Srpska

POSSIBILITIES OF STUDYING AT THE FACULTY OF AGRONOMY, MENDEL UNIVERSITY IN BRNO (CZ)

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Brno is the second largest city in the Czech Republic. It is situated in the centre of Europe and other important European capitals are within a two-hundred-kilometre radius: Prague, Vienna and Bratislava, while Budapest is not much further away. Brno is a city with a youthful atmosphere yet a long history, with over than 80 000 students in five public universities and it offers students both culture and fun. Mendel University in Brno (MENDELU) was established in 1919 with 12 thousand students. It is distinguished by its strong agricultural and forestry orientation, but what makes it really special are the facilities it offers its students. Four out of the five faculties and one institute are all located in a single campus (Faculty of Agronomy, Faculty of Forestry and Wood Technology, Faculty of Business and Economics, Faculty of Regional Development and International Studies, Institute of Lifelong Learning. The fifth faculty, horticulture, is situated in a South-Moravian jewel, Lednice. MENDELU holds ECTS label, therefore credits obtained at the Faculty are fully recognized. The Faculty of Agronomy is a modern institution with many years' experience in educating new generations of agronomy experts. Over two thousand students currently study programmes at Bachelor's, Master's and PhD. level. These programmes cover traditional agricultural fields such as animal and plant breeding, and also food production, environmental science, waste management, farming business and agricultural machinery to name just a few. To exchange students, the Faculty of Agronomy offers over 40 courses on plant production, animal breeding, chemistry, botany, zoology, food production, agritourism, climatology, soil science and others. As part of their studies, students can exploit university farm at Žabčice. Students can study courses in Czech and English.

Key words: study, agronomy, science, agriculture

Acknowledgment: This research was supported by grant project FA MENDELU IGA TP 2014

INFLUENCE OF ECOLOGICAL CHANGES TO THE OCCURENCE OF INFECTIOUS DISEASES

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Climate changes have great influence worldwide, on the occurrence and development of infectious diseases in humans and animals and especially on the occurrence of zoonoses. Besides that, advanced technologies, international transport and trade, and also changes and adaptation of microorganisms are significant factors for the occurrence of infectious diseases. Climate changes disturb natural processes in ecosystem and contribute to creating favorable conditions to achieve contact of hosts (humans and animals) with the reservoirs of pathogen agents for humans and animals. Diseases, previously preferably found in tropical regions, now are spreading to the regions with moderate climate, what is connected to the global warming. Insects which are vectors for certain diseases are now present also in regions where they did not exist before. Climate changes, on a long-term, influence the population of insects, the dynamics of their multiplication, especially temperature and humidity, which on the long run affects geographical distribution of vectors. Higher temperature in the environment enables for insects and microorganisms to multiply faster, since that is not possible on lower temperatures. Significant and severe zoonoses, such as avian influence, Lyme disease and Rift Valley Fever are probably a consequence of global warming. Highly pathogen virus H5N1 is a serious threat and great concern, because the main bird migration roads are being disrupted or changed, due to the extremely low or high temperatures. This fact enables a closer contact of wild and domestic birds and also humans. The role of ticks in the occurrence of diseases such as babesiosis and Lyme disease, mosquitoes for transferring the virus of Rift Valley Fever, dengue fever, and blue tongue in ruminants, dirofilariosis and causative agent for malaria are well known. The most important consequence of global warming can be an increased mortality in wild and domestic animals and also humans. Medical and veterinary services must work effectively and apply adequate procedures for the prevention and control of infectious diseases.

Key words: climate changes, infectious diseases, zoonoses.

Acknowledgments This study is part of the research conducted within project TR31084 funded by the Ministry of Education, Science and Technological Development of Republic of Serbia.

USAGE OF MEDICINES IN VETERINARY MEDICINE AND POSSIBILITY OF SIDE EFFECTS APPEARANCE

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In disease prevention and sick animals treatment different pharmacologic substances are used. However, very often some side effects happen due to toxicity of the medicines used. Science discipline which addresses to how medicines affect the health of animals is called Farmaco-vigilance. During the application any medicine should be efficient and safe. Before putting medicines in wide use all of them should be checked for side effects. However, negative effects can be seen on animals only after its shorter or longer clinical usage. Therefore, for example “Chloramphenicol” was first used in 1948, and its toxic effect on bone marrow was noticed only in 1950 (after two years of usage of that medicine). Aspirin was first used in 1899 and its negative effect (stomach and intestinal bleeding) was noted only in 1938. Data about medicines side effects are being given to Pharmaceutical agency by medicine factories, veterinary workers, health care workers, farmers ...etc. Pharmaceutical agency of Republic of Serbia in agreement with the Pharmaceutical law “Službeni glasnik RS” br. 30/2010 monitors the ways of data gathering regarding the side effects of the medicines used in veterinary medical practice. Based on obtained data Pharmaceutical agency can revoke the license of the specific medicine off the market, or change the conditions under which medicine can be used. Most frequent side effects of medicines used for domestic animals are vomiting, anorexia, depression, lowered efficiency, diarrhea, ataxia and at the end death. When we compare ways of medicine application, most frequent side effects happen after oral application and most frequent problems happen with cats and dogs. Most frequent meds that have side effects are non steroid anti inflammatory medicines, Avermektin, Medetomidin and some others.

Key words: medicines, side effects, domestic animals.

Section 2. Crop Production



III International Symposium and
XIX Scientific Conference of Agronomists of Republic of Srpska

**THE INFLUENCE OF WEATHER CONDITIONS AND FERTILIZING METHOD
ON PLANT HEIGHT AT DIFFERENT CULTIVARS OF WINTER WHEAT**

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Examinations were performed at stationary field experiment with fertilizing that has been applied for many years (over 30), at the property of Center for small grains in Kragujevac. The experiments were performed in three years period (2004-2007). The experiment on which examinations have been performed includes also six variants of fertilizing: 1) N₀ P₀ K₀; 2) N_{80, 120} P₀ K₀; 3) N_{80, 120} P₆₀ K₆₀; 4) N_{80, 120} P₁₀₀ K₆₀; 5) N_{80, 120} P₆₀ K₀; 6) N_{80, 120} P₁₀₀ K₀; 7) N_{80, 120} P₀ K₆₀. Individual fertilizers were used: KAN as the nitrogen fertilizer, superphosphate as the phosphate fertilizer, and as the potassium fertilizer it was used 60% potassium salt. In experiment it was included also seven different of winter wheat cultivars: Takovčanka, Ana Morava, KG 100, Lazarica, KG 56 S, KG 4 and KG 5. The height of plant is the varietal characteristics, but in a great extent largely depends on the entered fertilizers and weather growing conditions. The aim of this work was to examine the influence of various dosages and relation of mineral fertilizers on plant height of different cultivars of winter wheat. In the three year average, minimum height of plant for examined varieties of the winter wheat was on the control. The use of fertilizer had a highly significant increase in the height of winter wheat. The biggest height of plants of winter wheat in period of triennial examination, obtained cultivar KG 4 (80 cm) at NP₂ variant of fertilizing, at higher nitrogen dose.

Key words: wheat, plant height, fertilizing variants, cultivars

UTICAJ VREMENSKIH USLOVA I NAČINA DJUBRENJA NA VISINU BILJKE KOD RAZLIČITIH SORTI OZIME PŠENICE

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Ispitivanja su izvedena na stacionarnom poljskom ogledu sa djubrenjem koji se izvodi dugi niz godina (preko 30) na imanju Centra za strna žita u Kragujevcu. Ispitivanja su izvedena u trogodišnjem periodu i to 2004/2005, 2005/2006, 2006/2007 godine. Ogled na kome su obavljena ispitivanja pored kontrole obuhvata i šest varijanti djubrenja: 1) $N_0 P_0 K_0$; 2) $N_{80, 120} P_0 K_0$; 3) $N_{80, 120} P_{60} K_{60}$; 4) $N_{80, 120} P_{100} K_{60}$; 5) $N_{80, 120} P_{60} K_0$; 6) $N_{80, 120} P_{100} K_0$; 7) $N_{80, 120} P_0 K_{60}$. Koristila su se pojedinačna djubriva i to: KAN (kao azotno), superfosfat (kao fosforno) i 60% kalijumova so (kao kalijumovo). U ogled je uključeno i sedam različitih sorti ozime pšenice: Takovčanka, Ana Morava, KG 100, Lazarica, KG 56S, KG 4 i KG 5. Visina biljke je sortna odlika, ali u velikoj meri zavisi i od unetih mineralnih djubriva i vremenskih uslova gajenja. Cilj ovog rada bio je da se ispita uticaj različitih doza i odnosa mineralnih djubriva na visinu biljke kod različitih sorti ozime pšenice. U trogodišnjem proseku najmanja visina biljaka ispitivanih sorti bila je na kontroli. Upotrebom djubriva ostvareno je visoko značajno povećanje visine ozime pšenice. Najveću visinu biljaka u trogodišnjem periodu ostvarila je sorta KG 4 (80 cm) na varijanti djubrenja NP_2 pri višoj dozi azota.

Ključne reči: pšenica, visina biljke, varijante djubrenja, sorte

EFFECTS OF PRODUCTION CONDITIONS AND TEST TEMPERATURES ON TRAITS OF MAIZE HYBRID SEEDS

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Effects of the seed fraction, location and temperature on morphological and physiological traits of seeds of three maize hybrid combinations (ZP 505, ZP 677 and ZP 684) developed at the Maize Research Institute, Zemun Polje were observed. The following three traits were analysed: weight of the intact dry seed prior to germination (m_0), germination energy (ek) and total germination (uk). Seed germination was analysed at the two temperature regimes: t_1 = standard temperature regime and t_2 = modified cold test on paper. Seeds classified into fractions according to their shape and size had significant differences in energy and germination (90.2-98.6). The values of the coefficient D for the location and temperature were very high and almost functional in all three hybrid combinations in both locations and the modified cold test (99.9). At the same time, the values of the coefficient R showed a different range over hybrid combinations in both locations and under standard temperature conditions. These values ranged from very unreliable (0.502) to very high (0.909). Hybrid combinations differed in total seed germination. The highest diversity in this morphological and physiological trait expression was determined in the hybrid combination ZP 505. The results on LSD ranking of mean values can be observed in values of F test of the analysis of variance. The location of seed production did not affect the hybrid combination SC 684, while it statistically significantly affected seeds of the combinations ZP 677 and ZP 505.

Key words: maize, fraction, location, temperature, germination

UTICAJ USLOVA PROIZVODNJE I TEMPERATURE ISPITIVANJA NA OSOBINE HIBRIDNOG SEMENA KUKURUZA

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Ispitivan je uticaj frakcije semena, lokacije i temperature na morfološka i fiziološka svojstva semena tri hibridne kombinacije kukuruza proizvedenih u Institutu za kukuruz „Zemun Polje“ (ZP 505, ZP 677, ZP 684). Analizama obuhvaćene su tri osobine: masa celog suvog semena pre klijanja (m0), energija klijanja (ek), ukupno klijanje(uk). Ispitivanje klijanja semena izvršeno je pri dva temperaturna režima: t1= standardni temperaturni režim I t2= modifikovani cold test na papiru. Podeljeno seme na frakcije po obliku i veličini ima značajne razlike u vrednosti energije i klijavosti semena(90,2-98,6). Vrednosti koeficijenta D za lokaciju i temperaturu, kod semena sve tri hibridne kombinacije, su vrlo visoke i skoro funkcionalne za obe lokacije i modifikovani cold test (99,9). Istovremeno, vrednosti koeficijenta R pokazuju različit raspon po hibridnim kombinacijama za obe lokacije i standardne temperaturne uslove. Ove vrednosti kreću se od nepouzdanе (0,502) do vrlo visoke (0,909). Za osobinu ukupno klijanje semena ispoljavaju se razlike između sve tri hibridne kombinacije. Najveću raznolikost u ispoljavanju ove morfološko-fiziološke osobine ispoljilo je seme hibridne kombinacije ZP 505. Rezultati LSD rangiranja srednjih vrednosti mogu se zapaziti u vrednostima F testa iz analize varijanse. Za seme hibridne kombinacije SC 684 lokacija proizvodnje semena nema značaja dok za seme kombinacija ZP 677 i ZP 505 lokacija proizvodnje ima statistički vrlo visoku značajnost.

Ključne reči: kukuruz, , frakcije, lokacija, temperatura, klijanje

**GENOTYPIC AND PHENOTYPIC CORRELATION BETWEEN YIELD
COMPONENTS IN S₁ AND HS PROGENIES OF AN F₃ MAIZE POPULATION**

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The main goal of the most maize breeding programs is to create superior inbred lines that could be used for getting newer, better commercial hybrids. It is necessary, by using suitable experimental methods, to investigate potential of every recently created population for possible adopting in long-term breeding programs. This paper presents the investigation of F₃ population 2002-30, created in the Department of Maize, Institute of Field and Vegetable Crops, Novi Sad. The investigation lasted for three years. At the first year, about 150 plants of the studied population were selfed and simultaneously crossed with the tester 1491x1496, in order to get complementary S₁ and HS progenies. After the harvest, 41 progenies of each type were selected by the random sample method. During the second and third year, trials were carried out in Aleksinac, Leskovac, and Kruševac, as three studied environments, in RCB design. Moderately strong and strong positive phenotypic correlation between yield components and grain yield was established, but between certain yield components negative correlation coefficients also were found. We found many significant positive, but also negative values of genotypic correlation coefficients; however, general tendencies were the same as for phenotypic correlation coefficients. Genotypic correlation coefficients of HS progenies were much greater than the phenotypic ones.

Key words: maize, correlation, recurrent selection, yield components.

GENOTIPSKE I FENOTIPSKE KORELACIJE KOMPONENTI PRINOSA KOD S₁ I HS POTOMSTAVA JEDNE F₃ POPULACIJE KUKURUZA

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Glavni cilj većine programa oplemenjivanja kukuruza predstavlja stvaranje superiornih inbred linija koje će se koristiti za dobijanje novih, boljih, komercijalnih hibrida. Neophodno je ispitati odgovarajućim eksperimentalnim metodama potencijal svake novostvorene populacije za eventualno uključivanje u dugoročni program oplemenjivanja. U radu su obavljena ispitivanja na F₃ populaciji 2002-30 dobijenoj u Zavodu za kukuruz Instituta za ratarstvo i povrtarstvo u Novom Sadu. Ispitivanja su izvedena tokom tri godine. U prvoj godini je oko 150 biljaka F₃ populacije 2002-30 samooplođeno i istovremeno ukršteno sa testerom 1491x1496, da bi se dobila naspramna S₁ i HS potomstva. Nakon berbe, odabrano je po 41 S₁ i HS potomstava za oglede, metodom slučajnog uzorka. Tokom druge i treće godine obavljani su oglede u Aleksincu, Leskovcu i Kruševcu, što ukupno čini tri okruženja (environment), po RCBD metodi. Utvrđene su srednje jake i jake pozitivne fenotipske korelacije između komponenti prinosa i prinosa zrna, ali su uočene i negativne vrednosti fenotipskih korelacija između pojedinih komponenti prinosa. Uočeno je više značajnih pozitivnih, ali i negativnih vrednosti genotipskih korelacija, mada su generalni trendovi bili isti kao i za koeficijente fenotipskih korelacija. Genotipske korelacije u HS potomstvu su bile znatno jače nego fenotipske.

Ključne reči: kukuruz, korelacije, rekurentna selekcija, komponente prinosa.

**INBRED LINES AS DONORS OF FAVOURABLE ALLELES FOR THE
IMPROVEMENT OF THE PERCENT OF LODGED AND BROKEN PLANTS OF F1
MAIZE HYBRIDS**

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Maize inbred lines developed from different cycles of recurrent selection of the two synthetic populations (BSSS and BSCB₁) were observed in the present study. The objective of the study was to establish which of the two observed populations had the lowest relative values of favourable alleles for the lodged and broken plants trait for the improvement of the elite maize hybrid ZP580. According to obtained results the lowest average values for this trait (0.63%) was detected in the genotype B99(C10) of the population BSCB₁. When selecting donors of favourable alleles for the lodged and broken plants trait, the value of the parameter μG^* should be as lower as possible and the value of the parameters μD^* or μF^* should be as higher as possible. The lowest values of μG^* were established in the inbred lines B99(C10), B73(C₅), B90(C7) and B91(C8), while the highest values were recorded in the inbreds B37(C0), B84(C7) and B14(C0). It was also determined that inbreds expressed significantly higher genetic relatedness with the parent ZPL1. Significant differences of μG^* -(μD^* or μF^*) were not established in the inbreds B73(C₅), B90(C7), B91(C8) and B99(C10), which had the lowest value of the parameter μG^* . Therefore, the best method to develop the initial population for selection would be self-pollination of the generation F₁ of the crosses ZPL1 x B73, ZPL1 x B90, ZPL1 x B91 and ZPL1 x B99. Inbreds B37(C0), B84(C₇) and B14(C10) had significantly higher values of the parameter μG^* than the parameter μD^* , hence they cannot be used as donors of favourable recessive alleles for the improvement of the percent of lodged and broken plants trait in the elite hybrid ZP580.

Key words: inbred lines, maize, donors, hybrid, alleles

**INBRED LINIJE DONORI POŽELJNIH ALELA ZA POPRAVKU OSOBINE
PROCENAT POLEGLIH I SLOMLJENIH BILJAKA F₁ HIBRIDA KUKURUZA**

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U ovom radu su ispitivane inbred linije kukuruza dobijene iz različitih ciklusa rekurentne selekcije dve sintetičke populacije: BSSS i BSCB₁. Cilj ispitivanja je bio da se za osobinu procenat poleglih i slomljenih biljaka oceni koja od ispitivanih inbred linija proučavanih sintetika ima najniže relativne vrednosti poželjnih alela za popravku elitnog hibrida kukuruza ZP580. Od ispitivanih linija donora genotip B99(C10) iz populacije BSCB₁ je imao najnižu prosečnu vrednost za ovu osobinu (0,63%). Prilikom izbora donora poželjnih alela za procenat poleglih i slomljenih biljaka poželjno je da vrednost parametara μG^* bude što niža a vrednost parametara μD^* ili μF^* što viša. Najniže vrednosti μG^* pokazale su inbred linije B99(C10), B73(C5), B90(C7) i B91(C8), dok su najviše zabeležene kod linija B37(C0), B84(C7) i B14(C0). Na osnovu dobijenih podataka u istraživanju proučavane inbred linije su ispoljile veću genetičku srodnost sa roditeljem ZPL1. Za linije B73(C5), B90(C7), B91(C8) i B99(C10) koje su imale najmanje vrednosti parametra μG^* nisu utvrđene značajne vrednosti razlike $\mu G^* - (\mu D^* \text{ ili } \mu F^*)$ tako da bi najbolji način za zasnivanje početne populacije za selekciju bio samooplodnja F₁ generacije ukrštanja ZPL1 x B73, ZPL1 x B90, ZPL1 x B91 i ZPL1 x B99. Linije B37(C0), B84(C7), i B14(C10) su imale značajno veće vrednosti parametra μG^* od parametra μD^* tako da se ne mogu koristiti kao donori poželjnih recesivnih alela za popravku osobine procenat poleglih i slomljenih biljaka kod elitnog hibrida ZP580.

Ključne reči: inbred linije, kukuruz, donori, hibrid, aleli

EXPERIENCE IN THE MANUFACTURE OF LIQUID BIOFUEL

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In the paper are analysed the results and experience due to the production of biofuels – cold extracted rape oil and biodiesel on the Agricultural Institute of Republic Srpska. In addition to the results of research, it is indicated on the problems which restrict the development of this field, from the production of rape to the organization of collecting of used oils. The methods introduced for analysing of biodiesel are described, with the special emphasize on the introduction of the method for analysing of metilestars content.

Key words: rape oil, biodiesel, control of biofuels quality

ISKUSTVA U PROIZVODNJI TEČNIH BIOGORIVA

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U radu su prezentovani rezultati i iskustva u vezi sa proizvodnjom biogoriva; hladno cijedenog repičinog ulja i biodizela na Poljoprivrednom institutu Republike Srpske. Uz rezultate istraživanja, ukazano je i na probleme koji otežavaju razvoj navedene oblasti, od proizvodnje uljane repice do organizacije sakupljanja korišćenih ulja. Opisane su do sada usvojene metode za analizu kontrole kvaliteta biodizela, a posebno je istaknut značaj uvođenja metode za utvrđivanje sadržaja metil-estara.

Ključne riječi: repičino ulje, biodizel, kontrola kvaliteta biogoriva

SOME QUANTITATIVE PROPERTIES OF WINTER WHEAT (*TRITICUM AESTIVUM* L.) GROWN IN MELIORATED DEPOSOL

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This paperwork presents the two-year research results on impacts of different agricultural practices on the growth and development of winter wheat (*Triticum aestivum* L.). This research has been performed within the biological reclamation phase of deposol in Stanari mine. The significance of growing wheat is reflected in the production of grain and total biomass. The aim of the research is to determine the impacts of different doses of fertilizers and varieties to yield, seed quality and other quantitative properties of wheat. A two-year research (2011 and 2012) has been performed on meliorated deposol in the process of reclamation. Deposol to be researched is located on the internal dump site for overburden from the open pit Raškovac - Stanari. Field two-factor experiment was set up according to the randomized block design with four replications. The first factor (A) represents agromeliorative measures fertilizations. The second factor (B) involves tracking of four varieties of winter wheat (nova bosanka, prijedorčanka, orion and evropa 90). Measurement and statistically analysis of plant height, seed yield and 1000 grain weight has been performed. Achieved results indicate the existence of a statistical differences occurring especially between the applied treatments. The maximum measured height of wheat plants was 81,5 cm and average height was 65,51 cm. Maximum seed yield was 4,8 t/ha, with the average 2,68 t/ha. The average value of 1000 seeds is 34,88 g, the maximum value of 42,15 g and 18,5 g minimum. The minimum value of plant height was 32,5 cm, and seed yield was 0,7 t/ha. The highest mean values of plant height were measured at doses of fertilizers N₆₀₊₄₀P₆₀K₆₀. The highest mean values of yield and mass of 1000 seeds were measured at doses of fertilizers N₆₀₊₉₀P₆₀K₆₀. Applied treatments, along with the agroecological habitat conditions affected the different results of the measured characteristics. Achieved results show that the winter wheat can be grown on meliorated deposol of Stanari mine overburden disposal, and later on during the potential production in the postreclamation period.

Key words: plant height, yield, seed quality, Stanari.

NEKE KVANTITATIVNE OSOBINE OZIME PŠENICE (*TRITICUM AESTIVUM* L.) GAJENE NA MELIORISANOM DEPOSOLU

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U radu su iznijeti dvogodišnji rezultati istraživanja uticaja različitih agrotehničkih mjera na rast i razvoj ozime pšenice (*Triticum aestivum* L.). Ova istraživanja su provedena u okviru biološke faze rekultivacije deposola u rudniku lignita Stanari. Značaj gajenja pšenice se ogleda u proizvodnji zrna i ukupne biomase. Cilj istraživanja je utvrđivanje uticaja različitih doza mineralnih đubriva i korišćenih sorti na prinos, kvalitet sjemena i druge kvantitativne osobine ozime pšenice. Dvogodišnja istraživanja (2011. i 2012.) su vršena na meliorisanom deposolu u postupku rekultivacije. Deposol za istraživanje je smješten na unutrašnjem odlagalištu otkrivke sa površinskog kopa Raškovac – Stanari. Poljski dvofaktorijalni ogled postavljen je po metodi slučajnog blok sistema u četiri ponavljanja. Prvi faktor (A) predstavlja agromeliorativne mjere đubrenja. Drugi faktor (B) obuhvata praćenje četiri sorte ozime pšenice (nova bosanka, prijedorčanka, orion i evropa 90). Izvršeno je mjerenje i statistički obrađena visina biljaka, prinos sjemena i masa 1000 zrna. Dobijeni rezultati ispitivanja ukazuju na postojanje statističkih razlika između primjenjenih tretmana. Maksimalna izmjerena visina biljaka pšenice je 81,5 cm, a prosječna 65,5 cm. Maksimalni prinos sjemena iznosi 4,8 t/ha, a prosjek 2,68 t/ha. Prosječna vrijednost mase 1000 zrna je 34,88 g, maksimalna vrijednost 42,15 g, a minimalna 18,5 g. Minimalna vrijednost visine biljaka je 32,5 cm, a prinosa sjemena iznosi 0,7 t/ha. Najveće srednje vrijednosti visine biljaka su izmjereni pri dozama đubriva $N_{60+40}P_{60}K_{60}$. Najveće srednje vrijednosti prinosa sjemena i mase 1000 zrna ostvareni su pri dozama đubriva $N_{60+90}P_{60}K_{60}$. Primjenjeni tretmani, zajedno sa agroekološkim uslovima staništa su uticali na različite rezultate mjerenih osobina. Ostvareni rezultati dokazuju da se ozima pšenica može gajiti na meliorisanom deposolu odlagališta rudnika lignita Stanari, a i kasnije pri mogućoj proizvodnji u postrekultivacionom periodu.

Ključne riječi: visina biljaka, prinos, kvalitet sjemena, Stanari.

GRAIN YIELD AND YIELD COMPONENTS IN TRITICALE ON ACIDIC SOILS DEPENDING ON MINERAL FERTILIZATION AND LIMING

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A field experiment with triticale cultivars 'KG-20', 'Odyssey' and 'Tango' was set up at the Secondary School of Agriculture in Kraljevo in 2011 and 2012 to evaluate the effect of mineral fertilization and liming on grain yield and yield components. The soil used in the trial was a vertisol undergoing degradation, characterized by a heavy texture, a coarse unstable structure, poor physical properties and an acid reaction ($\text{pH}_{\text{H}_2\text{O}} = 4.5$). Results were subjected to a three-factor analysis of variance (year, fertilization, genotype), and interdependence of the traits was measured by the simple correlation coefficient using SPSS software (1995). Mineral fertilization and liming led to an increase in yield components, notably grain number per spike and grain weight per spike, with grain yield being significantly higher in fertilization treatments. Grain yield showed the strongest correlation with spike number m^{-2} ($r=0.75$), plant height ($r=0.69$) and grain number per spike ($r=0.63$) ($P \leq 0.01$). Spike number m^{-2} was positively correlated with grain number per spike and thousand grain weight, and negatively with overall tillering. A negative correlation was observed between tillering and thousand grain weight, and plant height was positively correlated with spike length and grain number per spike. Spike number m^{-2} is a yield limiting component in winter triticale. The significant values for the coefficient of correlation between grain yield and plant height, and between grain yield and spike length suggest that these yield components can serve as additional criteria when selecting triticale for grain yield.

Key words: triticale, acid soils, correlation coefficient, grain yield

THE INFLUENCE OF THE PARTICLE SIZE DISTRIBUTION OF MAIZE AS RAW MATERIAL ON EXTRACT CONTENT OF BEER

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The use of maize has a very long tradition in beer production. Maize is a raw material, commonly used to replace some portion of malt, over the world, but in our region, too. There is no significant influence on sensory properties and quality if adding in moderate quantities and application of appropriate technology is present. For this purpose, the maize has to have defined technological characteristics and required quality. The aim of this study was to investigate the influence of particle size distribution of different hybrids on the extract content and the effects of their application. The content of moisture, protein, fats / oils, and starch were determined by Near infrared method. Also, the determination of the extract content was carried out by an enzymatic method (EBC 6.5) using automated Beer analyzer Anton Paar. Starch from maize grits are decomposed under the influence of the purified bacterial origin α - amylase, in the process of mashing according to the Congress method. This method includes determination the compounds formed under the influence of the malt enzyme during standardized procedure of mashing. Under these conditions determined compounds are being extracted in solution called Congress wort). According to these results, the protein and extract contents in samples were significantly different. For all the other observed parameters there were insignificant differences.

Keywords: maize, malt, particle size distribution, extract, beer

ISPITIVANJE UTICAJA GRANULOMETRIJSKOG SASTAVA KUKURUZA KAO SIROVINE NA SADRŽAJ EKSTRAKTA PIVA

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Upotreba kukuruza u proizvodnji piva ima dugu tradiciju. Kukuruz je sirovina, koja se širom sveta, a i na našim prostorima koristi kao najčešća zamena dela slada. Dodavanjem u umerenoj količini i primenom odgovarajućeg tehnološkog postupka ne utiče bitno na senzorna svojstva i kvalitet. Da bi to bio slučaj, kukuruz mora da bude odgovarajućeg kvaliteta i poseduje definisana tehnološka svojstva. Cilj rada je bio ispitivanje uticaja granulometrijskog sastava različitih hibrida kukuruza na sadržaj ekstrakta i efekat primene istog. Metodom Near infraread određeni su: vlaga, proteini, masti/ulja i skrob, dok je određivanje sadržaja ekstrakta vršeno enzimskom metodom (EBC 6.5) uz pomoć automatskog uređaja Beer analyser Anton Paar. Skrob iz kukuruzne krupice razlaže se pod dejstvom prečišćene α – amilaze bakterijskog porekla u postupku ukomljavaanja po Kongresnoj metodi. Ova metoda podrazumeva određivanje količine materija koje pod dejstvom enzima slada, u toku standardizovanog postupka komljenja, pod precizno usvojenim uslovima prelaze u rastvor, odnosno Kongresnu sladovinu. Na osnovu dobijenih rezultata, kod kukuruzne krupice hibrida kukuruza najveće razlike su uočene kod sadržaja proteina i ekstrakta, dok su ostali parametri imali približno jednake vrednosti.

Ključne reči: kukuruz, slad, granulacija, ekstrakt, pivo

EFFECT OF FERTILIZING SYSTEMS ON THE PHOSPHORUS EFFICIENCY INDICATORS AT DURUM WHEAT

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The main agronomic indicators of effectiveness for phosphorus fertilizing alone or combined with nitrogen fertilization N_{120} were studied in durum wheat grown in conditions of long term fertilizing experiment in two field crops rotation cotton – durum wheat under rain conditions for the period of three vegetations including years 2011 – 2013. The Latin square method was used as experimental design with trial plot size $50m^2$ in four replications. The examined fertilizing systems were as follows: N_0P_0 ; N_0P_{80} ; N_0P_{120} ; N_0P_{160} ; $N_{120}P_{80}$; $N_{120}P_{120}$; $N_{120}P_{160}$. Nitrogen fertilization as NH_4NO_3 applied before sowing (1/3 of the rate) and at early spring (2/3 of the rate). The phosphorus fertilization was applied before sowing as triple superphosphate. The soil type of experimental field was Pelic vertisols. Weather conditions during the studied period 2011 – 2013 were different as a temperature and rainfall each year. With nearest values of rainfall and air temperature to the average long annual values for the region was 2011. Indexes partial factor productivity (PFP), agronomic efficiency (AE), apparent crop recovery (RE), partial nutrient balance (PNB), and physiological efficiency of applied phosphorus (PE) were studied. It was established that fertilizing systems of durum wheat strongly affect the indicators of phosphorus efficiency. The partial factor productivity of phosphorus changed from 13.4 to 51.8 kg grain per kg P_2O_5 applied in dependence of the fertilizing system. The average agronomic efficiency was varied in range 1.6-28.1 kg grain and 0.20-4.58 kg grain protein for the experimental period. Apparent crop recovery efficiency of applied phosphorus (kg increase in P uptake per kg P applied) was very low 0.11-0.15 $kg \cdot kg^{-1}$ when wheat was grown with no nitrogen fertilization. Recovery efficiency and physiological efficiency of applied P (kg yield increase per kg increase in P uptake from fertilizer) did not depend of the quantity of applied phosphorus $P_{80}-P_{160}$ in systems without nitrogen. Alone phosphorus fertilizing in rates 80-160 $kg P_2O_5 \cdot ha^{-1}$ demonstrated lower efficiency of phosphorus expressed as calculated indicators partial factor productivity, agronomic efficiency, apparent crop recovery, partial nutrient balance, and physiological efficiency. Systematic fertilization of durum wheat in rates $N_{120}P_{80}$ was the most effective in average for the experimental period.

Key words: phosphorus efficiency indicators, durum wheat.

IMPROVEMENT OF GRAIN QUALITY AND QUALITY OF BREAD WHEAT

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The aim of this study presents the role of major factor (proteins, starch) and minor factor (lipids, soluble proteins), genetic and environmental factor in determining quality as well as contribution of breeding to improvement quality characteristics of wheat germplasm. Wheat is the important source of baking food. Nowadays the increasing of world population demands parallel increases in food production, especially of wheat. Wheat breeders need to give the same importance to grain quality and yield potential as well disease resistance. Increasing yield potential is associated with decreasing grain protein content, which is strongly related to bread-making quality. Wheat grain protein content varies between 8 and 17%, influenced by genetic and environmental factors. Variations in grain protein content may significantly influence the dough strength properties of a wheat cultivar, but, cannot completely explain quality differences among wheat cultivars. Wheat flour consists viscoelastic protein (gluten). Gluten comprising approximately 80% of the total endosperm protein (glutenin and gliadins). Glutenin fractions are responsible for variation of elasticity in dough and gliadin for extensibility to the gluten complex. Protein quality, determined by presence of specific glutenin subunits as well amount ratio of polymeric/monomeric protein. Gliadins subunits controlled by genes *Gli-1* and *Gli-2* located at the short arm of group 1. and group 6. homologous chromosomes, high-molecular weight glutenin (HMWG) controlled by *Glu-1* loci located at the long arm of group 1., and low molecular weight glutenin (LMWG) subunits controlled by genes of the *Glu-3* complex loci located on the short arm of group 1. chromosomes are important in determining gluten viscoelasticity. Grain quality trait (hardness, endosperm particle) associated with the milling properties of wheat and with the baking quality of the resulting milling products. The contents of grain endosperm is native starch (75% dry weight) which have a small influence to functional properties of wheat flour used for baking. Damaged starch by exposing its components (amylose and amylopectin) to interact with other ingredients of the baking formula, significantly influence the water absorption and fermentation time of bread-making doughs, as well as the values of crumb textural properties of bread.

Key words: wheat, quality, genes, breeding, improvement

UNAPREĐENJE KVALITETA ZRNA I KVALITETA HLEBNE PŠENICE

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Cilj ovih istraživanja je da se predstavi uloga glavnih faktora (proteini, skrob) i minornih faktora (masti, rastvorljivi proteini), genetičkih i sredinskih činilaca u određivanju kvaliteta, kao i primena oplemenjivanja na poboljšanje osobina kvaliteta pšenične germplazme. Pšenica je važan izvor hrane u pekarstvu. Danas povećanje svetske populacije zahteva paralelno povećanje proizvodnje hrane, posebno pšenice. Oplemenjivači pšenice treba da daju isti značaj za kvalitet zrna i prinos zrna kao i otpornost na bolesti. Povećanje potencijala za prinos je povezano sa smanjenjem sadržaja proteina zrna, koji su tesno povezani sa pekarskim kvalitetom. Sadržaj proteina pšenice varira između 8 i 17%, pod uticajem genetičkih i ekoloških faktora. Variranje sadržaja proteina u zrnu može značajno uticati na osobine snage testa kod sorti pšenice, ali ne može u potpunosti da objasni razlike između sorti pšenice prema kvalitetu. Pšenično brašno sadrži viskoelastični protein (gluten). Gluten sadrži približno 80% od ukupnog sadržaja proteina endosperma (glutenina i glijadina). Gluteninske frakcije su odgovorne za varijacije elastičnosti testa a glijadini za rastegljivost glutenskog kompleksa. Kvalitet proteina, određen je prisustvom specifičnih gluteninskih subjedinica kao i proporcionalnim odnosom količine polimerni/monomernih proteina. Glijadinske subjedinice su pod kontrolom gena *Gli-1* i *Gli-2* koji se nalaze na kratkom kraku 1. i 6. grupe homologih hromozoma, glutenini visoke molekulske težine (HMWG) su pod kontrolom *Glu-1* lokusa koji se nalaze na dugim kracima grupe 1., a gluteninske podjedinice niske molekulske težine (glutenina LMWG) su pod kontrolom gena *Glu-3* lokusa koji su locirani na kratkim kracima 1. grupe homologih hromozoma, koji su takođe važni u određivanju viskoelastičnosti glutena. Osobine kvaliteta zrna (tvrdoća, čestice endosperma) povezane su sa osobinama mlevenja pšenice i pekarskim kvalitetom dobijenih mlinskih proizvoda. Sadržaj endosperma zrna je poreklom skrob (75% suve težine) koji ima mali uticaj na funkcionalna svojstva pšenice brašna koje se koristi za hleb. Oštećeni skrob odnosno njegove komponente (amiloza i amilopektin) u interakciji sa ostalim sastojcima za pečenje, imaju značajan uticaj na apsorpciju vode i vreme fermentacije koje zahteva testo za pečenje hleba, kao i vrednost osobine teksture sredine hleba.

Ključne reči: pšenica, kvalitet, geni, oplemenjivanje, poboljšanje.

EFFECTS OF DIFFERENT TYPE OF CYTOPLASM ON THE EAR HEIGHT IN MAIZE INBRED LINES

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The aim of the study was to determine effects of different types of cytoplasm (*cms-C*, *cms-S* and fertile) and environmental factors on the ear height in 12 maize inbred lines. The trial was set up in two locations during 2008 and 2009. According to the analysis of variance there were very significant differences among inbred lines in the ear height as well as interactions between inbred lines and observed factors (genotype, cytoplasm, year and location). The highest (96.88 cm), i.e. the lowest (62.04 cm) ear heights were recorded in the inbred lines L₃ and L₇, respectively. The type of cytoplasm significantly affected observed traits of inbred lines: a very significantly ($Lsd_{0.01}$) lower ear height was recorded in inbred lines with sterile cytoplasm of *cms-S* type in comparison with inbreds with *cms-C* type of sterility and inbreds with fertile cytoplasm. A higher average ear height (80.98 cm) was determined in the first location (Selection field) than in the second location (School farm estate - 76.03 cm). Furthermore, the ear height very significantly ($Lsd_{0.01}$) varied over years in the inbreds L₁, L₇ and L₈, while there were no differences in remaining nine inbreds. The cluster analysis was performed and obtained dendograms showed the differences in relatedness, i.e. the genetic distances among inbred lines of a diverse source of cytoplasm. Inbred lines with C and inbred lines with S source of sterility (L₁, L₂, L₃, L₄, L₅, L₇, L₉ and L₁₁) expressed certain similarity in regard to grouping into a single cluster, while the inbred lines L₆ and L₈ were classified into another cluster. Fertile inbred L₁₀ was unique and represented just a single cluster, and according to divergence it is largely genetically distant from remaining inbreds regardless of the source of cytoplasm.

Key words: cytoplasmic male sterility, inbred lines, ear height

UTICAJ RAZLIČITOG TIPA CITOPLAZME NA VISINU BILJKE DO KLIPA INBRED LINIJA KUKURUZA

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Cilj istraživanja bio je da se odredi uticaj različitog tipa citoplazme (*cms-C*, *cms-S* i fertilna), i faktora spoljašnje sredine na visinu biljke do klipa dvanaest inbred linija kukuruza. Ogled sa inbred linijama postavljen je na dve lokacije tokom 2008 i 2009 godine. Na osnovu analize varijanse utvrđeno je da postoje veoma značajne razlike između inbred linija u visini biljke do klipa kao i interakcije inbred linija sa ispitivanim faktorima (tip citoplazme, godina i lokacija). Inbred linija L₃ je ostvarila najveću prosečnu vrednost visine biljke do klipa (96,88 cm), a najmanju prosečnu vrednost imala je inbred linija L₇ (62,04 cm). Tip citoplazme veoma značajno utiče na proučavane osobine inbred linija. Inbred linije sa sterilnom citoplazmom *cms-S* tipa imale su veoma značajno (Lsd_{0,01}) manju visinu klipa od inbred linija sa *cms-C* tipom sterilnosti i inbred linija sa fertilnom citoplazmom. Na prvoj lokaciji (Selekciono polje) ostvarena je veća prosečna vrednost visine biljke do klipa (80,98 cm) u odnosu na drugu lokaciju (76,03 cm) Školsko dobro. Visina biljke do klipa ispitivanih linija po godinama se razlikovala veoma značajno (Lsd_{0,01}) kod inbred linija L₁, L₇ i L₈ dok kod ostalih devet ispitivanih inbred linija nije bilo značajnih razlika. Urađena klaster analiza na osnovu dobijenih dendrograma pokazala je razlike u pripadnosti odnosno genetičkoj distanci između istih inbred linija ali sa različitim izvorom citoplazme. Inbred linije sa C i linije sa S izvorom sterilnosti (L₁, L₂, L₃, L₄, L₅, L₇, L₉ i L₁₁) pokazale izvesnu sličnost u pogledu grupisanja u jedan klaster dok su inbred linije L₆ i L₈ grupisane u drugi klaster. Fertilna linija L₁₀ po svojoj pripadnosti je jedinstvena i zastupa samo jedan klaster, a u pogledu divergentnosti nalazi se na velikoj genetičkoj distanci u odnosu na ostale linije bez obzira na izvor citoplazme.

Ključne reči: citoplazmatska muška sterilnost, inbred linije, visina biljke do klipa

**EFFECT OF NITROGEN FERTILIZER AND EFFECTIVE MICROORGANISM
(EM) ON YIELD AND QUALITY OF SUGAR BEET**

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Effective microorganism (EM) is a microbial inoculant promoted to stimulate plant growth and soil fertility in agriculture. In our study a field experiment was conducted to determine the effects of nitrogen fertilizer and EM on yield and quality of sugar beet in 2011, in Jovein, Iran. Experimental design was factorial, as a randomized complete block design in three replications. Treatments included nitrogen at three levels: N1 (control) = 0, N2 = 100 and N3 = 200 kg N per hectare and the amount of EM in three levels: E1= 4 liters, E2 = 8 liters and E3 = 12 liters per hectare. Results indicated that effects of nitrogen and EM were significant on all parameters. The highest and lowest root yield obtained for N3 and N1 respectively. N1 had the highest sugar content and the lowest sugar content was belonged to N3. The highest sugar yield and white sugar yield was observed in N2. The highest root yield was observed in N3×E2, but the highest sugar yield and white sugar yield was belonged to N2×E2. The results showed that consumption of EM, can somewhat reduce the need for nitrogen fertilizers in sugar beet.

Keywords: Effective Microorganisms, nitrogen fertilizer, Sugar beet.

APPLICATION TECHNIQUES OF LIQUID STARTER FERTILIZER IN COMMERCIAL MAIZE PRODUCTION

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Conventional corn production involves the use of granular fertilizer which distribution is carried out with various types of fertilizer spreaders. As opposed to the conventional production, this research is conducted with the assumption that using a combination of granular and liquid starter fertilizers, and improved application techniques, achieve higher in grain yield. In this scientific paper, in addition to the use of conventional mineral fertilizers, investigated the impact of mechanized application of different norms of liquid starter fertilizer in the production of commercial maize. The application of liquid starter fertilizer was performed simultaneously with sowing, with the existing seeder, adapted with prototype machine for the application of liquid starting fertilizer. The results show that grain yield in areas where was applied a method of application starter fertilizer, increased by $1.43 \text{ t} \cdot \text{ha}^{-1}$ compared to the results obtained with conventional production.

Keywords: liquid starter fertilizers, mechanized applications, norms of fertilization, commercial maize yield.

TEHNIKA INKORPORACIJE TEČNOG STARTNOG ĐUBRIVA U PROIZVODNJI KUKURUZA

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Konvencionalna proizvodnja kukuruza podrazumeva upotrebu granuliranih mineralnih đubriva čija se distribucija vrši različitim tipovima rasipača mineralnih đubriva. Za razliku od konvencionalne proizvodnje, ova istraživanja su sprovedena uz pretpostavku da će se primenom kombinacije granuliranih i tečnih startnih đubriva, kao i unapređenom tehnikom aplikacije, ostvariti veće vrednosti u prinosu zrna. U radu je, pored upotrebe konvencionalnih mineralnih đubriva, istraživan uticaj mehanizovane aplikacije različitih normi tečnog startnog đubriva u proizvodnji merkantilnog kukuruza. Aplikacija tečnih startnih đubriva vršena je istovremeno sa setvom, pri čemu je na postojećoj sejatici izvršena adaptacija postavljanjem prototipa mašine za aplikaciju. Dobijeni rezultati pokazuju da je prinos zrna na površinama gde je primenjena tehnika aplikacije startnog đubriva viši za 1,43t·ha⁻¹ u odnosu na rezultate dobijene pri konvencionalnoj proizvodnji.

Ključne reči: tečno startno đubrivo, mehanizovana aplikacija, norma đubrenja, merkantilni kukuruz, prinos.

**THE EFFECT OF FALL SOWN DIFFERENT COVER CROPS ON SWEET MAIZE
WEEDINESS**

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Sweet maize (*Zea mays saccharata* Sturt.) is considered a weak competitor because of its shorter and less developed habit, which makes improved weed management systems a main priority. The objective of the study was to determine the effect of different winter grown cover crops, and legume-cereal based mixtures on weediness of sweet maize (floristic composition of the weed community, fresh weight and air dry weight). The decrease in a number and a biomass, especially of perennial weeds, is one of advantages of cover crop growing. Obtained results in the years of investigation (2011/12 and 2012/13), show that the number of perennial weeds and their fresh weight were lower in cover crops than in control treatments: dead organic mulch - soil covered with straw in autumn and winter time, and conventional (traditional) variant – bare soil uncovered during fall and winter time. Along legume species, favorable effect on weediness of sweet maize had been recorded on winter hairy vetch, as well on a kind of non legume species, winter fodder kale. Investigation cover crops had lowered weed infestation of sweet maize in comparison to the control treatments.

Key words: cover crops; legume-cereal mixtures, sweet maize; weed infestation

THE EFFECT OF SOME YIELD COMPONENTS ON GRAIN YIELD OF WINTER WHEAT

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Grain yield is a complex trait of outstanding economic significance, dependent upon a number of hereditarily determined traits and environmental conditions in which plant is developing. Therefore, contribution of various plant traits to grain yield is a permanent subject of studies in plant breeding. This paper presents the results of a study dealing with individual and joint effect of some yield components on grain yield of representative Serbian cultivars of winter wheat. The trials have been set at two locations (Kraljevo and Zaječar, Serbia), where four winter wheat cultivars (Pobeda, Planeta, ZA-75, Nora) were grown in five fertilization and liming variants. Trials were set in split-plot design, with three replications. Individual effect of plant height, spike length and 1000 grain mass was observed using simple regression analysis, while joint effect of those three traits on grain yield was studied by multiple regression analysis. The input data were for the all cultivars and fertilization variants from both locations, in order to get a better estimate of the part of grain yield variation explained by the investigated grain yield components. Simple regression analysis shows that the all independent variables had a positive effect on grain yield, but that effect was significant at the level of $P < 0.001$ for plant height and 1000 grain mass, while for spike length it was not significant. Multiple regression analysis of individual and joint effect of the studied parameters on wheat grain yield showed that plant height ($\beta = 0.639^{***}$) and 1000 grain mass ($\beta = 0.322^{**}$) had significant effect on grain yield, while the effect of spike length was not significant. Intercept value was also significant at the level of $P < 0.001$. Adjusted R^2 value (0.829) showed that 82.9% of the observed variation in wheat grain yield was explained by the studied three traits. F test for goodness of fit was significant at the level of $P < 0.001$.

Key words: wheat, plant height, spike length, 1000 grain mass, grain yield.

UTICAJ NEKIH KOMPONENTI PRINOSA NA PRINOS ZRNA OZIME PŠENICE

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Prinos zrna je kompleksno svojstvo od izuzetnog ekonomskog značaja, koje zavisi od niza naslednih svojstava i agroekoloških uslova u kojima se biljka razvija. Zato je doprinos različitih svojstava biljke u stvaranju prinosa zrna stalni predmet istraživanja u oplemenjivanju biljaka. U radu su prikazani rezultati ispitivanja individualnog i združenog uticaja nekih komponenti prinosa na prinos zrna novijih domaćih sorata ozime pšenice. Ogledi su izvedeni na dva lokaliteta (Kraljevo i Zaječar, Srbija), na kojima su četiri sorte ozime pšenice (Pobeda, Planeta, ZA-75, Nora) gajene u pet varijanti đubrenja i kalcizacije. Ogledi su postavljeni po metodi podeljenih parcelica (*split-plot design*) sa tri ponavljanja. Individualni efekat visine biljke, dužine klasa i mase 1000 zrna je utvrđivan pomoću jednostruke regresione analize, dok je združeni efekat sva tri ispitivana svojstva na prinos zrna utvrđivan pomoću višestruke regresione analize. Za analizu su korišćene vrednosti za sve sorte i varijante đubrenja na oba lokaliteta, radi bolje procene udela u variranju prinosa zrna koji je objašnjen efektom ispitivanih komponenti prinosa. Jednostruka regresiona analiza je pokazala da su sve tri nezavisne promenljive imale pozitivan efekat na prinos zrna, ali je taj efekat bio značajan na nivou verovatnoće pogreške od $P < 0,001$ za visinu biljke i masu 1000 zrna, dok za dužinu klasa nije bio značajan. Višestruka regresiona analiza pojedinačnog i združenog uticaja ispitivanih parametara na prinos zrna pšenice je pokazala da su visina biljke ($\beta = 0,639^{***}$) i masa 1000 zrna ($\beta = 0,322^{**}$) imale značajan efekat na prinos zrna, dok uticaj dužine klasa nije bio značajan. Vrednost preseka (*intercept*) je takođe bila značajna na nivou verovatnoće pogreške od $P < 0,001$. Korigovana R^2 vrednost (0,829) pokazuje da se 82,9% utvrđenih varijacija u prinosu zrna pšenice može objasniti variranjem ispitivana tri svojstva. F test za stepen podudaranja (*goodness of fit*) je bio značajan na nivou verovatnoće pogreške od $P < 0,001$.

Ključne reči: pšenica, visina biljke, dužina klasa, masa 1000 zrna, prinos.

INFLUENCE OF TILLAGE DEPTH ON SOME MORPHOLOGICAL AND PRODUCTIVE TRAITS OF WINTER RYE

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Besides it is a significant cereal for breadmaking, rye is characterized by favorable nutritive properties. Furthermore, it also can be used as feed, then for production of alcohol, starch and vinegar, cellulose, lignin, and germ is used in pharmaceutical industry. This study has been aimed to investigate the effect of soil cultivation depth on some morphological and productive traits of winter rye in hilly and mountain areas of north Kosovo. The trial was carried out during 2009/10 and 2010/11 in mountain area of north Kosovo, at 630 m of altitude. It was set in random complete block design with three replications. Cultivar of winter rye Raša was used for the trial. Three depths of soil cultivation were investigated (disc harrowing to 10-15 cm of depth, plowing to depth of 20 cm and plowing to depth of 30 cm). Dependence on tillage depth of the following parameters was observed: plant height, spike length, number of grains per spike, absolute mass of grain, hectoliter mass of grain and grain yield at 14% of moisture. The data were collected for both years and statistically processed by analysis of variance. Results of the study showed that soil cultivation depth had significant effect on the all investigated parameters. Significant differences were observed in plant height, spike length and number of grains per spike between the variant where tillage was done only by disc harrowing and the variant with plowing to 20 cm of depth. Absolute and hectolitre mass of grain were the highest in tillage to 30 cm of depth, while between disc harrowing and plowing to depth of 20 cm there was not any statistically significant difference. Grain yield was the highest in tillage to 30 cm of depth (2450 kg ha⁻¹) and was significantly higher in regard to tillage only by disc harrowing (1840 kg ha⁻¹). There was no statistically significant difference in grain yield between plowing to 20 and 30 cm of depth. In order to get rye grain yield of a satisfactory level, one should not do soil cultivation at depth lower than 20 cm.

Key words: rye, tillage depth, number of grains per spike, absolute mass, hectoliter mass, grain yield.

UTICAJ DUBINE OBRADE ZEMLJIŠTA NA NEKE MORFOLOŠKE I PRODUKTIVNE OSOBINE OZIME RAŽI

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Pored toga što je značajno hlebno žito, raž se odlikuje i povoljnim nutritivnim karakteristikama. Takođe, može se koristiti i kao stočna hrana, zatim za proizvodnju alkohola, skroba i sirćeta, celuloze, lignina, a klica u farmaceutskoj industriji. Cilj ovih istraživanja je bio da se u brdskim i planinskim područjima severnog Kosova ispita uticaj dubine obrade zemljišta na neke morfološke i produktivne osobine raži. Ogljed je izveden tokom 2009/10 i 2010/11 godine u planinskom području severnog Kosova, na nadmorskoj visini od 630 m. Postavljen je po sistemu slučajnog rasporeda parcela u tri ponavljanja. U ogledu je korišćena ozima sorta raži Raša. Ispitivane su tri dubine obrade zemljišta (tanjiranje na 10-15 cm dubine, oranje na dubini do 20 cm i oranje na dubini do 30 cm). Praćeni su sledeći parametri: visina biljaka, dužina klasa, broj zrna u klasu, apsolutna masa zrna, hektolitarska masa zrna i prinos zrna sa 14% vlage, u zavisnosti od dubine obrade. Prikupljeni su podaci za obe godine i statistički obrađeni analizom varijanse. Rezultati istraživanja pokazuju da je dubina obrade zemljišta imala značajnog uticaja na sve ispitivane parametre. Utvrđene su značajne razlike u visini biljaka, dužini klasa i broju zrna po klasu između varijanti gde je obrada izvođena samo tanjiračom i varijanti sa oranjem na dubini od 20 cm. Apsolutna i hektolitarska masa zrna su bile najveće kod obrade na 30 cm dubine, dok između obrade tanjiračom i plugom na 20 cm dubine nisu postojale statistički značajne razlike. Prinos zrna je bio najveći kod obrade na 30 cm dubine (2450 kg ha⁻¹) i bio je značajno veći u odnosu na obradu samo tanjiračom (1840 kg ha⁻¹). Statistički značajnih razlika u prinosu zrna nije bilo između obrade na dubini od 20 i 30 cm. Da bi prinosi raži bili na zadovoljavajućem nivou obradu zemljišta ne bi trebalo izvoditi na dubini manjoj od 20 cm.

Ključne reči: raž, dubina obrade zemljišta, broj zrna u klasu, apsolutna masa, hektolitarska masa, prinos.

UPTAKE AND UTILIZATION EFFICIENCY OF NITROGEN AND PHOSPHORUS IN DURUM WHEAT

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The uptake and utilization efficiency of nitrogen and phosphorus in durum wheat was studied in conditions of long term fertilizing experiment. The standard variety „Progress”, selected in Institute of field crops – Chirpan town, Bulgaria grown in two field crops rotation cotton – durum wheat in rain conditions for the period of three vegetation years 2011 – 2013. The experimental design was the method of Latin square with trial plot size 50m² in four replication. The treatments were as follows: N₀P₀; N₀P₈₀; N₀P₁₂₀; N₀P₁₆₀; N₁₂₀P₈₀; N₁₂₀P₁₂₀; N₁₂₀P₁₆₀. Nitrogen fertilization as NH₄NO₃ was applied before sowing (1/3 of the rate) and early spring (2/3 of the rate). The phosphorus fertilization was applied before sowing as triple superphosphate. The soil type of experimental field was Pelic vertisols. Weather conditions during the studied period 2011 – 2013 were different as a temperature and rainfall each year. With nearest values of rainfall and air temperature to the average long annual values for the region was 2011. It was established that productivity of aboveground biomass and grain was two-fold higher in fertilizing systems with applied N₁₂₀ and phosphorus rates of 80 - 120 kg P₂O₅.ha⁻¹, compared to the systems with no phosphorus fertilizing. Uptake efficiency of nitrogen and phosphorus or total uptake of these nutrients in aboveground dry mass at maturity, similar to wheat productivity, was higher in systems fertilized with nitrogen. The uptake of nitrogen was in the range 52.5 – 166 kg N.ha⁻¹, and phosphorus uptake – 22.5 - 77.4 kg P₂O₅.ha⁻¹, average for the period. The highest expense of nitrogen for 100 kg grain formation was established in fertilizing system N₁₂₀P₁₂₀ – 3.84 kg N. The expense of phosphorus for 100 kg grain formation increased in parallel with applied phosphorus rate and did not depend of nitrogen fertilizing. The highest value observed in systems with applied high phosphorus rate of P₁₆₀. Nitrogen utilization efficiency for biomass and grain production in durum wheat was the lowest in fertilizing system N₁₂₀P₁₂₀, and the lowest phosphorus utilization efficiency was obtained in fertilizing treatment N₁₂₀P₁₆₀.

Key words: durum wheat, nitrogen, phosphorus, efficiency

**COMPARISON BETWEEN MEASURED AND CALCULATED POTENTIAL
EVAPOTRANSPIRATION OF WINTER WHEAT BY USING CROPWAT MODEL**

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The experimental investigation through field trials has been carried out in the river valley of Južna Morava, municipality of Merošina, on the alluvium soil type, during the period 2009-2011. The trials were set at 198 m of altitude, 43°19' N of latitude and 21°54' E of longitude, in random complete block design (RCBD) with five replications. Area of each elementary plot was 35 m², and during vegetation usual agrotechnical measures for wheat were carried out. Trials included three irrigation variants with pre-irrigation soil humidity of 60%, 70% and 80% of FWC, as well as unirrigated control. Water consumption for evapotranspiration of winter wheat (289.5-410.7 mm) was measured by water balance method. Considering average for both investigated years, the highest grain yield of winter wheat was observed at the variant with pre-irrigation soil humidity 70% of FWC (7110 kg ha⁻¹ and 7480 kg ha⁻¹), so measured values of ET at this variant from 381.1 to 393.1 mm represent potential evapotranspiration (ETP) of winter wheat in southern Serbia. Calculated demand for water of winter wheat (ETc) by CROPWAT model for the season 2009/10 was 442.7 mm, while in the season 2010/11 calculated water consumption amounted 461.4 mm of water. Application of CROPWAT model for calculation of ETc is possible, but only if calibration of crop coefficients (Kc) were carried out for agroecological conditions of our country.

Key words: potential evapotranspiration, wheat, irrigation, CROPWAT.

KOMPARACIJA IZMERENE I OBRAČUNATE POTENCIJALNE EVAPOTRANSPIRACIJE OZIME PŠENICE KORIŠĆENJEM CROPWAT MODELA

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Eksperimentalna istraživanja poljskim ogledom u uslovima navodnjavanja obavljena su u dolini reke Južna Morava, Opština Merošina, na aluvijalnom zemljištu u periodu 2009-2011. godine. Ogled je bio lociran na nadmorskoj visini 198 m, a geografske koordinate su: 43° 19' severne geografske širine i 21° 54' istočne geografske dužine. Ogled je postavljen po slučajnom blok sistemu u pet ponavljanja. Veličina osnovne parcelice bila je 35 m², a tokom vegetacije obavljena je redovna agrotehnika za pšenicu. U ogledu su bile zastupljene tri varijante navodnjavanja sa predzalivnom vlažnošću od 60%, 70% i 80% od PVK, kao i kontrolna varijanta bez navodnjavanja. Metodom vodnog bilansa izmeren je utrošak vode ozime pšenice na evapotranspiraciju (289,5 – 410,7 mm). Za obe godine istraživanja najviši prinosi zrna ozime pšenice dobijeni su na varijanti sa predzalivnom vlažnošću 70% od PVK (7110 kg ha⁻¹ i 7480 kg ha⁻¹), zato izmerene vrednosti ET na ovoj varijanti od 381,1 do 393,1 mm predstavljaju potencijalnu evapotranspiraciju (ETP) pšenice za uslove u južnoj Srbiji. Obračunate potrebe pšenice za vodom (ETc) CROPWAT modelom za sezonu 2009/10 bile su 442,7 mm, dok je u sezoni 2010/11 obračunat utrošak od 461,4 mm vode. Korišćenje CROPWAT modela za obračun Etc ozime pšenice je moguće, ako se prethodno obavi kalibracija koeficijenata useva (Kc) za agroekološke uslove gajenja u našoj zemlji.

Ključne reči: potencijalna evapotranspiracija, pšenica, navodnjavanje, CROPWAT.

INVESTIGATION OF GERMLASM OF CLOVER IN LOCAL AGROECOLOGICAL CONDITIONS

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Production of quality forage is the basis of development and improvement of livestock production in the Republic of Srpska. Perennial legumes are a source of high quality protein foods. *Trifolium* and *Lotus* are the most important legumes of the genera in our agroecological conditions. In this paper, determined the genetic variability and tested the ability of a combination of local genotypes clover which has been based on the experimental data of a two-year examination at Manjača. The obtained results in the experimental work shows that it is a genetic material with high production and quality characteristics. By chemical analysis of air-dry hay has been determined a high percentage of protein genotypes of red clover (13.19 to 17.81 %) and birdsfoot trefoil (16.16 to 21.55 %). The aim of this work is improvement of varieties creation with high yield potential and high quality by using appropriate methods in the coming period.

Keywords: perennial legume breeding, yield, quality.

ISPITIVANJE GERMLAZME DJETELINA U LOKALNIM AGROEKOLOŠKIM USLOVIMA

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Proizvodnja kvalitetne stočne hrane čini osnovu razvoja i unaprjeđenja stočarstva u Republici Srpskoj. Višegodišnje leguminoze predstavljaju izvor kvalitetne proteinske hrane. U našem agroekološkom području najznačajnije su leguminoze iz rodova: *Trifolium* i *Lotus*. U ovom radu na osnovu eksperimentalnih podataka u dvogodišnjem ispitivanju na Manjači utvrđivana je genetička varijabilnost i ispitane su kombinacijske sposobnosti lokalnih genotipova djetelina. Dobijeni rezultati u ogleđnom radu pokazuju da se radi o genetičkom materijalu sa visokim proizvodnim i kvalitativnim svojstvima. Hemijskom analizom vazdušno-suvog sijena utvrđen je visokim procentom proteina ispitivanih genotipova crvene djeteline (13,19-17,81 %) i smiljkite (16,16-21,55 %). Cilj rada je da se korišćenjem odgovarajućih metoda oplemenjivanja u narednom periodu stvore sorte sa povećanim proizvodnim potencijalom za prinos, visokog kvaliteta.

Ključne riječi: višegodišnje leguminoze, oplemenjivanje, prinos, kvalitet.

EFFECT OF ROW SPACING ON SEED YIELD, YIELD COMPONENTS AND SEED QUALITY OF ALFALFA

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Under agro-environmental conditions of Southern Serbia, research was conducted over a three-year period to evaluate the effect of row spacing on seed yield, yield components and seed quality of alfalfa cv. 'K-23'. The average seed yield of alfalfa was highest at a row spacing of 40 cm (271.69 kg ha⁻¹), followed by row spacings of 20 cm (249.44 kg ha⁻¹) and 60 cm (243.98 kg ha⁻¹). The highest and lowest number of inflorescences per stem were obtained in rows spaced 60 cm (13.37 inflorescences/stem) and 20 cm apart (8.57 inflorescences/stem), respectively. The widest row spacing of 60 cm (7.15 pods/inflorescence) resulted in the highest number of pods per inflorescence, whereas the lowest number was produced at 20 cm spacing (5.50 pods/inflorescence). Grain number per pod ranged from 3.55 (at 20 cm row spacing) to 4.05 (at 60 cm). The highest quality of alfalfa seed during the three years of research was obtained at the widest row spacing (60 cm). Thousand-seed weight was highest at 60 cm and lowest at 20 cm (1.97 g and 2.07 g, respectively). The highest average values for seed germination rate were reported for 60 cm row spacing (88.00%) and the lowest for 20 cm row spacing (85.76 %).

Key words: alfalfa, seed yield, row spacing, yield components, seed quality

UTICAJ MEĐUREDNOG RASTOJANJA NA PRINOS, KOMPONENTE PRINOSA I KVALITET SEMENA LUCERKE

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U agroekološkim uslovima južne Srbije izvršena su trogodišnja istraživanja radi utvrđivanja uticaja međurednog rastojanja na prinos, komponente prinosa i kvalitet semena lucerke sorte K-23. Najviši prosečan prinos semena ostvaren je setvom na međurednom rastojanju od 40 cm (271.69 kg ha⁻¹), zatim pri rastojanju od 20 cm (249.44 kg ha⁻¹) a najniži pri međurednom rastojanju od 60 cm (243.98 kg ha⁻¹). Najviše cvasti po stabljici ostvareno je setvom na rastojanju od 60 cm (13.37 cvasti/stabljici) a najmanje pri međurednom rastojanju od 20 cm (8.57 cvasti/stabljici). Međuredno rastojanje od 60 cm uslovalo je najviše mahuna po cvasti (prosečno 7.15 mahune/cvasti) dok je najmanje mahuna (5.50 mahuna/cvasti) bilo pri rastojanju od 20 cm. Broj zrna po mahuni kretao se od 3.55 (rastojanje od 20 cm) do 4,05 (međuredno rastojanje od 60 cm). Najbolji kvalitet semena u toku trogodišnji istraživanja ostvaren je setvom na međurednom rastojanju od 60 cm. Tako je najviša masa 1000 semena ostvarena pri setvi na rastojanju od 60 cm a najniža na 20 cm (2.07 odnosno 1.97 g). Najviša prosečna klijavost semena ostvarena je pri međurednom rastojanju od 60 cm (88.00%), a najniža pri rastojanju od 20 cm (85.76 %).

Ključne reči: lucerka, prinos semena, međuredno rastojanje, komponente prinosa, kvalitet semena

SEED YIELD AND SEED YIELD COMPONENTS OF AUTOCHTHONOUS PERENNIAL RYEGRASS POPULATIONS

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Examination had been performed at research field and laboratories of Agricultural Institute of Republic of Srpska in Banjaluka in a period from 2006 to 2008. The goal of this paper was to examine components of seed yield offspring of autochthonous populations of English ryegrass, and based to these results to single out materials that would later be used in a program of creation of domestic varieties of English ryegrass. During examination the following properties had been analyzed: seed yield (kg ha⁻¹), mass of 1000 seeds (g), size (largeness) of seed (seed/g) and hectoliter mass (kg). During a biennial examination significant differences had been determined between populations of English ryegrass in a seed yield. Examined populations of English ryegrass had achieved a high average seed yield (903.9 kg ha⁻¹). Largest biennial average seed yield had been achieved with population Sarajevo (1,045.5 kg ha⁻¹). Quality of seed of examined populations had been very good and average mass of 1000 seed amounted to 2.1 g. During these examinations the smallest seed had a population of Sarajevo (598 seed/g) and the largest population Banjaluka (423 seed/g). Average hectoliter seed mass of seven examined populations of English ryegrass amounted to 25.8 kg.

Key words: perennial ryegrass, populations, yield, hectoliter mass, seed size.

PRINOS I KOMPONENTE PRINOSA SJEMENA AUTOHTONIH POPULACIJA ENGLESKOG LJULJA

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Ispitivanja su obavljena na oglednom polju i laboratorijama Poljoprivrednog instituta Republike Srpske u Banjaluci u periodu 2006-2008. godine. Cilj rada bio je da se ispitaju komponente prinosa sjemena potomstava autohtonih populacija engleskog ljulja, te da se na osnovu tih rezultata izdvoje materijali koje bi se kasnije koristili u programu stvaranja domaćih sorti engleskog ljulja. Tokom istraživanja analizirana su slijedeća svojstva: prinos sjemena (kg ha⁻¹), masa 1.000 sjemena (g), veličina (krupnoća) sjemena (sjemena/g) i hektolitarska masa (kg); Tokom dvogodišnjih istraživanja, utvrđene su značajne razlike između populacija engleskog ljulja u prinosu sjemena. Ispitivane populacije engleskog ljulja ostvarile su visok prosječan prinos sjemena (903,9 kg ha⁻¹). Najveći dvogodišnji prosečan prinos sjemena ostvaren je sa populaciom Sarajevo (1.045,5 kg ha⁻¹). Kvalitet sjemena ispitivanih populacija bio je vrlo dobar, a prosječna masa 1.000 sjemena iznosila je 2,1g. Tokom ovih ispitivanja najsitnije sjeme imala je populacija Sarajevo (598 sjemena/g), a najkrupnije populacija Banjaluka (423 sjemena/g). Prosječna hektolitarska masa sjemena sedam ispitivanih populacija engleskog ljulja iznosila je 25,8 kg.

Ključne riječi: engleski ljulj, populacije, prinos, hektolitarska masa, veličina sjemena.

**EFFECT OF THE FOLIAR APPLICATION OF PHOSPHORUS AND POTASSIUM
ON THE GRAIN YIELD OF FORAGE PEAS (*PISUM SATIVUM* SSP. *ARVENSE* L.)
ON ACID SOIL**

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Soil acidity is one of the factors that limits growth of many crops, especially legumes. In addition to the lack of calcium, such soils are characterized by a high content of mobile form Al, Fe, Mn and reduced content of readily available P and K. The aim of the study was to estimate the effect of foliar fertilization with phosphorus and potassium (water-soluble fertilizers P52K34, Haifa, Israel) on plant growth, yield and yield components (number of nodes with pods per plant, number of pods per plant, number of grain per plant) on the individual plants of forage peas. The experiment was set up in pots (15L volume, one plant per pot) filled with soil substrate (Glaysol type, pHKcl4.8) in the 2013th year. Varieties of forage peas Junior and Javor (Institute of Field and Vegetable Crops, Novi Sad) were sown using a randomized design with five replications and two variants of foliar fertilization (control and foliar fertilization). The foliar treatment was carried out two times: at the beginning of intensive growth and two weeks after, in the concentration of 1 %. Cultivars differed significantly in stem height (Junior 146.8 cm, Javor 69.5 cm). Regardless of foliar fertilization, significantly more nodes with pods per plant, number of pods per plant, number of grain per plant and grain weight per plant were recorded in cv. Junior compared to Javor. Foliar fertilization has a positive effect on yield components, so that the grain yield in both cultivars was significantly higher ($P < 0.05$) in fertilized variants. Considering the positive results from this experiment, the research should be continued, regarding to determine the validity of the measure in field conditions.

Key words: forage peas, foliar fertilizers, phosphorus, potassium, grain yield

UTICAJ FOLIJARNE PRIMENE FOSFORA I KALIJUMA NA PRINOS ZRNA STOČNOG GRAŠKA (*PISUM SATIVUM* SSP. *ARVENSE* L.) NA KISELOM ZEMLJIŠTU

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Kiselost zemljišta jedan je od faktora koji ograničava gajenje mnogih kulturnih biljaka, naročito leguminoza. Pored nedostatka kalcijuma, takva zemljišta se odlikuju visokim prisustvom lako mobilnih formi Al, Fe, Mn i smanjenim sadržajem lakopristupačnog P i K. Cilj rada bio je da se analizira uticaj folijarne prihrane fosforom i kalijumom (vodotopivo đubrivo P₅₂K₃₄, Haifa, Izrael) na porast biljaka, prinos zrna i komponente prinosa (broj rodnih kolenaca po biljci, broj mahuna po biljci, broj zrna po biljci) na pojedinačnim biljkama krmnog graška. Eksperiment je zasnovan u 2013. godini u saksijama (zapremine 15l, jedna biljka po saksiji) napunjenih zemljišnim supstratom (Pseudoglej, pH_{KCl}4,8). Sorte krmnog graška Junior i Javor (Institut za ratarstvo i povrtarstvo, Novi Sad) posejane su po potpuno slučajnom rasporedu u pet ponavljanja i dve varijante folijarne prihrane (kontrola i folijarno đubrenje). Folijarni tretman izvršen je u dva navrata: na početku intenzivnog porasta i dve nedelje nakon toga u koncentraciji 1%. Sorte su se značajno razlikovale u visini stabla (Junior 146,8cm, Javor 69,5cm). Nezavisno od folijarne prihrane, značajno veći broj rodnih kolenaca po biljci, broj mahuna po biljci, broj zrna po biljci i masa zrna po biljci zabeleženi su kod sorte Junior u odnosu na Javor. Folijarna prihrana je pozitivno uticala na komponente prinosa, tako da je prinos zrna kod obe sorte bio značajno veći (P<0,05) na đubrenoj varijanti. S obzirom na pozitivne rezultate iz ovog eksperimenta, istraživanja bi trebalo nastaviti, odnosno utvrditi opravdanost mere i u poljskim uslovima.

Ključne reči: krmni grašak, folijarna prihrana, fosfor, kalijum, prinos zrna

**EFFECT OF THE FOLIAR APPLICATION OF LIQUID ORGANIC FERTILIZER
"BIOPLANT FLORA" ON FORAGE PEAS (*PISUM SATIVUM SSP. ARVENSE L.*)
GRAIN YIELD**

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Proper mineral nutrition of forage peas, especially on acid soils is a prerequisite for greater realization of grain yield potential. The field experiment involved forage peas cv. Junior (Institute of Field and Vegetable Crops, Novi Sad) is set on cambisol soil type using a randomized block design with three replications. The aim of the study was to analyze the impact of foliar liquid organic fertilizer (Bioplant Flora, Plant DOO, Russia) on plant growth, grain yield per plant and yield components (number of node with pods per plant, number of pods per plant, number of grain per plant) in dense stand (20 cm interrow spacing, 4 cm within row). Foliar application of the fertilizer was carried at two times: first time at the start of intensive growth and second two weeks after, in the concentration of 0.4 % with 250 L ha⁻¹ of water. Foliar fertilization with liquid organic fertilizer had a positive effect on all studied traits. Due to the relatively favorable weather conditions for forage pea production in the 2013th year, average plant height was 152cm on the control treatment and 173cm on the treated variants. Foliar fertilization resulted in an increase in the number of nodes with pods per plant from 4.37 to 6.33 and grain yield per plant from 3.1 g to 5 g ($P < 0.05$) as well as increase in plant height and number of grain per plant ($P < 0.1$). It can be associated with better supply of plants with mineral nutrients and positive effect of biostimulants from liquid fertilizer on growth i.e. stem elongation and formation of generative organs.

Key words: forage peas, Bioplant flora, grain yield, yield components

**UTICAJ FOLIJARNE PRIMENE TEČNOG ORGANSKOG ĐUBRIVA "BIOPLANT
FLORA" NA PRINOS ZRNA KRMNOG GRAŠKA (*PISUM SATIVUM* SSP.
ARVENSE L.)**

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Pravilna mineralna ishrana krmnog graška, naročito na kiselim zemljištima jedan je od preduslova za bolju realizaciju potencijala za prinos zrna. Poljski ogled sa sortom krmnog graška Junior (Institut za ratarstvo i povrtarstvo, Novi Sad) postavljen je na zemljištu tipa gajnjače po potpuno slučajnom blok sistemu u tri ponavljanja. Cilj rada bio je da se analizira uticaj folijarne prihrane tečnim organskim đubrivom (Bioplant flora, Plant DOO, Rusija) na porast biljaka, prinos zrna biljci i komponente prinosa (broj rodni kolenaca po biljci, broj mahuna po biljci, broj zrna po biljci) u uslovima guste setve (20 cm međuredno, 4cm u redu). Folijarna primena đubriva izvršena je u dva navrata: na početku intenzivnog porasta i dve nedelje nakon toga u koncentraciji 0.4% sa 250 l ha⁻¹ vode. Folijarna prihrana tečnim organskim đubrivom pozitivno je uticala na sve ispitivane osobine. S obzirom na relativno povoljne meteorološke uslove za proizvodnju graška u 2013. godini prosečna visina biljaka bila je 152cm na kontrolnoj varijanti i 173cm na tretiranoj varijanti. Folijarna prihrana je uticala na povećanje broja rodni kolenaca po biljci sa 4,37 na 6,33 i prinosa zrna po biljci, sa 3,1g na 5g (P<0,05) kao i na povećanje visine biljke i broja zrna po biljci (P<0,1). To se može povezati sa boljom snabdevenošću biljke mineralnim hranivima i pozitivnim delovanjem biostimulatora koje đubrivo sadrži na porast odnosno izduživanje stabla i formiranje generativnih organa.

Ključne reči: krmni grašak, Bioplant flora, prinos zrna, komponente prinosa

STUDY OF DRY MATTER ACCUMULATION AND YIELD OF SOME DURUM WHEAT GENOTYPES

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A field experiment was carried out at ATTC of Lushnja (Albania) in 2009-2010. Four different genotypes of durum wheat (Creso, Nr 24, L-5\11-1 and Valforte) were compared on dry matter accumulation. The dynamics of dry matter accumulation were assessed 10 times every 14 days. Dry matter accumulation of wheat plant represents a powerful advantage to control production. Our data suggest that the accumulation of dry matter in time has an exponential trend, reaching the maximum value at the end of milk stage and then decreasing at physiological maturity. Higher amounts of dry matter were accumulated by genotypes 5 \ 11-1 and Valforte, while Creso and especially No. 24, accumulate small amounts. Analysis for two periods (emergence-heading and heading –maturity) show that in the first period, Nr 24 accumulates large amounts of dry matter, while at the end of the period this indicator drops. This proves, that excessive growth in the period before the heading, in most cases, leads to a smaller grain production. By analyzing the contribution of dry matter in the construction of various plant organs, we noticed that Valforte and No. 24, use a considerable part of dry matter for the construction of leaf and stem, while Creso and L -5 \ 11-1 use most of the dry matter for grain production creation.

Key words: dry matter, durum wheat, genotype, grain production,

THE RESULTS OF EXPLOITATION TRIALS OF OUT-DIGGERS IN OUT-DIGGING THE MERCANTILE POTATO IN THE SONDITIONS OF NORTHERN KOSOVO AND METOHIA

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Potato is an important crop for human consumption and preparation of various products. Harvesting of potatoes can be done manually or mechanically by using of different types of towed diggers and combines which can be applied as towed and self-propelled. Harvesters in our agro-ecological conditions are rarely used due to the extensive cropping including size of plots, and due to a high purchasing prices of the devices, therefore out-diggers are regularly in use. Out digging the mercantile potato is an operation that requires quality work out digger, bearing in mind the possible damage to the tubers caused by the working body that can affect the quality and duration of storage the tubers. Characteristics of rotating single-rowed out-digger is to significantly injure and waste of potato tubers, while digger with oscillating sieve roughly sieves the soil and also damage the tubers in the field, especially if there are more stones in the soil. For out digging the potatoes, the best effects are being expressed by single-row and double-row diggers with a conveyor belt. This paper presents the results of tests of exploitation of various out-diggers for dig the potato tubers in the ecological conditions of northern Kosovo and Metohia. The aim of our study was to determine the quality of the work of potato diggers, power consumption and surface effect. On the basis of these results it was concluded that the total losses of potato tubers was between 13.89% and 16.45% out of the yields in the studied plots. During testing the diggers generated effects ranged from 0.34 ha h⁻¹ up to 0.59 ha h⁻¹, with an average fuel consumption of 5.33 l h⁻¹.

Key words: out-digger, potato, quality of work, energy consumption.

REZULTATI EKSPLOATACIONIH ISPITIVANJA VADILICA PRI VAĐENJU MERKANTILNOG KROMPIRA U USLOVIMA SEVERNOG KOSOVA I METOHIJE

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Krompir predstavlja značajnu kulturu za ishranu ljudi i dobijanje različitih prerađevina. Ubranje merkantilnog krompira može se obaviti ručno ili mehanizovano primenom različitih tipova vučenih vadilica i kombajna koji mogu biti izvedeni kao vučeni i samohodni. Kombajni se u našim agroekološkim uslovima retko koriste zbog viske nabavne cene i veličine poseda, dok su vadilice najčešće u upotrebi. Vađenje merkantilnog krompira predstavlja operaciju koja zahteva kvalitetan rad vadilica, imajući u vidu moguća oštećenja krtola od strane radnih organa koja mogu da se odraze na kvalitet i dužinu čuvanja krtola. Karakteristika rotacionih jednoredih vadilica je da u značajnoj meri povređuju i razbacuju krompir, dok vadilice sa osciljućom rešetkom teško istresaju zemlju, a takođe oštećuju krtole naročito ako u njivi ima više kamena. Za vađenje merkantilnog krompira najbolje efekte ispoljavaju jednoredne i dvoredne vadilice sa pokretnom trakom. U radu su prikazani rezultati eksploatacionih ispitivanja različitih vadilica za vađenje krtola merkantilnog krompira u agroekološkim uslovima severnog Kosova i Metohije. Cilj naših istraživanja je bio da se utvrdi kvalitet rada vadilica merkantilnog krompira, potrošnja energije i površinski učinak. Na osnovu rezultata istraživanja zaključeno je da su se ukupni gubici krtola krompira kretali u granicama od 13,89% pa 16,45% u odnosu na ostvareni prinos na ispitivanim parcelama. U toku ispitivanja vadilica ostvareni učinci su varirali od 0,34 ha h-1 pa do 0,59 ha h-1, uz prosečnu potrošnju goriva od 5,33 l h-1.

Ključne reči: vadilica, krompir, kvalitet rada, potrošnja energije

**GRAIN YIELD, TEST WEIGHT AND PROTEIN HERITABILITY AND
GENOTYPE X ENVIRONMENT INTERACTION OF DURUM WHEAT**

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The aim of this study was to investigate the genotype x environment interaction and heritability of grain yield, test weight and to estimate the correlation among the yield and quality traits of durum wheat. Twelve durum wheat genotypes were grown in three planting seasons from 2008-2010 according to randomized complete block design. A combined analyze of variance indicated that years and genotypes were significantly different for grain yield, protein content and test weight, while genotype x year interaction was insignificant only for test weight. Broad sense heritability of grain yield, protein content and test weight were 0.64, 0.68 and 0.32 respectively. Grain yield had a positive significant correlation ($r = 0.38^{**}$) with thousand kernel weight, which had a significant correlation ($r = 0.32^{**}$) with test weight. Protein content had negative significant correlation ($r = - 23^{**}$ with grain yield and $r = - 20^{*}$ with thousand kernel weight).

Key words: heritability, correlation, test weight, protein, variance

Section 3. Agricultural Economics and Rural Development

**POSSIBILITIES OF APPLYING ENVIRONMENTAL MODELING FOR
CALCULATING BIOMASS PRODUCTION OF AGROENERGY CROPS**

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Environmental models represent models which are related to a specific aspect of the natural environment. By using these type of models we can increase understanding, gain new knowledge foresee the state of a phenomenon, process or system in a certain moment of time and certain point in space, and conduct various simulations which can be very useful in the decision making process. When making environmental models it is very important to adhere to a specific methodology in order for the model results to be valid. Modeling of biomass production should include all relevant parameters and process which include environmental factors, photosynthesis, autotrophic and heterotrophic respiration, carbon allocation and species specifics. When formulating a model which is used to simulate biomass two approaches can be used. First approach implies the use of descriptive model, while the second one is based on a mechanistic model. Descriptive or statistical, regression or empirical models are based on the application of statistical and correlative methods derived from known data gathered through empirical methods. These types of models often have a short simulation time, fewer number of variables and their parameters are easier to estimate. Although their accuracy can be quite high, since they include known and unknown effects which impact biomass production, descriptive models have significant limitations. Extrapolation of these models to other locations and/or species is almost impossible, since they are based on empirical data. Mechanistic models are on the other hand based on “imitating” different, primarily physiological, processes. When making a mechanistic model, instead of using large quantities of empirical data, knowledge of certain process is used to translate them to mathematical functions. These types of models usually have more sub-models which are at least one hierarchical level lower than the key parameter which is being modeled. In this paper we will review up to date program solutions which can be used to model calculation of biomass production in agroenergy crops. Simulation of biomass production done within a certain model before the actual crop planting gives a large number of valuable information and contributes to the efficiency of the entire process. It can also be very important for the economical feasibility of the whole endeavor. This is especially important since the demand for biomass as a resource for biofuel production is increasing each day.

Key word: biomass, environmental modeling, agroenergy crops.

MOGUĆNOSTI PRIMENE EKOLOŠKOG MODELOVANJA ZA PRORAČUN PRODUKCIJE BIOMASE AGROENERGETSKIH USEVA

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Ekološki modeli predstavljaju modele koji se odnose na neki specifični aspekt prirodnog okruženja. Uz pomoć ovakvih modela možemo povećati razumevanje i doći do novih znanja, predvideti stanje fenomena, procesa ili sistem u određenom trenutku u trenutku u vremenu i na određenom mestu u prostoru, i obavljati raznovrsne simulacije koje mogu biti od velike pomoći u procesu donošenja odluka. Prilikom formiranja ovakvih modela veoma je važno držati se određene metodologije kako bi njihovim rezultatima bili validni. Modelovanje produkcije biomase treba da obuhvati sve bitne parametre i procese kao što su faktori životne sredine, fotosinteza, autotrofna i heterotrofna respiracija, alokacija ugljenika i specifičnost vrsta. Problemu izrade modela koji treba da služi za modelovanje produkcije biomase može se pristupiti na dva načina. Prvi način podrazumeva izradu deskriptivnih modela, dok se drugi zasniva na izradi mehanističkih modela. Deskriptivni, ili statistički, regresioni ili empirijski modeli, kako se još često nazivaju, se zasnivaju na primeni statističkih i korelacionih metoda na osnovu poznatih podataka dobijenih empirijskim putem. Shodno tome, ovakvi modeli često imaju kratko vreme trajanja simulacije, manji broj promenljivih i njihove parametre je lakše proceniti. Iako njihova tačnost predviđanja može biti veoma visoka, s obzirom da obuhvataju i poznate i nepoznate uticaje na rast biomase, deskriptivni modeli imaju značajna ograničenja. Ekstrapolacija ovih modela na druge lokacije i/ili vrste uglavnom je nemoguća, jer se prvenstveno oslanjaju na empirijske podatke. Mehanistički modeli su modeli koji se zasnivaju na „oponašanju“ različitih, pre svega fizioloških, procesa. Za pravljenje ovakvih modela se, umesto velike količine podataka dobijenih osmatranjem, koriste znanja o određenim procesima koji se onda pokušavaju preesti u matematičke funkcije. Mehanistički modeli se sastoje od više podmodela koji su barem jednog hijerarhijskog nivoa ispod parametra koji model treba da predvidi. U ovom radu biće dat prikaz dosadašnjih programskih rešenjima koja se mogu koristiti za modelovanje proračuna produkcije biomase agrounergetskih useva. Simulacija produkcije biomase obavljena u okviru određenog modela pre stvarnog sađenja useba pruža veliki broj značajnih informacija (npr. ekonomska isplativost) i na dalje olakšava ceo proces. Ovo je posebno značajno jer potražnja za proizvodnjom biomase koja služi kao sirovina za proizvodnju biogoriva raste iz dana u dan.

Ključne reči: biomasa, ekološko modelovanje, agrounergetski usevi

IMPORTANCE AND ROLE OF FOOD INDUSTRY IN ECONOMIC AND REGIONAL DEVELOPMENT OF MONTENEGRO

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One of structural characteristics of Montenegrin food production, similar as in other transitional countries and under-developed economies, is higher share of primary agriculture in gross domestic product than of food-processing sector. This indicates a low level of agricultural product finishing, low level of self-supply with high number of agricultural products, as well as pronounced placement of agricultural products to the market through unregistered sale channels. Share of primary agricultural products and food industry in GDP of around 10% emphasizes its importance for the Montenegrin economy. According to the data obtained from MONSTAT for 2011, food sector registered share of 1.7% in GDP, whilst its share in the structure of industrial production in 2012 was at the level of 11.7%. According to the data from MONSTAT for 2011, number of employees in agricultural sector, including forestry and fishery, amounted to 10.900 persons, while the total number of employees from production of food products and beverages amounted to 3,425 persons. Pursuant to the results of Agricultural Census (2010), it was registered that 46,473 agricultural farms were engaged in agriculture, as in its core or additional activity. Unfavorable structure of companies and insufficient level of technical equipment also have negative effects to competitiveness of food industry. In addition to shortcomings that exist at the level of companies, it was also noticed that there are shortcomings at the institutional level, i.e. within implementation of system for food quality control. The most relevant branches of food industry are: dairy and meat industry, fruit and vegetable processing and production of beverages, mill-bakery industry, etc. The results of poll conducted among 40 food companies in Montenegro for the needs of analyzing condition of food industry, show that the main priorities of food industry, as of the development generator for primary agricultural production and regional development of Montenegro, for the following period are contained in: raising competitiveness in terms of offering high-quality food at adequate prices and acquiring status of raw material buyer from domestic agricultural producers.

Key words: food industry, self-supply, competitiveness

**TENDENCIES AND DIRECTIONS OF DEVELOPMENT OF THE FOOD
INDUSTRY OF THE REPUBLIC OF SRPSKA**

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The food industry and its development is very important for the development of primary agricultural production and final verification of its results in terms of achieving a regular income and can not be viewed independently of agricultural production. Food industry in the RS is characterized by great diversity in terms of type of activity, ownership structure, the installed capacity and the technical equipment. The subject of this research is the analysis of the food industry in the Republic of Srpska. The analysis included the sector of cereals, confectionery, dough production, fruit and vegetables, tobacco, milk and meat processing in the period since 2007. by 2012. year. The research in this paper aims to point out some problems that exist because there is a high degree of unused capacity, obsolete technology, inadequate investment in production capacity, and the lack of domestic raw materials which makes producers in the RS dependent on imported raw materials. Industrial production in the RS recorded a positive growth index, with the exception in the 2012, when it was 96. Index of manufacturing varies in the analysed period, from 101 through 117, followed by a slight fall in 2010 to 105.4, then in the 2012 on the 96. That what characterizes the food industry is slower growth compared to the overall manufacturing industry. This indicates that the food industry needs to pay special attention and with great precision to plan measures that will make an impact on the development of this sector. It is necessary to support the development of the food industry in RS, based on domestic raw materials, increased exports and more organized linking primary and manufacturing industries, accelerate the restructuring of the system of the food sector with an emphasis on ownership and management structure and the introduction of market criteria in all aspects of decision-making; to create conditions for more effective control of technological processes and products and insurance of instruments to provide assistance (financial) to companies for certification harmonized with EU directives. The research is based on the available data, with applied method "research desk" ("desk research"). Basic data are taken from the statistical publications of the Institute of Statistics of RS, which are in the work systematized using standard mathematical and statistical methods.

Keywords: Food industry, sector analysis, the Republic of Srpska

TENDECIJE I PRAVCI RAZVOJA PREHRAMBENE INDUSTRIJE REPUBLIKE SRPSKE

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Prehrambena industrija i njena razvijenost je veoma važna za razvoj primarne poljoprivredne proizvodnje i konačnu verifikaciju njenih rezultata u smislu ostvarenja redovnih prihoda i ne može se posmatrati nezavisno od poljoprivredne proizvodnje. Prehrambenu industriju u RS karakteriše velika šarolikost po pitanju vrste djelatnosti, vlasničke strukture, instaliranih kapaciteta i tehničke-tehnološke opremljenosti. Predmet ovih istraživanja je analiza prehrambene industrije u Republici Srpskoj. Analiza je obuhvatila sektore prerade žita, konditorske i tjesteničarske industrije, prerade voća i povrća, duvana, prerade mlijeka i mesa u periodu od 2007. do 2012. godine. Istraživanja u ovom radu imaju za cilj da ukažu na određene probleme koji postoje jer je prisutan visoki stepen neiskorištenih kapaciteta, zastarjele tehnologije, nedovoljan nivo investicija u proizvodne kapacitete, te nedostatak domaćih sirovina što proizvođače u RS čini ovisnim o uvoznim sirovinama. Industrijska proizvodnja u RS bilježi pozitivan indeks rasta, sa izuzetkom 2012. godine kada je on bio 96. Indeks prerađivačke industrije varira u posmatranom periodu od 101 preko 117 zatim dolazi do blagog pada u 2010. godini na 105,4 da bi u 2012. godini on bio 96. Ono što karakteriše prehrambenu industriju jeste sporiji rast u poređenju sa cjelokupnom prerađivačkom industrijom. To ukazuje da je prehrambenoj industriji potrebno posvetiti značajnu pažnju i sa velikom preciznošću planirati mjere koje će ostvariti uticaj na razvoj ovog sektora. Potrebno je podržati razvoj prehrambene industrije RS, zasnovane na domaćoj sirovini, povećanju izvoza i organizovanijem povezivanju primarne i prerađivačke industrije, ubrzati restrukturiranje sistema prehrambenog sektora sa naglaskom vlasničke i menadžerske strukture i uvođenje tržišnih kriterijuma u svim segmentima odlučivanja; stvoriti uslove efikasnijeg kontrolisanja tehnoloških procesa i proizvoda, te osiguranje instrumenata za pružanje pomoći (finansijske) preduzećima za dobijanje sertifikata usklađenim sa direktivama EU. Istraživanje je bazirano na raspoloživim podacima, uz primenjeni metod "istraživanje za stolom" ("desk research"). Osnovni podaci preuzeti su iz statističkih publikacija Republičkog zavoda za statistiku RS, koji su u radu sistematizovani primenom standardnih matematičko-statistički metodama.

Ključne reči: prehrambene industrija, sektorska analiza, Republika Srpska

CURRENT GLOBAL TRENDS IN FOOD SUPPLY

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Supply and availability of food were crucial factors that shaped the origin, development and persistence of human civilization through the ages. Food production in the world is a vital activity, which enables the maintenance and development of life of people on the planet. It has been increasing over the past decades due to increased productivity, expansion of the area of arable land and the massive use of fertilizers and pesticides. This allowed long-term and stable satisfying the world's needs for food. However, today's global changes that ispoljavju regarding the occurrence and duration of the economic crisis, increasing population, degradation of land and other natural resources, climate change, rising food prices and so on., influence the need to establish a new approach that would provide sustainable solutions, when terms of food supply. Sustainable food systems should provide food for all people while protecting the capacity of future generations to feed themselves, using resources efficiently at every stage along the road from fields to fork.

Key words: food, production, development, trends, resources

AKTUELNI SVETSKI TRENDovi U SNABDEVANJU HRANOM

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Snabdevanje i dostupnost hrane bili su presudni faktori koji su oblikovali nastanak, razvoj i istrajnost ljudske civilizacije kroz vekove. Proizvodnja hrane u svetu predstavlja vitalnu delatnost, kojom se omogućava održavanje i razvoj života ljudi na planeti. Ona se povećavala tokom proteklih decenija, zahvaljujući povećanju produktivnosti, proširenju oblasti obradivog zemljišta i masivnom korišćenju mineralnih đubriva i pesticida. Ovo je omogućilo dugoročno i stabilno zadovoljavanje svetskih potreba za hranom. Međutim, savremene globalne promene koje se ispoljavju u pogledu nastanka i trajanja ekonomske krize, povećanju broja stanovnika, degradaciji zemljišta i ostalih prirodnih resursa, klimatskim promenama, rastu cena hrane itd., utiču na potrebu koncipiranja novih pristupa koja bi pružili održiva rešenja kada je reč o snabdevanju hranom. Održivi sistemi hrane treba da omoguće proizvodnju hrane za sve ljude, istovremeno štiteći kapacitet budućih generacija da se prehrane, koristeći efikasno resurse u svakoj fazi duž puta od njive do trpeze.

Ključne reči: hrana, proizvodnja, razvoj, tendencije, resursi

**COMPETITIVENESS OF THE FRUITS AND VEGETABLES SECTOR AND
CONDITIONS OF EXPORT TO EU MARKET**

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This paper analyzes the comparative advantages of fruit and vegetables sector of Republic of Srpska and conditions for export of products to the EU market. Comparative advantages are calculated using the Balassa index (RCA). During the period 2009. – 2012. fruit and vegetables sector recorded positive values of RCA. In order to meet the requirements of the EU market and to meet the requirements of export products, were analyzed marketing standards for fruit and vegetables sector. Special emphasis in the analysis is the Council Regulation (No. 543/11), which details provide the rules on the CMO for fruit and vegetables sector in EU.

Keywords: fruits and vegetables, competitiveness, Republic of Srpska, EU market.

**KONKURENTNOST SEKTORA VOĆA I POVRĆA REPUBLIKE SRPSKE I
USLOVI IZVOZA NA TRŽIŠTE EU**

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U radu se analiziraju komparativne prednosti sektora voća i povrća Republike Srpske i uslovi izvoza proizvoda na tržište EU. Komparativne prednosti su izračunate korišćenjem Balassa indeksa (RCA). U periodu od 2009. – 2012. godine sektor voća i povrća bilježi pozitivne vrijednosti RCA. U cilju zadovoljavanja zahtjeva tržišta EU i ispunjavanja uslova izvoza proizvoda, analizirane su tržišne norme za sektor voća i povrća. Poseban akcenat u analizi je na Uredbi vijeća br.543/11, koja detaljno propisuje pravila o uređenju zajedničke organizacije tržišta za sektor voća i povrća.

Ključne riječi: voće i povrće, konkurentnost, Republika Srpska, tržište EU.

**URBAN AGRICULTURE IN CENTRAL AND EASTERN BOSNIA AND
HERZEGOVINA**

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The share of agriculture and fisheries in total GDP amounts to 7.4% in Bosnia meanwhile agricultural sector employs 20.6% of the total labour force (2012). About 39% of the total Bosnian population can be classified as urban. Urban and peri-urban agriculture (UPA) is about food production and processing within and around cities. The paper aims at analysing UPA in Bosnia with a particular focus on Sarajevo and East Sarajevo regions. The work is based on an extended literature review and on primary data collected by semi-structured interviews, performed in autumn 2011, with 30 urban gardeners as well as a number of extension agents, representatives of civil society organizations and officers in the municipal Departments for Urban Planning and Economy in central and eastern Bosnia. The paper (i) provides an overview of UPA in particular benefits, constraints and risks, and production sites, systems, and techniques; (ii) explores references to UPA in the main agricultural development policies in Bosnia; (iii) screens international projects dealing with UPA during the post-war period in Sarajevo and East Sarajevo regions and enumerates promoting and implementing organisations; (iv) assesses focus on UPA in extension approaches and methods; (v) analyses urban planning and zoning regulations in Trnovo, Istocna Ilidza (IsI), Istocno Novo Sarajevo (INS), Pale, Sokolac, Vlasenica and Milici municipalities and how favourable are they for UPA; (vi) analyses budget dedicated to agriculture in the urban municipalities of IsI and INS; and (vii) provides some recommendations for UPA development. It includes two case studies from the Community Gardening Program: Mala Bašta garden at Stup (Sarajevo) and Suncokret garden at Kula (IsI). Semi-structured interviews focused also on economic, environmental and social benefits of UPA in the post-war Sarajevo and East Sarajevo. Taking into consideration the research results it can be assumed that UPA can bring about sustainable social, economic and environmental benefits therefore regulatory framework should be improved, multilevel and multi-stakeholder governance promoted, and the role of extension services fostered. UPA cannot be developed without conducive and enabling land use policies and regulations facilitating access to urban spaces for agricultural purposes.

Keywords: urban gardening, governance, urban planning, extension, Bosnia.

SWOT ANALYSIS OF SECTOR OF MEDICINAL AND AROMATIC PLANTS IN SERBIA

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In analyzing the business sector of medicinal and aromatic plants in Serbia, SWOT analysis is used to identify strengths, weaknesses, opportunities and threats existing in the market. The results were used to identify the different measures of improving the business sector, as well as directions for further development of the market. The main opportunities lie in supporting value added processing of raw materials, better marketing approach to all aspects and accompanying certificate (organic, ISO, KIA, HACCP ..). Strengthening market ratio it can be activated better vertical and horizontal cooperation among the participants in the value chain, which can lead to an expansion of plantation production, gathering grounds and therefore increasing the amount of raw materials in the domestic market and exports. Market research of medicinal plants, it was concluded that there is a demand for a variety of products from medicinal plants, including spices, dietary supplements, essential oils and extraction at the national, regional and EU markets.

Key words: SWOT analysis, medicinal and aromatic plants, sector, market, export

SWOT ANALIZA SEKTORA LEKOVITOG I AROMATIČNOG BILJA U SRBIJI

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U analizi poslovanja sektora lekovitog i aromatičnog bilja u Srbiji, korišćena je SWOT analiza u cilju identifikacije snaga, slabosti, prilika i pretnji koje vladaju na ovom tržištu. Dobijeni rezultati su poslužili za identifikaciju različitih mera unapređenja poslovanja sektora, kao i pravca daljeg razvoja tržišta. Glavne mogućnosti leže u podršci dodatoj vrednosti obradom biljnih sirovina, boljim marketing pristupom u svim segmentima kao i pratećim sertifikatima (organski, ISO, KIA, HACCP..). Jačanjem tržišnih veza može se aktivirati bolja vertikalna i horizontalna saradnja između učesnika u vrednosnom lancu što može dovesti do proširenja plantažne proizvodnje, areala sakupljanja a samim tim i povećanja količine biljnih sirovina na domaćem tržištu i u izvozu. Istraživanjem tržišta lekovitog bilja došlo se do zaključka da postoji tražnja za različitim proizvodima od lekovitog bilja, uključujući začinsko bilje, dijetetske suplemente, etarska ulja i ekstrakte, na nacionalnom, regionalnom i tržištu EU.

Key words: SWOT analiza, lekovite i aromatične biljke, sektor, tržište, izvoz

**ANALYSIS OF THE STORAGE SPACE IN REPUBLIC OF SRPSKA IN ORDER TO
INCREASE AGRICULTURAL PRODUCTION**

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In this analysis we examined current situation of the storage space with reference to storage capacity in Republika Srpska for store of grainy agricultural products. Special attention was devoted to the construction time, storage type and storage capacity up till and over 1000 t. The research included the production of the grainy agricultural products for 2010 and 2011. After the systematization, classification and establishing the production amount of the grainy agricultural products the analysis of the possibility to increase the production with reference to storage capacity was made. The aim of the study was to determine the possibility to increase the production of grainy agricultural products depending on the storage capacity of existing storage capacity. Studies are showing that Republika Srpska dispose with storage capacity of 317.976 t in total (storage capacity in total is referring on storages, which have storage capacity over 1.000 t) and that Republika Srpska needs to have bigger storage capacity in order to increase agricultural production. This statement is confirmed by following facts: production of grainy agricultural products in 2010. was 739.546 t - missing storage capacity for 421.570 t; production of grainy agricultural products in 2011 was 701.645 t - missing storage capacity for 383.678 t and production of grainy agricultural products in 2012 was 595.495 t which means that it was missing 277.519 t of storage capacity.

ANALIZA SKLADIŠNOG PROSTORA U REPUBLICI SRPSKOJ U CILJU POVEĆANJA POLJOPRIVREDNE PROIZVODNJE

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U radu je izvršeno snimanje stanja skladišta sa osvrtom na skladišne kapacitete u Republici Srpskoj za skladištenje zrnastih poljoprivrednih proizvoda. Posebna pažnja je posvećena na vrijeme izgradnje, vrsti skladišnog prostora i kapacitetu skladišta preko 1000 t. Skladišta, čiji su skladišni kapaciteti ispod 1000 t, nisu bili predmet analize iz razloga što se ta skladišta koriste na poljoprivrednim gazdinstvima i sa aspekta skladištenja tržišnih viškova merkantilnog zrna su zanemarujući. Istraživanje je obuhvatilo proizvodnju zrnastih poljoprivrednih proizvoda za 2010. i 2011. godinu. Nakon sistematizacije, razvrstavanja, te utvrđivanja količina proizvodnje zrnastih poljoprivrednih proizvoda izvršena je analiza mogućnosti povećanja proizvodnje u odnosu na skladišne kapacitete. Cilj istraživanja je bio da se utvrdi mogućnost povećanja zrnastih poljoprivrednih proizvoda u zavisnosti od skladišnog kapaciteta postojećih skladišnih kapaciteta. Istraživanja pokazuju da Republika Srpska raspolaže sa skladišnim prostorom kapaciteta 317.976 t (ukupni skladišni kapacitet se odnosi na skladišta, čiji je skladišni kapacitet preko 1.000 t) i da Republika Srpska treba da ima veći skladišni prostor kako bi se povećala poljoprivredna proizvodnja. Ova konstatacija je potvrđena sledećim činjenicama: proizvodnja zrnastih poljoprivrednih proizvoda u 2010. godini bila je 739.546 t - nedostaje skladišnog kapaciteta za 421.570 t; proizvodnja zrnastih poljoprivrednih proizvoda u 2011. godini bila je 701.654 t - nedostaje skladišnog kapaciteta za 383.678 t, i proizvodnja zrnastih poljoprivrednih proizvoda u 2012. godini bila je 595.495 t, što znači da je nedostajalo skladišnog kapaciteta za 277.519 t.

**DESIGNING OF DRAINAGE CANALS NETWORK DURING LAND
CONSOLIDATION PROCESS**

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Digging of drainage canals in the area where reclamation is carried out, besides improving water-air regime in the soil might lead to worsening of conditions for agricultural production. Possible worsening might be reflected in the fragmentation of agricultural plots due to land expropriation for future canals. In addition to increasing the number of plots due to expropriation, cutting plots by drainage canals leads to the formation of irregular plots, which are often difficult to access. However, if the drainage canals network is formed within the process of land consolidation, it is possible to synchronize a network of canals, field roads and other facilities in the area. In that manner, property of participants can be grouped during land consolidation to fewer larger plots, which are regular in shape - suitable for agricultural production and with direct access to the field road. Moreover, in the process of land consolidation field roads can be formed harmonized with a network of drainage canals, which beside grouped properties, reduce transportation costs from one plot to another. The paper presents the possibilities of spatial analysis using geographic information system, in order to determine the effects of land consolidation. Spatial analyzes were performed on the land consolidation area Noćaj and Salaš Noćajski.

Keywords: land consolidation, geographic information system, agricultural plot, drainage.

IZRADA MREŽE KANALA ZA ODVODNJAVANJE U POSTUPKU UREĐENJA ZEMLJIŠNE TERITORIJE

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Iskop kanala za odvodnjavanje na području gde se provode melioracije, osim poboljšanja vodno-vazdušnog režima u zemljištu, može dovesti i do pogoršanja uslova za poljoprivrednu proizvodnju. Moguće pogoršanje se ogleda u usitnjavanju poljoprivrednih parcela usled eksproprijacije zemljišta za buduće kanale. Osim povećanja broja parcela usled eksproprijacije, presecanje parcela kanalima za odvodnjavanje dovodi do formiranja nepravilnih parcela, do kojih je često i otežan prilaz. Međutim, ukoliko se mreža kanala za odvodnjavanje formira u okviru postupka komasacije, moguće je uskladiti mrežu kanala, poljskih puteva i ostalih objekata u ataru. Na taj način se može grupisati posed učesnika komasacije na manji broj većih parcela, koje su pravilnog oblika – pogodnog za poljoprivrednu proizvodnju i kojima je obezbeđen direktan pristup sa poljskog puta. Pored toga, u postupku komasacije se može formirati mreža poljskih puteva, usklađena sa mrežom kanala za odvodnjavanje, tako da se uz grupisani posed, smanjuju troškovi transporta sa parcele i na parcelu. U radu su prikazane mogućnosti prostornih analiza, korišćenjem geografskog informacionog sistema, kako bi se utvrdili efekti uređenja zemljišne teritorije. Prostorne analize su sprovedene na komasacionom području Noćaj i Salaš Noćajski.

Ključne reči: Uređenje zemljišne teritorije, Geografski informacioni sistem, poljoprivredna parcela, odvodnjavanje.

USE AND OPERATION OF WATER RESERVOIR AND IRRIGATION SYSTEMS – OPTIMIZATION THROUGH STAKEHOLDER PARTICIPATION

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Known amount of water available in the water reservoir at specified time is a prerequisite to plan multifunctional use of the reservoir and can improve temporal and spatial availability of water for different users. This in turn can bring bigger revenues from water users that can then be used for reservoir maintenance. Vogršček reservoir was built to be used for irrigation (84.5% of volume), and flood protection (15.5% of volume) however nowadays it hosts also other uses (fisheries, tourism and sport activities such as sailing). It supplies water for the largest irrigation system in Slovenia - Vogršček irrigation system (1000 hectares). Only a third of available water for irrigation is used per year, leaving large reserves unexploited. The purpose of this research is to help the owner of the infrastructure (state of Slovenia) in forming optimization use plan of the reservoir regarding its water use for irrigation (increase water use for irrigation) and propose incorporation of other new uses in reservoir operation without endangering reservoir water use potential for irrigation. Optimization of entire system is proposed, which includes improving the operation, maintenance and financing of both parts of the system (reservoir and existing irrigation system). It is expected that this will reduce public spending and encourage water users to optimize their water use. This research recommends this should be implemented involving cooperation with the stakeholders. Recognizing and considering possibilities of multipurpose use of water reservoir can lead to more equitable and socially sustainable outcomes of operation and maintenance, although it is perceived that forming such system is complex. We want to demonstrate that led participation of stakeholders defining (new) relationships between users of the system can help create improved institutional arrangements for operation, maintenance and financing of the entire system and leads to full cost recovery for water services. Partial results of the research shown in this paper, present activities of communication with stakeholders of the system, challenges anticipated and planned for further processes of optimization of both parts of addressed system.

Keywords: Irrigation, Participatory water management, Vogršček multipurpose reservoir, Water use optimization

SLOVENIAN PHENOLOGICAL ARCHIVE AND ITS IMPORTANCE FOR AGRICULTURE

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Phenology, the study of cyclical biological events, such as bud breaking, flowering or harvesting, has recently become an important tool in environmental sciences. Phenological data are the necessary part of agrometeorological information, needed both for operational purposes and in long-term studies to understand how weather and climate variability impacts agriculture. Slovenian phenological archive comprises the data from growing season 1950/1951 onwards. Observations started under former Hydrometeorological Institute at 30 locations, this number increased to a maximum of 120 stations at the same time. Since 1990s phenological network, coordinated by the Environmental Agency of the Republic of Slovenia, consists of 61 stations, representative of regional climatic conditions. Observations are carried out on 41 non-cultivated plants (herbaceous plants, forage legumes, grasses, forest trees, shrubs) and 23 cultivated plants extended on varieties (field crops, fruit trees, vine). Some other phenophases like haymaking, harvest of winter crops or first gathering of pollen by bees are also monitored. Phenological data are dates of phenophase appearance, expressed in Julian days (day of the year). Methods and criteria for observations follow the guidelines of the agrometeorological committee of World meteorological organization. To check the accuracy of the observed data, visual and logical quality control is followed by critical control, using graphical and statistical methods. The usefulness of the phenological data of cultivated plants is often limited due to the rapid change in varieties, the old and new varieties are not comparable in time series analysis. The data series of non-cultivated plants exist for longer periods, adjust the normal distribution and are suitable for statistical modeling. There are 51 phenological stations with uninterrupted data series from the beginning of observations, meaning more than 60-yr time series, which enables the analysis of phenological trends. The quality of the data sets varies also considerably among the observers, regarding their precision during phenological recording. Phenological data can be used in agriculture to predict correct time of planting, irrigating, fertilizing, crop protection, define the length of growing season, evaluate the frost risk, define agroclimatic zones, calculate thermal time requirements, forecast the phenological event and, finally, assess the impact of climate change on plant production.

Key words: phenology, archive, Slovenia, agriculture

MANAGEMENT ALBANIAN ECONOMY THROUGH THE BANKING SYSTEM

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Background : Enterprise - Bank relationship is of particular importance in the context of financial policy conception. So in Anglo-Saxon countries at first direct finance was overvalued, while in countries of continental and Latin Europe enterprises tend more to borrow using bank intercession. The Albanian legal framework paved the way for the transformation. With all the changes made in our banking system, we emphasize that it remains in some specific conditions fragile same as the new system, the financing capacity of the banking system , the need to establish confidence in the financial and banking system and the need for modernization of instruments and supervisory and control systems as well. Bank credit is one of the most important channels of economic enterprises financing, while banks serve as the instrument of realization of this fund flow. Results: Among the main reasons of the low level of economy lending can be mentioned, the high level of credit risk , Bank-business relationship, efficient breakdown of the legal and the executive system, the lack of alignment of banks that offer loans throughout the country . Conclusions: As a conclusion, our financial and banking system consolidation remains the way for the consolidation and growth of the activities of our enterprises and businesses. The latter ones, by the precise implementation of financial function, ratibility and a better ability to pay will be able to create profit growth as the basis for its obligations redeem and to develop right relationship with the financial and banking system. But we should also not forget that enterprise – financial, banking system relationship in Albania necessarily require an institutional pursuit. Only a favorable microeconomic policy could support a so vital and mutually connected evolution of relationship. Bank considers the client as a partner that affects in its progress and development. One of the prerequisites that the bank notifies to the customer to bound the relationship is that the client keeps the confidentiality of the Bank and vice versa.

Keywords: Banking system, Bank relationship, Bank.

MODEL OF COOPERATIVE ACTION OF OLIVE GROWERS IN SLOVENIAN ISTRIA

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In the last 20 years production of olives and olive oil in Slovenia has increased and with that the production of olive oil is becoming an important agricultural sector. Olive oil producers produce about 500 tonnes of olive oil on a surface area of around 1500 hectares. Olive oil yield is increasing therefore preparedness and conditions of olive oil producers for cooperative action, was investigated. The central aim of this study was to determine the main needs for cooperative action of olive growers and olive oil producers, to examine factors for participation in cooperation, and to suggest appropriate form for cooperation of olive growers and olive oil producers. This study is based on a mixed-methods. The data has been collected by semi-structured interviews and surveys. Respondent were selected through snowball sampling. We found that olive oil producers are mostly willing to cooperate to improve the way of promotion and to participate in educational activities. The main motives for cooperative action are support to facilitate the sale of olive oil, trust in cooperative leadership, low prices of resources, and the possibility to exchange different views between cooperative members. Associations and alternative forms of cooperation, which are associations for the collective purchasing, associations for maintain the product quality, and associations for collective marketing, are the most desirable form of cooperation. Since olive growers and olive oil producers are aware of the benefits of cooperation and collective action, we notice the challenges for further research. Needs and desires of Slovenian olive growers and olive oil producers for cooperation and collaboration with olive oil producers beyond Slovenian borders, could be investigated.

Key words: cooperative, collective actions, oliveculture

ECONOMIC ADEQUACY OF BLACKBERRY IN RURAL AREAS OF SIRINIC DISTRICT

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Sirinicka District has extensive conditions for growing blackberries: an abundance of water, the collision of Continental and Mediterranean climate at an altitude of 800 meters and the necessary range in daily temperatures. Agriculture has always been the main activity of the inhabitants of this region. Farming dominates among agricultural sectors, but there are good conditions for fruit production, especially for the production of berries (raspberries, blackberries, blueberries). In Sirinička District blackberries are mostly grown on smaller farms in the highlands, where the best results are reached, but in recent years the demand for this type of berries are steadily increasing and interest in its cultivation grows. Production often takes place without any control on such fragmented parcels, which does not even cover the minimum requirements of customers. Therefore it is necessary of farm specialization and formation of associations and organizations with the aim of completing the cycle (production of blackberries and mini refrigerators where the final product is frozen blackberries). It would be a great chance for successful rural development of Sirinic District. To achieve the objective, intensive production of blackberries is required. This paper presents an economic analysis as a guide to what is the value of funds needed to upgrade the blackberry now, given the average calculation of blackberry production in the area of Sirinic District, as well as the profit and the level of economic viability .

Key words: blackberry, production, costs, economic impact

**FAMILY FARMS IN MONTENEGRO AS A FACTOR FOR DEVELOPMENT OF
VILLAGE AND AGRICULTURE**

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Agricultural production in Montenegro has a long tradition and thanks to available natural resources it could present a backbone of economic development. However, there are limiting factors for development of Montenegrin villages, which are primarily: dispersed agricultural areas and structures for their utilization. Almost entire agricultural production in Montenegro is conducted at family farms. Due to unfavorable economic and social conditions such farms have not been in position to ensure sufficient finances on their own for production modernization. This resulted in significant migration towards Podgorica and coastal areas. Share of agricultural population in total population decreased many times- from around 75% immediately after the II World War to around 6% according to the most recent evaluations. According to the most recent agricultural census from 2010, number of family agricultural farms is 48847 and there is 59360 ha of uncultivated land. The data indicates that separation between village and agriculture occurred. Regarding the number of farms, the lowest number is in Tivat, 169, whilst Podgorica has the primacy with 7254 farms. Analysis of socio-demographic and agrarian factors in development of agriculture and villages shows that labors has increasingly becoming a limiting factor for agrarian development and revitalization of farms. Demographic abandonment and aging of villages represent main trends in development of Montenegrin population. Demographic picture of Montenegrin agricultural population is unfavorable, since intensive aging process has many negative implications, which could be expected in following period too.

Key words: agricultural farm, village, structure, agriculture

MISSION AND IMPORTANCE OF ADVISORY WORK FOR FARM BUSINESS IN SERBIA

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Goal of agricultural extension service in Serbia is harmonizing measures of agricultural policy with goals of agricultural producers by applying and dissemination of scientific knowledge, skills, technologies, technics and innovations in farming. During the centuries agriculture was based on traditional skills and knowledge which were passed from generation to generation, with purpose of household consumption and self-sufficiency. Modern agriculture is activity influenced by law of markets and constantly exposed to increasing competition at the world market. This is why investing knowledge and capital in agriculture is necessity. Farmers are increasingly in search for the information which will help them make strategic decisions, so their investments in future would not fail or be devaluated. The role of government in these circumstances is an indispensable factor, because without policy support to agriculture and agricultural policy measures would be hard to achieve cost-effective agriculture. As the main institution implementing agricultural policy measures, there is agricultural extension service Serbia with the aim of fulfilling the needs of creating appropriate sustainable transfer of knowledge and information in agriculture. Advisory as institution has long history in, with the beginnings related to year od 1853, when the Agricultural school in Topčider was established, with first 200 agronomists educated. Main tasks of agricultural extension services in Serbia are: two-way information, services, education and training, the trials, the connection and cooperation. Extension work in Serbia is defined annually, as well as it is included in mid-term plans of the Ministry of Agriculture, Forestry and Water Management, and involves the use of individual, group methods, the use of print and mass media for education as well as the collection and dissemination of data for the relevant institutions. Agricultural extension agents in Serbia are required to attend during the expert meetings, get information regarding the scientific achievements and innovations, agricultural policy measures, so they can be able to provide timely and accurate information to their clients (farmers).

Key words: Agricultural extension service in Serbia, transfer of knowledge, agricultural policy measures, education.

ZADACI I ZNAČAJ SAVETODAVNOG RADA ZA POSLOVANJE POLJOPRIVREDNIH GAZDINSTAVA U SRBIJI

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Poljoprivredna savetodavna služba Srbije ima za cilj usklađivanje mera agrarne politike sa ciljevima poljoprivrednih proizvođača kroz primenu i širenje naučnih saznanja, veština, tehnologija, tehnika i inovacija u poljoprivrednu proizvodnju. Poljoprivredna proizvodnja je vekovima bila zasnovana na tradicionalnim umećima i znanjima koja su se prenosila "sa kolena na koleno" sa glavnim ciljem sopstvene potrošnje i zadovoljenja porodičnih potreba. Moderna poljoprivreda je delatnost koja podleže zakonima tržišta i biva konstantno izložena sve većoj konkurenciji na svetskom tržištu, stoga su ulaganja znanja i kapitala u poljoprivredu neminovnost. Poljoprivredni proizvođači u sve većoj meri traže informacije koje im mogu pomoći da donesu strateške odluke kako njihova današnja ulaganja u budućnosti neće propasti ili biti obezvređena. Uloga države u ovim okolnostima predstavlja neizostavan faktor jer bi bez politike podrške poljoprivrede i mera agrarne politike bilo teško ostvariti isplativu poljoprivrednu proizvodnju. Kao glavna institucija sprovođenja mera agrarne politike javlja se poljoprivredna savetodavna služba Srbije sa ciljem ispunjenja potreba kreiranja adekvatnog održivog sistema prenošenja znanja i informacija u poljoprivredi. Savetodavstvo kao institucija u Srbiji ima dugu istoriju, a počeci se vezuju za 1853.godinu, kada je osnovana Zemljoradnička škola u Topčideru, koja je školovala prvih 200 agronoma. Glavni zadaci poljoprivredne savetodavne službe Srbije su: dvosmerno informisanje, pružanje usluga, edukacija i obuka, ogledi, povezivanje i saradnja. Savetodavni rad u Srbiji je definisan na godišnjem nivou kao i u okviru srednjoročnih planova Ministarstva poljoprivrede, šumarstva i vodoprivrede i podrazumeva primenu individualnih, grupnih metoda, korišćenje štampanih i mas medija za edukaciju kao i prikupljanje i diseminaciju podataka za potrebe nadležnih institucija. Poljoprivredni savetodavci u Srbiji su u obavezi da tokom godine posećuju stručne skupove, informišu se u vezi sa naučnim dostignućima i inovacijama, merama agrarne politike, kako bi svojim korisnicima (poljoprivrednim proizvođačima) mogli da pruže pravovremene i preciznu informacije.

Ključne reči: Savetodavna služba Srbije, transfer znanja, mere agrarne politike, edukacija.

SAVING STRATEGIES OF RURAL HOUSEHOLDS IN EASTERN BOSNIA

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Governments' focus has been recently mainly on access to credit while rural households value also appropriate deposit services. Savings importance with respect to rural economic and social development has long been recognized. Savings are essential for protecting and boosting the assets of rural populations. The paper analyses rural households' saving strategies in eastern Bosnia. It is based on a review of secondary data and primary information collected by a questionnaire survey carried out in March 2013 with 147 rural households from nine municipalities in eastern Bosnia (Han Pijesak, Sokolac, Milici, Vlasenica, Foca, Rogatica, Bratunac, Sekovici and Zvornik). The questionnaire survey focused on saving purposes; access to various saving means, including formal and informal ones; membership in and management of saving/credit groups; and reasons for using formal money deposits (banks). The formal and semiformal sectors are currently not meeting the demand for financial services of all rural households. Saving helps rural clients manage emergencies (66.7%), ensure children education (44.9%), prepare investments (10.2%) and smooth consumption. Savings are quite often the primary source of financing for small individual projects. They are also the main source of funding used to meet daily needs such as education and health costs, or purchase inputs needed for agricultural crops. In addition to bank deposits saving means include also saving groups as 12.9% members of interviewees' families belong to a saving/credit group. Most of respondents (63.1%) declared that these groups meet often or at least once per month. Participation in rotating savings and credit groups is also a way for strengthening social capital of rural households. However, survey results showed that 72.8% of respondents prefer keeping their savings as cash at home. Less than a fifth (17%) of the surveyed rural households' members used a kind of monetary saving from a formal institution in the past 5 years. Savings are also kept in form of animals/livestock, precious metals and jewellery or invested in buildings. Rural households give the highest priority to security when deciding where and how to save. Access of rural households to appropriate saving services is of paramount importance for rural households diversification in Bosnia.

Keywords: Saving strategies, rural finance, rural households, Bosnia.

THE QUALITY OF NATURAL ENVIRONMENT AND ORGANIC PRODUCTS IN MEETING THE EXPECTATIONS AND NEEDS OF TOURISTS

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When we talk about the quality of the natural environment and organic products as elements of the touristic offer, primarily we think about the areas of rural and ecological tourism. Tourism is almost entirely dependent on the environment. Natural and man-made resources are representing the primary source of tourism. Degradation of the primary sources will most likely lead to a drop in tourism. Organic production includes the harmonic development of market needs and the preservation of the environment, but also the reduction in quantity in favour of the quality of products. The participation of state institutions is required in order to boost the development of organic production and to define the strategy and the necessary measures for the promotion of organic production. In order to meet the requests of tourists there is the need to expand the range of organic products, provide a continuous offer and develop appropriate marketing. The needs and desires of consumers are the main focus in the application of all marketing activities, which show the manufacturer (i) what to produce and (ii) how to recycle, , and (iii) where and at what price to sell the final product. The continuous research and collection of information show to what extent consumers are satisfied with existing product and what leads them to buy that product again, thus creating the figure of loyal customers. An important limiting factor for the future development of the sector is low knowledge of marketing and sales promotion techniques. The paper highlights the importance of the quality of the natural environment, organic products and the ecology as part of the tourism offer in order to promote organic production, ecology marketing and ecotourism.

Keywords: organic products, tourism, ecology, environmental marketing

Section 4. Fruit Growing and Viticulture

IMPACT OF UNDERCUT TREATMENT ON FRUITING BRANCH IN INTENSIVE PLUM GROWING SYSTEMS

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This paper analyzes the impact of undercutting pomotechnical treatment of fruiting branch of the plum trees aimed to initiate growth of new shoots for replacement. Research were conducted in the period 2011 – 2013 on the trees of cv. Stanley and Čačanska leptotica as model plants. The trees are in full fruiting period in orchard of high intensity (1250 trees / ha). The treatment was applied in lateral branch whose basal thickness exceeds 1/2 thick of main trunk. Analysis of the number of fruiting branch in which base new shoots for the replacement is formed as a result of undercutting, shows that the emergence of new shoots, significantly higher in the branches where the treatment was applied, ranged from 75% in cv Čačanska leptotica and 90% in cv Stanley. In both cultivars undercut treatment of fruiting branch results with more than one shoot. In cv Stanley, as a result of undercutting treatment the highest percentage (50.00%) appears new shoots whose length is shorter than 10 cm (short increments). The analysis of new shoots of cv Čačanska leptotica, as a result of undercutting shows that their length is less than 10 cm (50%) or longer than 30 cm (50%). In the analyzed cultivars certain varietal specificity in response to pomotechnical treatment undercutting of fruiting branch was found, which are reflected primarily in the level of initiation of new shootpoints and category of shoots obtained by this procedure. Both varieties respond positively to the applied pomotechnical treatment showing that, this treatment should be used in regular production, to maintain the structure of the spindle and allow the formation of a young fruiting tree.

Key words: pomotechnical treatment, replacement.

UTICAJ ZAHVATA PODSECANJA NOSAČA RODNOG DRVETA U INTENZIVNIM SISTEMIMA GAJENJA ŠLJIVE

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U radu je analiziran uticaj pomotehničkog zahvata podsecanja višegodišnjih nosača rodnog drveta kod šljive u cilju iniciranja novih prirasta za zamenu. Ispitivanja su obavljena u periodu 2011 – 2013. godina na stablima sorti Stenli i Čačanska leptotica kao model biljkama. Stabla se nalaze u periodu punog plodonošenja u zasadu visoke intenzivnosti (1250 stabala/ha). Zahvat podsecanja primenjen je kod nosačačija debljina u osnovi prelazi 1/2 debljine provodnice. Analiza broja nosača rodnog drveta u čijoj bazi su formirani novi prirasti za zamjenu kao rezultat zahvata podsjecanja, pokazuje da je pojava novih prirasta, značajno veća kod nosača gdje je izvršen zahvat podsjecanja i da on iznosi 75% kod sorte Čačanska leptotica, odnosno 90% kod sorte Stenli. Kod obe analizirane sorte zahvat podsecanja nosača rodnog drveta doveo je do pojave više od jednog novog prirasta. Kod sorte Stenli, kao rezultat zahvata podsjecanja u najvećem procentu (50,00%) kao rezultat nastaju prirasti, čija je dužina kraća od 10 cm (kratki prirasti). Za razliku od sorte Stenli, kod sorte Čačanska leptotica, analiza prirasta koji nastaju kao rezultat podsecanja ukazuje da je reč o prirastima čija je dužina kraća od 10 cm (50%) ili pak duža od 30cm (50%). Kod analiziranih sorti je utvrđena određenassortna specifičnost u reakciji na pomotehnički zahvat podsecanja višegodišnjih nosača rodnog drveta, a koja se ogleda pre svega u stepenu iniciranja novih tačaka rasta i kategoriji prirasta koji se dobijaju ovim zahvatom. Obe sorte pozitivno reaguju na primenjeni pomotehnički tretman podsecanja nosača rodnog drveta, koji treba primenjivati u redovnoj proizvodnji, kako bi se održala struktura vretena i omogućilo formiranje mladog rodnog drveta.

Ključne reči: pomotehnički tretman, smena

**MORPHOLOGICAL ANALYSIS OF POLLEN GRAIN OF SWEET CHESTNUT
(*CASTANEA SATIVA* MILL.)**

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The paper analyzed the morphology of the pollen grain of chestnut (*Castanea sativa* Mill.) in "dry" state- morphophysiological status of pollen dissemination, as a possible element for the assessment of vitality. The study was conducted on pollen of 22 chestnut genotypes in the area Potkozarje. Pollen was analyzed by scanning electron microscopy (SEM), with the analysis of pollen grains dimensions and structure and positioning holes for germination as well as exine ultrastructure. Morphometric analysis of pollen grains of chestnut in "dry" condition as morphologically and physiologically prepared pollen grains for distribution on release from the anthers, indicating the existence of certain genotypic characteristics. The maximum length of pollen grains was observed among genotypes Parnice 1 (21.79 nm), Sreflije bolte 2 (21.36 nm) and Kostajnica Vranovac 3 (21.24 nm). The minimum length of the pollen grains was found in genotype Sreflije Bolte 3 (17.33 nm). The minimum width of the pollen grains was observed in genotype Sreflije Bolte 3 (8.36 nm) and highest in genotypes Kostajnica Slabinja 3 (11.75 nm) and Kostajnica Vranovac 2 (11.75 nm). Taken together the results of this study shows that pollen exine of studied genotypes of chestnut belongs to tectum type with less severe reticulum. Ultrastructural analysis of exine shows some differences in the prevalence of the tectum and reticulum at different positions on the pollen grain. On the basis of the analysis it can be concluded that in all the genotypes of chestnut pollen grains were physiologically and morphologically prepared for release from the anthers and distribution Genotype specificity of exine ultrastructure and openings for germination is documented for all genotypes presented in this paper.

Keywords: pollen, exine, colpa.

NOTE: The study is part of research performing in the framework of the research project "Microsporogenesis, mikrogametogenesis and pollen germination of *Castanea sativa* Mill. Associations in Fago Castanetum and Quercu Castanetum Potkozarje in the region", which was implemented during the 2010th and 2011.in Institute for genetic Resources of the University of Banja Luka. Project was realized with the financial support of the Ministry of Science and Technology of Republic of Srpska.

MORFOLOŠKA ANALIZA POLENOVOG ZRNA PITOMOG KESTENA (*CASTANEA SATIVA* MILL.)

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U radu je analizirana morfologija polenovog zrna pitomog kestena (*Castanea sativa* Mill.) u "suvom" stanju -morfofiziološkom statusu polena u raznošenju, kaomogućeg elementa za ocenu vitalnosti. Ispitivanje je obavljeno na polenu 22 genotipa pitomog kestena na području Potkozarja. Polen je analiziran skanirajućim elektronskim mikroskopom (SEM), pri čemu su određene dimenzije polenovih zrna, struktura i pozicioniranje otvora za klijanje i ultrastuktura egzine. Morfometrijska analiza polenovih zrna ispitivanih genotipova kestena u "suvom" stanju kao morfološki i fiziološki pripremljenih polenovih zrna za raznošenje po oslobađanju iz antera, ukazuje na postojanje određenih genotipskih specifičnosti. Najveća dužina polenovih zrna zabeležena je kod genotipova Parnice 1 (21,79nm), Sreflije Bolte 2 (21,36nm) i Kostajnica Vranovac 3 (21,24nm). Najmanja dužina polenovog zrna utvrđena je kod genotipa Sreflije Bolte 3 (17,33nm). Najmanja širina polenovog zrna, zabeležena je kod genotipa Sreflije Bolte 3 (8,36nm) a najveća kod genotipova Kostajnica Slabinja 3 (11,75 nm) i Kostajnica Vranovac 2 (11,75nm). Uopšteno posmatrano, egzina polena ispitivanih genotipova kestena pripada tektatnom tipu sa manje izraženim retikuluma. Analiza ultrastrukture egzine pokazuje određene razlike u zastupljenosti tektuma i retikuluma na različitim pozicijama polenovog zrna. Na osnovu izvedenih analizamože se konstatovati da su kod svih posmatranih genotipova kestena polenova zrna fiziološki i morfološki vitalno pripremljena za oslobađanje iz antera, odnosno za raznošenje. Genotipske specifičnosti ultrastrukture egzine i otvora za klijanje dokumentovani su za sve genotipove prikazani u radu.

Ključne reči: polen, egzina, kolpa.

Napomena: Rad predstavlja dio istraživanja realizovanih u okviru naučno-istraživačkog projekta pod nazivom "Mikrosporogeneza, mikrogametogeneza i kljavost polena *Castanea sativa* Mill. u asocijacijama *Fago Castanetum* i *Querco Castanetum* u regionu Potkozarja", koji je realizovan tokom 2010. i 2011. godini u Institutu za genetičke resurse Univerziteta u Banjoj Luci uz finansijsku podršku Ministarstva nauke i tehnologije Republike Srpske.

**THE INFLUENCE OF SHOOTS AGE ON GENERATIVE POTENTIAL AND FRUIT
QUALITY OF RED CURRANT (*RIBES RUBRUM L.*) CULTIVARS**

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In this study were shown results of the generative potential and fruit quality of six cultivars of red currant in environment conditions of Obrenovacka Posavina. Observation were done in the collective orchard of 13 cultivars, cultivated in shrub form with planting distance from 1,8 x 0,8 m. The following parameters of generative potential of currant cultivars were monitored (number of fruit buds per shoot, number of flowers in an inflorescence, number of berries per cluster, percent of fruit set, and also quantitative berry weight, chemical and sensory properties. The greatest generative potential on two year old shoots had cultivar 'Rondom' (13.5 generative buds) and the smallest 'Rolan' (2.3). Cultivar 'Junifer' had the highest number of generative buds on three years old shoots (147.6) and cultivar 'Rovada' had the smallest (30.6). All cultivars had the bigger berries and heavier clusters on younger shoots. Also, most of the cultivars had a higher content of soluble solids and vitamin C in fruits developed in the younger part of the bush.

Key words: currant, cultivar, age of shoots, generative potential

**UTICAJ STAROSTI IZDANAKA NA GENERATIVNI POTENCIJAL I KVALITET
PLODOVA SORTI CRVENE RIBIZLE (*RIBES RUBRUM* L.)**

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U radu su prikazani rezultati ispitivanja generativnog potencijala i kvaliteta plodova šest sorti crvene u uslovima Obrenovačke Posavine. Ogled je postavljen u kolekcionom zasadu na imanju rasadnika Omega, sadnjom jednogodišnjih sadnica gajenih u sistemu žive ograde sa rastojanjem od 1,8 x 0,8 m. Od pokazatelja generativnog potencijala ispitivani su: broj rodni pupoljaka po izdanku, broj cvetova u cvasti, broj bobica u grozdu, procenat zametanja, masa grozda, a od kvalitativnih osobina: masa bobice, hemijski sastav i organoleptička svojstva. Najveći rodni potencijal na dvogodišnjim izdancima imala je sorta Random od 13,5 rodni pupoljaka po izdanku, a najmanji sorta Rolan od svega 2,3 pupoljka. Na trogodišnjem delu žbuna najveći rodni potencijal imala je sorta Džunifer (147,6) na najslabiji sorta Rovada (30,6). Sve sorte imale su veću masu i krupnije bobice na grozdovima formiranim na mladem delu biljke. Takođe, većina sorti imala je veći sadržaj rastvorljive suve materije i vitamina C u plodovima razvijenim na mladem delu žbuna.

Ključne reči: ribizla, sorte, starost izdanaka, generativni potencijal

FEATURES NURSERY PRODUCTION IN THE REPUBLIC OF SRPSKA

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High quality fruit production can not be achieved without well organized and the quality of nursery production. Quality planting material is the key to success for the establishment of intensive plantations. The paper analyzes the situation in the production of planting materials in the area of the territory of the Republic of Srpska 2010-2013. years. The 24 registered nursery fruit trees in the Republic of Srpska, produced seedlings of 20 species of fruit. Dominant species in the production of fruit are pear with 37%, apple 24% and plum with 13%. In the structure there are more and nectarine (11%), sour cherry (8%), cherry (2%) and peach (1%). Total number of seedlings produced in the RS for the analyzed period is 10,070.650. Analysis of the distribution of varieties in the production of apple seedlings, reflecting the high dose of traditionalism among producers, given the high percentage Idared varieties, grafted on M9 rootstock in the overall structure. Variety Williams on seedlings of wild pear (*Pyrus communis* L) dominates the production of pear trees. With Plums is the dominant variety Čačanska rodna grafted on cherry plum (*Prunus cerasifera* Ehrh). The analysis in nursery production are significant, because of the assessment of trends establishment of new plantations.

Keywords: fruits, planting material, varieties, rootstock

KARAKTERISTIKE RASADNIČKE PROIZVODNJE NA TERITORIJI REPUBLIKE SRPSKE

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Kvalitetna voćarska proizvodnja ne može se ostvariti bez dobro organizovane i kvalitetne rasadničke proizvodnje. Kvalitet sadnog materijala predstavlja ključ uspjeha za podizanje intenzivnih zasada. U radu je izvršena analiza stanja u proizvodnji sadnog materijala na području teritorije Republike Srpske u periodu 2010-2013. godina. U 24 registrovana rasadnika voćnih sadnica u Republici Srpskoj, proizvode se sadnice 20 voćnih vrsta. U strukturi voćnih vrsta dominira kruška sa 37%, jabuka 24% i šljiva sa 13%. U strukturi se nalaze još i nektarina (11%), višnja (8%), trešnja (2%) i breskva (1%). Ukupan broj proizvedenih sadnica u RS za analizirani period iznosi 10,070.650. Analiza zastupljenosti sorti u proizvodnji sadnica jabuke, odražava visoku dozu tradicionalizma među proizvođačima, imajući u vidu veliko procentualno učešće sorte Ajdared, kalemljene na podlozi M9 u ukupnoj strukturi. Sorta Viljamovka na podlozi sijanac divlje kruške (*Pyrus communis* L.) dominira u proizvodnji sadnog materijala kruške. Kod šljive dominantnu sortu predstavlja Čačanska rodna kalemljena na džanariku (*Prunus cerasifera* Ehrh). Analiza karakteristika rasadničke proizvodnje je značajna, zbog ocjene trendova uspostavljanja novih zasada.

Ključne riječi: voćne vrste, sadni materijal, sorte, podloge

**VARIABILITY OF OIL CONTENT IN FRUIT OF OLIVE VARIETY ŽUTICA ON
MONTENEGRIN COAST**

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The oil content in olive fruit is the most important parameter for growing olive varieties for oil production. In the group of olive varieties for oil production belongs Žutica the major variety on Montenegrin Coast. The oil content in the fruit of this variety is in average above 21%. However, during the research of the properties of this variety the existence of variability in the oil content was recorded. In order to determine the degree of the variability oil content in fresh fruits of 42 accessions of Žutica variety were analysed. The results confirmed Žutica variety with high content of oil as well as the existence of variability of this parameter between accessions studied. Of the total number of examined 22 accessions had the oil content in the fruit of over 20%, while the oil content greater than 22 % had 13 accessions. The highest oil content was in fruit of VAL2 (24.3%). The results suggest the need for selection of Žutica accessions (clones) with higher oil content in the fruit for multiplication and spread in the new plantations.

Key words: olive, Žutica, olive oil content

MORFOMETRIJSKE KARAKTERISTIKE AKTUELNIH SORTI ŠLJIVE

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Cilj rada je proučavanje morfometrijskih karakteristika introdukovanih sorti šljive u uslove regije Banja Luka – Prijedor: Katinka, Altanova renkloda, Čačanska lepatica, Čačanska najbolja, Čačanska rodna, Elena, Hanita, Kalifornijska plava i Top 2000. Kao standard, korišćene su sorte Stenli i Požegača. Eksperimentalni dio istraživanja u ovom radu je izveden na dva različita lokaliteta: Bukvalek, Banja Luka i Omarska, Prijedor, u toku 2007 godine. Proučavanje pomoloških karakteristika obuhvatilo je sljedeće morfometrijske parametre: masa ploda, visina ploda, širina ploda, dužina peteljke, čvrstoća mesa ploda, sadržaj suve mase u ćelijskom soku, masa koštice, visina koštice, širina koštice. Variranje morfoloških parametara ispitivanih sorti šljive pokazuje značajne genotipske razlike. Na osnovu dobijenih rezultata pomoloških istraživanja plodova introdukovanih sorti šljive na području banjalučke regije, konstatujemo da sve ispitivane sorte imaju genotipski specifične morfometrijske karakteristike ploda koje su u skladu sa dostupnim literaturnim podacima. Ova istraživanja su jedan od važnih elemenata za ocenu novih sorti pre njihovog uvođenja u proizvodne uslove banjalučke regije.

Ključne riječi: šljiva, morfometrijske karakteristike, plod

MORPHOMETRIC CHARACTERISTICS OF CURRENT PLUM VARIETIES

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The aim of this paper is to study the morphometric characteristics of introduced plum varieties within the region of Banja Luka - Prijedor: Katinka, Reine Claude d'Althan, Cacak's Beauty (Čačanska leptotica), Cacak's Best (Čačanska najbolja), Cacak's Fruitful (Čačanska rodna), Elena, Hanita, California Blue and Top 2000. As standard, the varieties of Stanley and Požegača (German Prune) were used. The experimental part of the research in this paper was carried out at two different locations: Bukvalek – Banja Luka and Omarska – Prijedor, during 2007. The study of pomology characteristics included the following morphometric parameters: fruit weight, fruit length, fruit width, stem length, firmness of the fruit flesh, the dry weight of the cell sap, the seed weight/height/width. The variations in the morphological parameters among the examined plum varieties show significant genotype differences. Based upon the results of pomology research of introduced plum varieties in the Banja Luka region, we can conclude that all the examined cultivars possess genotype – specific morphometric fruit characteristics, consistent with the available literature data. This research is one of the important elements for evaluation of new varieties prior to their introduction into the production conditions of the Banja Luka region.

Keywords: plum, morphometric characteristics, fruit

THE POMOLOGICAL CHARACTERISTICS OF LEMONS GROWN IN DALMATIA

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The aim of this work is to analyse pomological and physiological characteristics of several lemons grown in various location in Dalmatia. Two of them have been determined as cvs. 'Meyer' and 'Lisbon'; other six lemon trees are either probably their seedlings or vegetative propagated progenies with possible mutations that are common in *Citrus*. Each of studied trees have reached maximum cropping capacity and yielded well in 2013. The trees have not shown any physiological or nutrition disorders. The results shown that Dalmatian lemons grown in private gardens, have satisfactory yielding potential and favourable fruit weight (91.7- 200.6 g), total soluble solids (TSS) (7.9-9.08% Brix), and TSS/TA ratio (1.41-2.25). However, only the cv. 'Meyer' and one phenotype similar to him had high juice content (39.5 %) which is above the worldwide established minimum standard juice content for lemon fruit (33.0 %). Fruit from all other phenotypes, including one recognised as cv. 'Lisbon', had lower juice content which ranged between 28.1 % and 32.7 %. It can be concluded that lemons grown in private gardens of Dalmatia have multifunctional purpose (i.e. sustainable fruit source, ornamental and landscape value). Therefore, its growing should be encouraged. The another important fact is that there is whole population of high and diverse genetic potential which remained unrecognized so far and should be used for breeding.

Key words: *Citrus ×limon*(L.) Burm.f., Dalmatia, pomological characteristic, fruit quality

**POMOLOGICAL PROPERTIES OF SOME CULTIVARS OF PLUM IN
CONDITIONS OF SARAJEVO**

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The paper presents results of two – year study of some pomological properties of three cultivars of plum ("Felsina", "Čačanska rodna" and "Auerbacher") grafted on GF 655/2rootstock. The research was carried out in the plum orchard for cultivar testing of Federal Bureau of Agriculture of Bosnia and Herzegovina. Obtained results showed that the an earlier flowering was in cultivar "Felsina". The earliest time of maturation was in cultivar "Felsina". Cultivar "Auerbacher" had statistically significant the lowest fruit weight than other cultivars. The randman of fruit was highest in cultivar "Auerbacher", and the lowest randman of fruit was in cultivar "Čačanska rodna". During of the research, the highest of yield was in cultivar "Čačanska rodna", and the lowest of yield was in cultivar "Felsina". The obtained results have confirmed that agro – environmental conditions of Sarajevo are favorable for growing the above – mentioned cultivars of plum.

Keywords: plum,cultivar, pomological properties.

THE YIELD SOME TOLERANT CULTIVARS OF PLUM IN TERMS OF SARAJEVO

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Plum is one of the most common fruits in Bosnia and Herzegovina and confirm that the above information. Plum Pox Virus (PPV) is the most important disease of plum, which causes changes in leaf and fruit. Introduction of new cultivars and their testing are the basis for the planting and production of fruits. Cultivars tolerant to PPV should provide profitable production and the better financial effects. The research was carried out the testing of three introduced cultivars of plum, planted in the plum orchard of Federal Institute of Agriculture of Bosnia and Herzegovina. Plantation was done in the spring of year 2007, at the altitude of 600 meters above sea level. The research was analyzed pomological properties of three cultivars of plum ("Čačanska rodna", "Topping" and "Topfirst"), grafted on Ferley rootstock, during the years 2012 and 2013. Planting spacing was 4×2.5 m. The results of research are indicate some differences in pomological and yield properties such as fruit weight, yield per tree as well as yield per hectare. This result makes a basic mission to provide reliable evaluation of the features and capabilities of grafted on Fereley rootstock.

Keywords: Plum, yield, tolerant, pomological properties.

**SUSCEPTIBILITY OF SOME WALNUT CULTIVARS TO *GNOMONIA*
LEPTOSTYLA AND *XANTHOMONAS ARBORICOLA* PV. *JUGLANDIS* IN
BULGARIA**

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The aim of the present research was to study and compare the susceptibility of 13 walnut cultivars – 5 Bulgarian (B), 3 French (F), 2 Hungarian (H), and 3 American (A) – to *Gnomonia leptostyla* (Fr.) and *Xanthomonas arboricola* pv. *juglandis* (Pierce) Dye, the pathogens causing leaf spot and walnut blight. The study was conducted under natural environmental conditions in a 5-8-year-old walnut collection orchard of the Fruit Growing Institute – Plovdiv, during the period 2008-2011. The evaluation of the attack produced by this pathogens was carried out on different organs leaves and nuts in two periods of the year (June and October). All the studied cultivars were distributed in 6 different levels of susceptibility to a given pathogen based on the degree of attack. The article presents data on the sensitivity of the studied walnut cultivars to the attack to *G. leptostyla* (Fr.) and *X. arboricola* pv. *juglandis* (Pierce) Dye and discusses the results obtained.

Key words: *Juglans regia*, cultivars, leaf spot, walnut blight, infection

COMPARISON OF HPLC-DAD AND LC-MS/MS FOR THE SEPARATION AND VALIDATION OF PHENOLIC ACIDS IN CHERRIES

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Cherries have been reported to contain various phenolics and anthocyanins which contribute to the total antioxidant activity. Phenolics comprise a large group of biologically active compounds from simple phenolic molecules which contain "phenolic acids" to polyphenols with at least two phenol rings. High-performance liquid chromatography with diode array (HPLC-DAD) method is a widely used method for the analyses of phenolic acids. Although the methods have been remarkably improved, tandem mass spectrometry (LC-MS/MS) systems with significant advantages have gradually replaced HPLC-DAD in many analyses. The aim of this study, was the evaluation of the two methods for linearity, quantitation limits, selectivity, precision, and accuracy for phenolic acids (ferulic, trans-cinnamic, 2-hydroxy cinnamic, gallic, caffeic, p-coumaric and chlorogenic acid). The extraction was done using ethanol at constant 60 °C temperature, during one hour. Using HPLC-DAD the obtained LOQs for all investigated phenolic acids were 0.30 µg/ml. The accuracy and precision were determined via recovery experiments, spiking sour cherries at 10.0, 50.0 and 200.0 µg/ml, in three replicates per level. The mean recoveries were 78.34 – 97.19% with the RSD of 1.2 – 12.4% for all compounds. The linearity was over 0.99 for the concentrations from 1.0 to 250.0 µg/ml with the repeatability RSD less than 13.4%. The LC-MS/MS method showed high reproducibility, as evident from the RSD values for intra-day and inter-day variability being 1.0–6.8% and 2.0–7.7%. The LC-MS/MS method exhibits linearity ($R^2 > 0.99$) for the concentrations from 1.0 to 250.0 µg/ml with the repeatability RSD less than 12.7%. The obtained LOQs for all the investigated phenolic acids were 0.1 µg/ml. The recovery values were from 83.62-94.51% with the RSD less than 12.11%. The HPLC-DAD performed well in terms of various validation parameters, and showed a good agreement with the LC-MS/MS.

Key words: HPLC-DAD, LC-MS/MS, phenolic acids, cherries

Acknowledgments The authors acknowledge the financial support of the Ministry of Education and Science, Republic of Serbia, Project Ref. TR31038.

**EFFECTS OF THE SUBSTRATE, FRUIT POSITION ON THE TREE AND
HARVEST TIME ON THE FRUIT MATURITY DEGREE IN THE VARIETIES OF
RED DELICIOUS AND IDARED**

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The aim of this paper is to study the influence of the substrate, the position of the fruit on the tree and harvest time on the maturity degree of the apples. The study has monitored the maturity degree of the varieties Red Delicious and Idared on substrates MM106 and M9. The apples were harvested at the following dates: 09 September, 15 September, 25 September 2007 under the environmental conditions of the municipality of Gradiska (Turjak and Grbavci villages). Immediately after the harvest, certain measurements of the parameters of fruits physiological status were done: fruit weight, fruit flesh firmness, soluble solids content in the cell sap of fruit flesh and starch content in the flesh of the fruit. The research in this paper shows that the fruit position on the tree has different effects on physiological processes in fruits, as among the varieties on different surfaces and between the studied parameters within a single variety as well. Fruit weight in both cultivars in all tested substrates had the lowest values in the first and largest ones in the third harvest time. Flesh firmness of the fruit is higher in the first and the lowest in the third harvest time in both cultivars on the substrate MM106, while on M9 there is a difference, depending on the fruit position on the tree in both cultivars. Fruit position on the tree of Red Delicious on both substrates had no influence on the content of soluble solids, while with Ida Red there was no significant impact on the content of soluble solids. The fruit position on the tree, together with the substrate, had no influence on the starch degradation degree with Red Delicious. With Idared on MM106, there is no effect on the starch degradation degree concerning the substrate M9 of the same variety, caused by the fruit position on the tree. Based on the study results of the physiological status of the fruit, it can be concluded that the substrate, the fruit position on the tree together with harvest time make a significant impact on the fruit maturity degree in the varieties of Red Delicious and Idared.

Key words: apple, substrate, maturity degree

UTICAJ PODLOGE, POZICIJE PLODA NA STABLU I VREMENA BERBE NA STEPEN ZRELOSTI PLODOVA KOD SORTI JABUKE CRVENI DELIŠES I AJDARED

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Cilj ovog rada je proučavanje uticaja podloge, pozicije ploda na stablu i vremena berbe na stepen zrelosti plodova jabuke. U istraživanju je praćen stepen zrelosti sorti Crveni Delišeš i Ajdared na podlogama MM106 i M9. Jabuke su ubrane u tri roka berbe: 05.09., 15.09., 25.09. 2007. godine u ekološkim uslovima opštine Gradiška (Turjak i Grbavci). Odmah nakon berbe vršena su mjerenja parametara fiziološkog statusa plodova: masa ploda, tvrdoća mesa ploda, sadržaj rastvorljivih suvih materija u ćelijskom soku mesa ploda i sadržaj skroba u mesu ploda. Rezultati istraživanja pokazuju da pozicija ploda na stablu različito utiče na fiziološke procese u plodovima, kako između ispitivanih sorti na različitim podlogama tako i između ispitivanih parametara unutar jedne sorte. Masa ploda kod obe sorte na svim ispitivanim podlogama imala je najmanje vrijednosti u prvom a najveće u trećem roku berbe. Tvrdoća mesa ploda je veća u prvom a najmanja u trećem roku berbe kod obe sorte na podlozi MM106, dok je na podlozi M9 prisutna razlika u zavisnosti od pozicije ploda na stablu kod obe sorte. Pozicija ploda na stbalu kod sorte Crveni Delišeš na obe podloge nije imala uticaja na sadržaj rastvorljive suve materije, dok je kod sorte Ajdared imala značajan uticaj na sadržaj rastvorljive suve materije. Pozicija ploda na stablu i podloga, kod sorte Crveni Delišeš nisu imale uticaja na stepen razgradnje skroba. Kod sorte Ajdared na podlozi MM106 nema uticaja pozicije ploda na stblu na stepen razgradnje skroba u odnosu na podlogu M9 iste sorte. Na osnovu dobijenih rezultata fiziološkog statusa plodova može se zaključiti da podloga, pozicija ploda na stablu i vrijeme berbe ima značajan uticaj na stepen zrelosti plodova kod sorti Crveni Delišeš i Ajdared.

Ključne riječi: jabuka, podloga, stepen zrelosti

**FLORAL MORPHOLOGY CHARACTERIZATION OF SOME POMEGRANATE
(*PUNICA GRANATUM* L.) CULTIVARS GROWN IN MONTENEGRO**

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Pomegranate flower is heterostyled and forms three types of flowers. Hermaphroditic flowers with long pestle and large ovaries that can only bear fruit. Intermediate and functionally male flowers are with smaller pestle and smaller ovary. This paper presents the results of morphological characteristics of flower three most common varieties of pomegranate (Staki barski, Šerbetaš i Dividiš meke kore) over a period 2002-2004. Investigations were carried out at three different locations: Bar, Dobra Voda and Golubovci near Podgorica. The maximum length and width of a flower in all varieties was at hermaphroditic type of flower (4.75 cm), a statistically significantly higher compared to the other two categories examined. Hermaphroditic type of flower has a statistically significantly longer pestle (13.58 mm), while the shortest in functionally male-type 3.93 mm. There was a highly significant correlation between the length of the pistil and width of a flower ($r = 0.8486^{**}$), as well as the length of the flower ($r = 0.7042^{**}$). Number of sepals and petals is similar in average in all varieties and ranges from 6.97 to 7.33. There were registered flowers with 9 sepals and petals, not referred as specific trait for Punicaceae family. Functionally male type of flower in average had the highest number of stamens (320), which is in the function of the formation of a sufficient amount of pollen and better fertilization, and the lowest was registered in hermaphrodite flower type (272). A phenomenon was observed in the same varieties in different localities (Šerbetaš) occurs formation of an uneven number of flowers, which leads to a higher number of hermaphrodite flowers in such a case.

Key words: pomegranate, *Punica granatum* L., flower

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

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The importance of fruit production in this region is indicated by the fact that it is one of the most profitable branches of agricultural production and that it provides significant funding for rural development. In addition to pruning, bending branches, nutrition management, regulation of growth and development it is possible to use synthetic growth regulators - chemical fruit thinning. Chemical thinning should be regularly recommended practice measure aimed to balance growth and yield. The field trial was set up in eight years old apple orchards "Fruit Eco" in Gornji Podgradci, municipality Gradiska. Training form was solax. The trees grafted on M106 rootstock were planted at 1,2 m within a row and 4 m between rows and trees grafted on M9 rootstock were planted 4 between row and 1 m within row. Chemicals that were used for fruit thinning were Amidthin and Nokad. Fruit counting was done before harvest. It was found that minimum number of fruits per branch was on M9 rootstock. Also, most pronounced effect of fruit thinning regarding fruit weight and size was on trees grafted on M9. Results showed that fruits had decreased firmness and increased dry matter content. However, it did not show significant differences in values of iodine - starch test and acid content.

Key words: apple fruits, chemical thinning, fruit quality

HEMIJSKO PRORJEĐIVANJE PLODOVA JABUKE ZLATNI DELIŠES

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Proizvodnja voća obezbeđuje značajna finansijska sredstva i predstavlja jednu od najprofitabilnijih grana poljoprivrede, a njena uloga je posebno značajna u razvoju ruralnih područja Republike Srpske. Pored rezidbe, povijanja grana, redovne ishrane, regulisanje rasta i rodnosti je moguće jedino uz primjenu sintetičkih regulatora rasta – hemijskog prorjeđivanja plodova. Hemijsko prorjeđivanje plodova treba da bude redovna pomotehnička mjera u cilju uspostavljanja ravnoteže između rasta i rodnosti. Ogled je postavljen u zasadu jabuke „Fruit Eco“ u Gornjim Podgradcima, opština Gradiška. Zasad jabuke je star 8 godina, na podlozi M9 razmaka sadnje 4 x 1 m i na podlozi MM106 razmaka sadnje 4 x 1,2 m. Uzgojni oblik je solaksa. Za hemijsko prorjeđivanje su korišćeni preparati Amidthin i Nokad. Prebrojavanjem plodova neposredno pred berbu je uvrđeno da je najmanji broj plodova bio na rodnim grančicama tretiranih stabla na podlozi M9. Najizraženiji efekat na masu i krupnoću su imali tretirani plodovi na podlozi M9. U ovom ogledu plodovi su imali smanjenu čvrstinu i povećan sadržaj suve materije. Međutim, nisu dobijene značajne razlike u vrijednosti jedno-skrobnog testa i sadržaju kiselina.

Ključne riječi: jabuka, plodovi, hemijsko prorjeđivanje, kvalitet plodova

**IMPACT INDOLBUTERNE ACID ON PROPERTIES RIZOGENA RIPE
CUTTINGS OF RED CURRANT (*RIBES RUBRUM* L.)**

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This paper presents a two-year (2011- 2012.g .) results of studies on the impact of exogenous substances fitohormonalne indolbuterne acid (IBA) on rizogena properties ripe cuttings red ribizle. Research was carried out in a closed room about (greenhouse) in Mostaru. Cuttings were treated with three different concentrations of IBA (1.000 , 2.000 , 3.000 ppm) and rooting in containers with a substrate , peat and agropperlita in relation 1:1. Investigated is rooting mature cuttings in three varieties : Rovada , Detvan and Hori. In varieties Rovada registered the best rooting (92,50 %) , whose cuttings treated with 3,000 ppm , and the lowest in cv. Detvan (85.35 %) which was treated with a solution 1000 ppm IBA. Concluded the best rooting in all the varieties of (Rovada , Detvan , Hori) who were treated with a solution of 3000 ppm IBA.

Keywords: variety, phytohormones , root, mature cuttings.

**UTICAJ INDOLBUTERNE KISELINE NA RIZOGENA SVOJSTVA ZRELIH
REZNICA CRVENE RIBIZLE (*RIBES RUBRUM* L.)**

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U radu su prikazani dvogodišnji (2011 - 2012. g.) rezultati proučavanja uticaja eksogene fitohormonalne materije indolbuterne kiseline (IBA) na rizogena svojstva zrelih reznica crvene ribizle. Istraživanje je obavljeno u zatvorenom prostoru (stakleniku) u Mostaru. Reznice su tretirane sa tri različite koncentracije IBA (1.000 , 2.000 , 3.000 ppm) i ožiljavane u kontejnerima sa supstratom od treseta i agroperlita u odnosu 1:1. Ispitivano je ožiljavanje zrelih reznica u tri sorte: Rovada , Detvan i Hori. U sorte Rovada registrovano je najbolje ožiljavanje (92,50 %), čije su reznice tretirane sa 3.000 ppm, a najslabije u sorte Detvan (85,35%) koja je tretirana sa rastvorom 1000 ppm IBA. Konstatovano je najbolje ožiljavanje kod svih ispitivanih sorti (Rovada , Detvan , Hori) koje su tretirane sa rastvorom 3000 ppm IBA.

Ključne riječi: sorta , fitohormoni , korijen , zrela reznica.

**DYNAMIC OF FLOWERING AND POLLEN VIABILITY OF HAZEL IN
CONDITIONS OF NORTH-WEST REPUBLIC OF SRPSKA**

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Introduced varieties of hazel in agro-ecological conditions of Republic of Srpska and the whole of BiH, show different specificities in the reaction on the, primarily, agroclimatic condition, which having influence on the specific conditions necessary for pollination and fertilization of hazel. The choice of cultivars that the conditions of Republic of Srpska and BiH successively entering in a phase of flowering, mutual incompatibility and low production of pollen life capable, in previous period led to a serious problem in production of hazel. An additional problem is certainly the emergence of large fluctuations of temperature in winter season which occur at the last time in the north-west of Republic of Srpska, and which thereby have a physiological effect on the growth stages of flowering of this fruit culture. Study of the dynamic of flowering and of viability of pollen was conducted with 13 cultivars in terms of north-west Republic of Srpska. The results show that in flowering stage there is now uniform flowering dynamics, or the occurrence of phenological stage of full flowering varieties observed. In this particular cultivars have different intensity of pollinations, and usually remain poorly or completely without pollination. Analyzed cultivars of hazel based on the production of pollen and pollen viability are vary significantly and can be divided into 5 groups: excellent pollinators, good pollinators, weak pollinators, alternative pollinators and genotypes without the ability for pollination. Uneven blossoming of varieties and poor pollen germination which in this study come to the fore, with incompatibility between varieties of hazel, must become a regular measure of biological control of fertility.

Key words: flowering, pollen, pollination

DINAMIKA CVJETANJA I ŽIVOTNA SPOSOBNOST POLENA LIJESKE U USLOVIMA SJEVEROZAPADNE REPUBLIKE SRPSKE

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Introdukovane sorte lijeske u agro-ekološkim uslovima Republike Srpske i čitave BiH pokazuju različite specifičnosti u reakciji na, prije svega, agro-klimatske uslove, koji imaju uticaj na specifične potrebe za oprašivanje i oplodnju. Izbor sortimenta, koji u uslovima Republike Srpske i BiH sukcesivno ulazi u fenofazu cvjetanja, međusobna inkompatibilnost sorti i niska produkcija životno sposobnog polena, u proteklom periodu doveli su do niza problema u proizvodnji lijeske. Dodatni problem je svakako i pojava velikih temperaturnih oscilacija u zimskom periodu koje se javljaju u posljednje vrijeme na području sjeverozapadne Republike Srpske, a koje pri tome imaju ekofiziološki uticaj na fenofazu cvjetanja ove voćne kulture. Istraživanja dinamike cvjetanja i životne sposobnosti polena sprovedeno je kod 13 sorti lijeske u uslovima sjeverozapadne Republike Srpske. Dobijeni rezultati pokazuju da u fenofazi cvjetanja ne dolazi do ravnomjerne dinamike cvjetanja, odnosno pojave fenofaze punog cvjetanja posmatranih sorti. Pri tome pojedine sorte imaju različit intenzitet oprašivanja, a najčešće ostaju slabo ili potpuno neoprašene. Analizirane sorte lijeske se na osnovu produkcije polena i klijavosti polenovih zrna značajno se razlikuju i mogu da se svrstaju u 5 grupa: odlični oprašivači, dobri oprašivači, slabi oprašivači, alternativni oprašivači i sorte bez sposobnosti oprašivanja. Neujednačeno cvjetanje sorti i slaba klijavost polena koja u ovom istraživanju dolaze do izražaja, uz inkompatibilnost između sorti lijeske, moraju postati redovna mjera biološke kontrole rodnosti.

Ključne riječi: cvjetanje, polen, oprašivanje.

**IMMUNITY ON LOW TEMPERATURE, THE CAUSES OF DISEASES AND
PESTS OF SELECTED CORNELIAN CHERRY GENOTYPES (*CORNUS MAS L.*) IN
THE UPPER POLIMLJE REGION**

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In this work are shown three – year examination of immunity on low temperature, the causes of diseases and pests from 30 Cornelian cherry genotypes (*Cornus mas L.*) selected from natural population in the Upper Polimlje Region. Cornelian cherry has many useful and important biological features which are not characteristics of many other fruit species such as: immunity on many fruit diseases and their causes they can grow on poor soil which can not be used and cultivated, immunity on low temperature and the immunity on drought. During the long period of successfulness is the region Cornelian cherry got adapted and also got immunity on biotic and abiotic influences. They natural resistance is of big importance because organic way of production can be adapted.

Key words: Cornelian cherry, Upper Polimlje, immunity, biotic and abiotic influences

**OTPORNOST NA NISKE TEMPERATURE, PROUZROKOVAČE BOLESTI I
ŠTETOČINE IZDVOJENIH GENOTIPOVA DRIJENA (*CORNUS MAS L.*) SA
PODRUČJA GORNJEG POLIMLJA**

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U radu su prikazani trogodišnji rezultati ispitivanja otpornosti na niske temperature, prouzrokovače bolesti i štetočine za 30 genotipova drijena koji su izdvojeni iz prirodne populacije sa područja Gornjeg Polimlja. Drijen odlikuju vrlo korisna i izražena biološka svojstva, koja nemaju većina voćnih vrsta: otpornost na prouzrokovače biljnih bolesti i štetočine voćaka, uspijevanje na siromašnijim zemljištima koja su ne koriste i ne obrađuju, otpornost na niske temperature i otpornost na sušu. Kroz dugi period uspijevanja na ovom prostoru drijen se prilagodio i izgradio otpornost prema nepovoljnim, kako biotičkim tako i abiotičkim uticajima sredine. Ta prirodna otpornost je od ogromnog značaja, jer omogućava gajenje po organskom konceptu proizvodnje.

Ključne riječi: drijen, Gornje Poljmlje, otpornost, abiotički i biotički faktori

EFFECT OF AQUEOUS EXTRACTS ON BLACKBERRIES YIELD IN ORGANIC PRODUCTION

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The aim of this research was to examine the effect of aqueous extracts of nettle, alfalfa and dandelion, with different number of days of fermentation, on yield and quality of blackberry fruits. During 2010 and 2011 application efficiency of aqueous extracts of nettle, dandelion and alfalfa were field tested on an organic plantation in the village of Brekinja, Kozarska Dubica municipality. Laboratory tests were conducted at the Agricultural Institute of the Republic of Srpska - Banja Luka. Aqueous extracts of nettle, dandelion and alfalfa, with fermentation time of 14 days or 21 days were used for the treatment of blackberry bushes. Nettle extract has been made of 1 kg of fresh chopped nettles, and alfalfa and dandelion extract was made of 2 kg chopped plants. It was determined the content of macro-elements in aqueous extracts of nettle, dandelion and alfalfa by using chemical analysis. According to the research the average yields of blueberries were from 9.02 t ha⁻¹ (control) to 10.94 t ha⁻¹ (alfalfa extract). The highest yield (10.97 t ha⁻¹) was recorded in the treatment of blackberry bushes with extract of alfalfa in which the fermentation lasted for 21 days. The duration of plant extracts fermentation and plant species that was used for the preparation of the solution has a significant impact on the yield of blackberries. Application of plants extracts significantly affects the quality and dry matter content of the fruit. Average values of soluble dry matter in ripe blackberry fruits were from 9.06 ° Brix (alfalfa extract) to 9.36° Brix (extract dandelion). The highest content of soluble dry matter in the blackberries fruit were found in the treatment with the extract of dandelion where the fermentation lasted for 21 days (9.50° Brix) and lowest in the treatment with extract of alfalfa with the same fermentation period (8.80° Brix). At the same time, it was observed the existence of statistically highly significant differences in the content of soluble dry matter in blackberry, which have been treated with the alfalfa extracts with different number of fermentation day. All of the tested treatments had higher yields of blackberries compared to the control. The highest average yield was obtained by treating the blackberry bushes with aqueous extract of alfalfa. The fermentation time did not have significant effect on the quality of fruits in any of the treatments.

Key words: aqueous extracts, blackberry, yield, fruit quality.

UTICAJ PRIMJENE VODENIH EKSTRAKATA NA PRINOS KUPINE U ORGANSKOJ PROIZVODNJI

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Cilj istraživanja je da se izvrši ispitivanje uticaja vodenih ekstrakata od koprive, lucerke i maslačka, sa različitim brojem dana fermentacije, na prinos i kvalitet plodova kupine. Poljska ispitivanja efikasnosti primjene vodenih ekstrakata koprive, maslačka i lucerke provedena su tokom 2010. i 2011. godine na organskom zasadu kupine u selu Brekinja - Kozarskoj Dubici, a laboratorijska ispitivanja obavljena su u Poljoprivrednom institutu Republike Srpske – Banjaluka. Za tretiranje žbunova kupine korišćeni su vodeni ekstrakti od koprive, maslačka i lucerke, sa periodima fermentacije od 14 dana i 21 dan. Za spravljanje ekstrakt koprive korišten je 1 kg svježe isjeckanih kopriva, a za ekstrakt lucerke i maslačka korišćeno je po 2 kg isjeckanih biljaka. Takođe je, hemijskom analizom, utvrđen sadržaj makro elemenata u vodenim ekstraktima koprive, maslačka i lucerke. Prema rezultatima istraživanja prosječni prinosi kupine bili su od 9,02 t ha⁻¹ (kontrola) do 10,94 t ha⁻¹ (ekstrakt lucerke). Najveći prinos (10,97 t ha⁻¹) je ostvaren pri tretiranju žbunova kupine sa ekstraktom lucerke kod koga je fermentacija trajala 21 dan. Dužina trajanja fermentacije biljnih ekstrakata i vrsta bilja koja je korišćena za spravljanje rastvora ima značajnog uticaja na prinos kupine. Primjena biljnih ekstrakata značajno utiče na kvalitet ploda, odnosno sadržaj suve materije u plodu. Prosječne vrijednosti sadržaja rastvorljive suve materije u zrelih plodovima kupine bile su od 9,06° Brix-a (ekstrakt lucerke) do 9,36° Brix-a (ekstrakt maslačka). Najveći sadržaj rastvorljive suve materije u plodu kupine utvrđen je kod tretmana sa ekstraktom od maslačka gdje je fermentacija trajala 21 dan (9,50° Brix-a), a najmanji pri tretmanu sa ekstraktom lucerke istog broja dana fermentacije (8,80° Brix-a). Istovremeno, uočeno je postojanje statistički visoko značajnih razlika u sadržaju rastvorljive suve materije u plodovima kupine koji su tretirani ekstraktima lucerke sa različitim brojem dana fermentacije. Svi ispitivani tretmani ostvarili su veći prinos kupine u odnosu na kontrolnu varijantu. Najveći prosječan prinos ostvaren je tretiranjem žbunova kupine sa vodenim ekstraktom lucerke. Trajanje fermentacije nije značajno uticao na kvalitet ploda kupine ni kod jednog tretmana.

Ključne riječi: vodeni ekstrakti, kupina, prinos, kvalitet ploda.

**ENERGY ASPECTS OF EXPLOITATION OF PRUNING RESIDUES FROM APPLE
PRODUCTION**

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Large quantities of biomass are made as a result from the fruit pruning, which is a required pomotechnical operation. Long-standing practice of destroying and burning the pruning residues is hard to change, although energy and environmental indicators point to the importance of the proper biomass exploitation. In Republic of Serbia, apple is grown at 40,000 ha, with the usual biomass yield (3 t/ha pruning residues). The aim of this study is to show the quantity and energy value of pruning residues from apple production, as well as ways and means of their proper exploitation. Upper heating power of pruning residues for two apple varieties (Idared and Jonagold), with 46% moisture, was 18.35 MJ/kg average.

Key words: biomass yield, energy, moisture, heating power, CO₂.

**ENERGETSKI ASPEKTI KORIŠĆENJA REZIDBENIH OSTATAKA IZ
PROIZVODNJE JABUKA**

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Velike količine biomase nastaju kao rezultat rezidbe voćaka, što predstavlja obaveznu pomotehničku meru. Dugogodišnja praksa uništavanja i spaljivanje rezidbenih ostataka se teško menja, ali energetske i ekološki pokazatelji ukazuju na značaj pravilne eksploatacije ovom biomasom. U Republici Srbiji, jabuka se gaji na oko 40.000 ha, sa uobičajenim prinosom biomase od 3t/ha rezidbenih ostataka. Cilj ovog rada je da ukaže na količine, energetske vrednosti i potencijal rezidbenih ostataka nastalih u proizvodnji jabuka, kao i načine i mogućnosti njegove pravilne eksploatacije. Gornja toplotna vrednost ostataka rezidbe dve sorte jabuke (Ajdared, Jonagold), pri vlažnosti od 46%, u proseku iznosi 18,35 MJ/kg.

Ključne reči: prinos biomase, energija, vlažnost, toplotna moć, CO₂.

**APPLICATION BIOSTIMULATORS BENEFIT PZ INCREASE FRUIT WEIGHT
IN LEMON MEYER (CITRUS MEYER Y. TAN .)**

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This paper presents the results of a two-year (2011 - 2012 g.) Tests the impact of bio-stimulant Benefit Pz for increased fruit weight of Meyer lemons in the area of Bara . Foliar treatment (400ml/hl) to Benefit Pz were performed twice , every 10 days starting 10 days from the fruiting lemon . We found a difference in the weight of the fruit between the treated and untreated fruit juice. The average weight of the fruits treated with biostimulator Benefit PZi was 119 , 50 grams, and fruit that are not treteirani 115.80 grams .

Keywords : lemon , foliar treatment , biostimulator , fruit weight .

**PRIMJENA BIOSTIMULATORA BENEFITA PZ ZA POVEĆANJE MASE
PLODA U LIMUNA MEJER (CITRUS MEYER Y.TAN)**

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U radu su prikazani dvogodišnji (2011-2012 g.) rezultati ispitivanja uticaja biostimulatora Benefita Pz za uvećanje mase ploda u limuna Mejer na području Bara . Folijarno tretiranja (400ml/hl) sa Benefitom Pz vršeno je u dva navrata , svakih 10 dana , počevši 10 dana od zametanja plodova limuna . Konstatovana je razlika u masi ploda između tretiranih i ne tretiranih plodova limuna . Prosječna masa plodova koji su tretirani sa biostimulatorom Benefit Pz iznosila je 119,50 grama, a plodovi koji nisu tretirani 115,80 grama .

Ključne riječi : limun, folijarno tretiranje , biostimulator , masa ploda .

INFLUENCE OF TIME AND THINING INTERSPACE ON YIELD AND QUALITY OF PEACH AND NECTARINE FRUIT IN MONTENEGRO

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The study results over the three year period (2007-2009) on three cultivars of peach and nectarine (Early Crest, May Crest, Springbelle, Adriana, Rita Star and Caldesi 2000) have been presented in the paper. The study includes: time of flowering, pollen germination percentage, the percentage of fruit set, interspaces and time of fruit thinning and their influence on fruit weight and total yield of the examined cultivars. The study found a high percentage of fruit set especially in cv. May Crest (86.60%) and the lowest was in cv. Springbelle (80.51%). Interspace thinning of 5.0 cm gave the highest average of fruit weight (119.0 g) in cv. Caldesi 2000 and the lowest (54.3 g) in cv. Early Crest. At a distance of 10 cm interspace thinning the highest fruit weight was again in cv. Caldesi 2000 (141.0) and the lowest in cv. Early Crest (59.3 g). Our research shows that the most favorable period for thinning of peaches in our agroecological conditions is at the end of April, when the initial fruit weight is 3-5 g.

Key words: Peach, cultivar, thinning, fruit quality, yield.

PHENOLIC CONTENT AND ANTIOXIDANT ACTIVITY OF SOUR CHERRY FRUITS CULTIVAR OBLAČINSKA

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Sour cherry (*Prunus cerasus* L.) is a valuable natural source of some bioactive compounds important in human health preservation. Sour cherry contains a wide range of antioxidant phytochemicals including phenolics as the most prominent group of compounds. Plants need phenolic compounds for pigmentation, growth, reproduction, resistance to pathogens and herbivores and for many other functions. In this study the antioxidant capacity, total polyphenolic, tannins and anthocyanin content of sour cherry cv. Oblačinska juice obtained from different locations (Irig and Rivica, Srem region) were investigated. The free radical scavenging properties of fruits were evaluated employing three different methodologies, including DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging assay, ferric reducing antioxidant power (FRAP) assay and 2,2'-azino-bis-3-ethylbenzthiazoline-6-sulphonic acid (ABTS^{•+}) assay. The content of investigated secondary metabolites in sour cherry juice, as well as antioxidant capacity did not differ significantly among different orchards. Antioxidant capacity is mainly due to the presence of polyphenols and tannins, but the antioxidant activity is also well supported by the anthocyanin fraction. This work was supported by Ministry of Education, Science and Technological Development of the Republic of Serbia, project No. TR-31038.

Ključne reči: antioxidant capacity, phenolics, sour cherry

SADRŽAJ FENOLNIH JEDINJENJA I ANTIOKSIDATIVNA AKTIVNOST PLODA OBLAČINSKE VIŠNJE

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Višnja (*Prunus cerasus* L.) je dragocen izvor pojedinih prirodnih bioaktivnih supstanci koje su veoma važne za očuvanje dobrog zdravstvenog stanja ljudi. Plod višnje sadrži velik broj antioksidativnih supstanci od kojih su fenolne supstance jedne od najznačajnijih. Biljkama su fenolna jedinjenja neophodna zbog pigmentacije, rasta i razvića, reprodukcije, odbrane od napada patogena i biljojeda, kao i zbog mnogih drugih funkcija. U ovoj studiji je ispitivan antioksidativni kapacitet i sadržaj ukupnih polifenola, tanina i antocijanina u soku plodova Oblačinske višnje gajene na različitim lokacijama (industrijske plantaže i privatne farme u irigu i Rivici u Sremu). Sposobnost uklanjanja slobodnih radikala u plodovima je ispitan pomoću tri različita testa: DPPH (2,2-difenil-1-pikrilhidrazil) test, FRAP test (ferric reducing antioxidant power) i ABTS⁺ (2,2'-azino-bis-3-etilbenzotiazoline-6-sumporna kiselina) test. Sadržaj ispitivanih sekundarnih metabolita u soku višnje se nije statistički značajnije razlikovao između ispitivanih uzoraka uzetih sa različitih lokaliteta. Antioksidativni kapacitet direktno zavisi od sadržaja polifenola i tanina u plodu, ali isto tako je u pozitivnoj korelaciji sa sadržajem antocijaninskih komponenti u uzorku. Ovaj rad je finansiran od strane Ministarstva Prosvete, Nauke i Tehnološkog razvoja republike Srbije, projekat broj TR-31038.

Ključne reči: antioksidativni kapacitet, fenoli, višnja

**EFFICIENCY OF FRUITLET THINNING IN 'GOLDEN DELICIOUS' AND
'GRANNY SMITH' APPLES BY USE OF METAMITRON**

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The influence of new chemical compound metamitron on chemical fruit thinning in two apple cultivars 'Golden Delicious' and 'Granny Smith' was investigated in this study. Metamitron is herbicide which works as a photosynthesis inhibitor. In two treatments, effect of this compound was enhanced by NAA (1-Naphthaleneacetic acid). This experiment was carried out in commercial five-year-old apple orchard of PIK „Južni Banat“, which is located in Bela Crkva. The planting distance of 3.3m x 0.8m (3878 trees/ha) and growing system of slender spindle were applied. Brevis®, a new specially formulated thinning agent containing 150 g/kg of metamitron, was used for spraying when central fruit in a cluster were 12-14 mm in diameter. In cv. 'Golden Delicious', the following treatments were applied: control, 225 mg/L, 248 mg/L, 270 mg/L, 225 mg/L metamitron + 10 µL/L NAA and 270 mg/L metamitron + 10 µL/L NAA. Treatments applied in cv. 'Granny Smith' were as follows: control, 150 mg/L, 188 mg/L, 225 mg/L, 150 mg/L metamitron + 5 µL/L NAA and 225 mg/L metamitron + 10 µL/L NAA. In all treatments spraying volume was 800 L/ha. Metamitron expressed a positive influence on chemical thinning of both studied cultivars. Single treatment with appropriate concentration of this chemical agent was enough for obtaining large yields consisted of high percentage of first quality fruit. The effect of this chemical compound could be intensified by mixing with NAA, but the treatments with the highest concentration of metamitron mixed by NAA can influenced overthinning in cv. 'Golden Delicious'.

Key words: brevis, chemical thinning, yield, fruit quality

FLOWERING PHENOLOGY OF FOUR APPLE CULTIVARS IN THE TERRITORY OF RAVNI KOTARI

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The flowering phenology of five apple cultivars ('Cripps Pink', 'Golden Delicious', 'Granny Smith', 'Gala' and 'Elstar') in the territory of Ravni kotari (located in the County of Zadar, Croatia) was studied. The study consisted of the following characteristics: the start and end of flowering, date of full bloom, flowering intensity, the average number of flowers in a flower cluster, the diameter of the central flower petals color in balloon phase and arrangement of petals in flower. The highest average number of flowers in the flower cluster had cv. 'Golden Delicious', and cv. 'Elstar' the lowest. The largest diameter of the central flower had the cv. 'Granny Smith' and the lowest cv. 'Elstar'. Cultivar 'Cripps Pink' had the earliest flowering (April 13) which lasted for about ten days, while cultivar 'Elstar' flowered the latest (April 20) and flowering lasted until April 29. The highest flowering intensity had cv. 'Cripps Pink' and the lowest cv. 'Elstar'. Petal color in balloon stage was different in all studied cultivars and petals were free, except in the cv. 'Elstar' where the petals overlapped. It can be concluded from this study that the cv. 'Cripps Pink' is unfavorable for breeding in the area of Ravni kotari, due to early flowering which makes it prone to damage from frosts and cold wind that blows from Velebit mountain.

Keywords: *Malus x domestica* Borkh., cultivar, blossoming, phenology

FEATURES OF YIELD OF PEACH DEPENDING ON THE DIFFERENT SYSTEMS AND REGIMES OF IRRIGATION

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In order to ensure real needs of peach for water, irrigation is given more attention in modern production, resulting in higher and more stable yields with consistent quality. Questions such as: how, what quantities of water and when to irrigate are particularly sensitive and will also be the subject of research in future. The study of yield and quality parameters of peach yields depending on the different systems and regimes of irrigation and the needs of peach for water was conducted in 2009, 2010 and 2011. The results show that the use of a specific way, and irrigation regimes can adversely affect the yield of peach. The best yield from the standpoint of quantity and quality is obtained under irrigation microsprinklers and weakest yield in drip irrigation. There is also the highest dry matter content of the fruits of peach that is irrigated by microsprinklers. Based on the results obtained in the research, it was found that the use of microsprinklers irrigation achieve the best returns in terms of quantity and quality of peaches.

Keywords: irrigation, sprinkler, micro sprinkler, drip, peach, yield components, yield.

KARAKTERTISTIKE PRINOSA BRESKVE U ZAVISNOSTI OD RAZLIČITIH NAČINA I REŽIMA NAVODNJAVANJA

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U cilju obezbjeđenja stvarnih potrebe breskve za vodom, navodnjavanju se poklanja sve veća pažnja u savremenoj proizvodnji što ima za rezultat veće i stabilnije prinose sa ujednačenim kvalitetom. Pitanja kao što su: na koji način, kojim količinama vode i kada navodnjavati su posebno osjetljiva i još dugo će biti predmet istraživanja. Proučavanje prinosa i parametara kvaliteta prinosa breskve u zavisnosti od različitih načina i režima navodnjavanja kao i potreba breskve za vodom obavljeno je tokom 2009, 2010 i 2011. Godine. Rezultati pokazuju da se primjenom određenog načina i režima navodnjavanja može uticati na karakteristike prinosa breskve. Najbolji prinos sa stanovišta količine i kvaliteta dobijen je u uslovima navodnjavanja mikrokišenjem a najslabiji pri navodnjavanu kapanjem. Takođe je i sadržaj suve materije najveći u plodovima breskve koja je navodnjavana mikrokišenjem. Na osnovu rezultata dobijenih u okviru istraživanja, utvrđeno je da se primjenom navodnjavanja mikrokišenjem ostvaruju najbolji prinosi sa aspekta količine i kvaliteta breskve.

Ključne riječi: navodnjavanje, kišenje, mikrokišenje, kapanje, komponente prinosa.

**STUDY ON EARLY APPLE CULTIVARS ('PETROVKA') FROM THE GENE POOL
OF TROYAN AND APRILTSI**

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The local plant resources of *Malus* genus were studied in the region of Troyan and Apriltsi. 10 forms were found out and studied from the group of Petrovka. The growth rate of trees was determined and biometric measurements of fruit were made. The trees have a great growth rate and reach considerable sizes. The largest fruit were found in form No 6 - 80.6 g and No 8 - 80.6 g. The basic biochemical composition of fruit was studied. The content of total sugars varied in the limits from 6.50 up to 9.90 mg%, and that of pectin from 0.73 up to 1.20 mg%. The susceptibility to apple scab (*Venturia inaequalis*) and powdery mildew (*Podosphaera leocotricha*) was accounted. Most of the studied forms are slightly susceptible to diseases, which determined them as appropriate for biological fruit production. From the conducted study on the basis of the results obtained, as the most perspective forms were selected No 6, No 8 and No 9.

Key words: apple, local genetic resources, susceptibility to diseases, biochemical composition

FILLING-IN EMPTY SPACES IN VINEYARDS AS AN OPTION FOR COST REDUCTION

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In the current conditions of development of viticultural production, our sole goal is not only to produce, but to produce the product marketable under most favourable conditions. This indicates that viticulture can be highly profitable if the technology of grape growing is in accordance with market requirements. Special attention in grape production should be paid to complete implementation of agrotechnical measures, which has so far not always been the case. After several years of exploiting a vineyard empty spaces appear, i.e. the lack of vine start to affect significantly the yield per unit of surface. When we compare calculation of raising new plants with the calculation of filling-in empty spaces in a vineyard (the majority of operations is performed within regular production) the costs of filling-in empty spaces prove to be less than in raising new plants. One should not wait for the spacing to threaten the survival of the existing vineyard; rather filling-in empty spaces should be practiced much before that time.

Key words: vineyards, grapes, agrotechnical measures, spacing, calculation

POPUNA PRAZNIH MESTA U VINOGRADIMA KAO MOGUĆNOST SMANJENJA TROŠKOVA

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U današnjim uslovima razvoja vinogradarske proizvodnje nije jedini cilj samo proizvesti, nego proizvesti onaj proizvod koji se pod najpovoljnijim uslovima može plasirati na tržištu. Ovo ukazuje na to da vinogradarstvo može biti visoko profitabilno ukoliko je tehnologija gajenja grožđa u skladu sa zahtevima tržišta. Posebna pažnja u proizvodnji grožđa mora se posvetiti potpunoj primeni savremenih agrotehničkih mera, što u dosadašnjoj praksi nije bio svuda slučaj. Posle nekoiko godina eksploatacije vinograda primećuje se pojava praznih mesta, to jest, nedostatak čokota počinje značajno da utiče na smanjenje prinosa po jedinici površine. Kada se uporedi kalkulacija podizanja novog zasada sa kalkulacijom popune praznih mesta u vinogradu (najveći deo operacija se izvodi u sklopu redovne proizvodnje) vidi se da su manji troškovi kod popune praznih mesta. Ne treba čekati da proređenost ugrozi opstanak postojećeg vinograda, nego popunu praznih mesta treba praktikovati znatno ranije.

Ključne reči: vinograd, grožđe, agrotehničke mere, proređenost, kalkulacija

PRODUCTION AND TECHNOLOGICAL PROPERTIES OF CLONES CABERNET SAUVIGNON CULTIVAR IN THE NIS WINE-GROWING REGION

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An adequate choice of a suitable cultivar/clone is highly important in the process of vineyard establishment. Enrichment of the existing grape cultivars with the new improved genotypes incurred as a result of clonal selection with better quality and it is performed in accordance with the requirements of modern viticulture. In many cultivars of grapevine, large number of clones grown in different viticultural regions in the world and in Serbia was selected. Five clones (169, 685, E 153, ISV 117 and VCR 19) of Cabernet Sauvignon cultivar at the experimental field of Center of Viticulture and Enology in Niš were investigated in this paper. The spacing between the grapevines was 3 x 1 m. The training system was Karlovački with mixed-type pruning system. During the two year period (2010 and 2011), the following was determined for the investigated clones: grape yield (kg/m²), bunch weight (g), berry weight (g), berry skin weight (g), berry mesocarp weight (g), seed weight (g), sugar content (%) and total acid content in must (g/l). The obtained results showed that the grape yield, berry weight, sugar content and total acid content in must were statistically significant or very significant for the differences among the studied clones. Bunch weight, berry skin weight, berry mesocarp weight and seed weight did not show statistical significance. The highest average grape yield and bunch weight were observed in the clone ISV 117 (0.57 kg/m²; 227.58 g). The average berry weight varied in the range from 1.74 g (clone 685) to 1.93 g (clones 169 and E 153). Clone 169 had the highest sugar content (21.03%) and the lowest total acid content in must (7.04 g/l), and clone VCR 19 had the lowest sugar content (20.19%) and the highest total acid content in must (8.45 g/l). In the agro-ecological conditions of Nis wine-growing region, the clones ISV 117 and 169 were the best regarding the studied traits. Clone ISV 117 stands out for grape yield and bunch weight, and clone 169 by berry weight and grape quality (sugar content and total acid content in must).

Key words: grapevine, clone, yield, grape quality.

**AGROBIOLOŠKA I TEHNOLOŠKA SVOJSTVA KLONOVA SORTE BURGUNDAC
SIVI (B – 10 I RULANDER 2/ 54) U NIŠKOM PODREJONU**

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U periodu 2010-2011. godine izučavana su agrobiološka i tehnološka svojstva klonova sorte burgundac sivi (B-10 i rulander 2/54) u niškom vinogradarskom podrejonu. Ispitivanja su obavljena u Centru za vinogradarstvo i vinarstvo u Nišu. U periodu ispitivanja vladali su povoljni uslovi za ispoljavanje bioloških i tehnoloških osobnosti ispitivanih klonova sorte. Visina prinosa grožđa i njegovo variranje po godinama ukazuju na visoku i stabilnu rodnost ispitivanih klonova. Sadržaj šećera u širi varirao je od 21.31 do 22.79%, a sadržaj ukupnih kiselina varirao je od 7.66 do 8.09 g / l. Hemijskom analizom vina utvrđeno je da su dobijena vina dobrog kvaliteta. Rezultati istraživanja potvrđuju opravdanost gajenja klonova sorte burgundac sivi u niškom vinogradarskom podrejonu.

Ključne reči: Klonovi, prinos grožđa, kvalitet grožđa i vina.

**THE VEGETATIVE POTENTIAL OF THE VINE CULTIVAR WHITE TAMJANIKA
IN THE CONDITIONS OF ŽUPA VINE DISTRICT**

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In this paper are presented results some important agrobiological traits of the cultivar White Tamjanika in the agroecological conditions of Župa vine district. The investigation was carried out at a productive vineyard in private property, at the location Svračak. The vineyard was established in 1981. Planting distance was 2.8 x 0.9 m. This investigation lasted three years, the period 2000-2002, and it included phenological observation, plant vegetative potential, resistance to *Botrytis cinerea* and wine quality. Weather conditions were favorable for development of this cultivar. The study was aimed to observe important agrobiological traits of the cultivar White Tamjanika, as well possibility growing and spreading in the conditions of Župa vine district. On the basis of the obtained results it can be concluded that this cultivar has shown positive agrobiological traits and enables making quality categories of wine.

Key words: vegetative potential, tamjanika, quality.

**AMPELOMETRIC CHARACTERISTICS OF GRAPE BUNCH OF VARIETIES
ZILAVKA AND BLATINA**

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Almost the entire grape production in BiH is realized in Herzegovina region, where for many years the relationship of the area under vine and the area under a table grape is approximately 80%:20%. Autochthonous wine varieties, Zilavka and Blatina have the greatest significance in the vineyard production in this region. That is the reason why they are the subject of numerous studies and analyzes. This paper presents the most important ampelometric characteristics of Žilavka nad Blatina varieties. Part of experimental studies on ampelometric characteristics of bunch, berries and seeds, are implemented in a vineyard of company „Aluminijumski kombinat“ located in Mostar region. Bearing in mind that the functional morphology of flowers in vine reproductive biology present an important factor in the effectiveness of the reproductive organs to the realization of high yields of appropriate quality grapes, special attention during the study is dedicated to the characteristics which have a direct impact to level of fertilization: bunch, berries and the seeds. The research was conducted during the period 2009-2011. Average bunch weight of Blatina variety for research period was 228.28 g, ranged from 169.35 to 289.19 g, with an average of 65.80 berries in a cluster. The average weight of berry was 3.49 g, with an average 1.51 seeds in the berries. The average bunch mass of the Zilavka variety, during the research period was 223.16 g and ranged from 170.06 to 325.45 g, with an average of 114.47 berries in a cluster. The average weight of berry, was 2.14 g, with an average 1.76 seeds in the berries. Greater variation of tested characteristics, were found in Blatina variety which can be addressed to the varietal specificity of this variety to the process of pollination and thus the displacement of berries in a bunch.

Key words: variety, bunch, characteristics

AMPELOMETRIJSKE KARAKTERISTIKE GROZDA SORTI ŽILAVKA I BLATINA

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Skoro celokupna proizvodnja grožđa u BiH, realizuje se na području Hercegovine, gde se već duži niz godina zadržava odnos od približno 80% površina pod vinskim i 20% površina pod stonim grožđem. Autohtone vinske sorte Žilavka i Blatina imaju najveći značaj u vinogradarskoj proizvodnji u ovoj regiji, zbog čega su predmet mnogobrojnih istraživanja i analiza. U ovom radu su prikazane najvažnije ampelometrijske karakteristike grozda sorti Žilavka i Blatina. Deo eksperimentalnih istraživanja u cilju ampelometrijskih analiza karakteristika grozda, bobice i semenke, realizovan je u proizvodnom vinogradu Aluminijskog kombinata u Mostaru. Imajući u vidu da je funkcionalna morfologija cvasti i cveta vinove loze u reproduktivnoj biologiji, veoma važan faktor efektivnosti reproduktivnih organa u funkciji realizacije visokih prinosa odgovarajućeg kvaliteta grožđa, posebna pažnja u ampelografskom proučavanju sorti Žilavka i Blatina, posvećena je karakteristikama na koje direktan uticaj ima stepen oplodnje: grozd, bobica i semenka. Istraživanja su realizovana u periodu 2009-2011. godina. Prosečna masa grozda sorte Blatina za period istraživanja iznosila je 228,28 g i kretala se u rasponu od 169,35 g do 289,19 g, sa prosečno 65,80 bobica u grozdu. Prosečna masa bobica sorte Blatina, iznosila je 3,49g, sa prosečno 1,51 semenkom u bobici. Prosečna masa grozda sorte Žilavka za period istraživanja iznosila je 223,16 g i kretala se u rasponu od 170,06 g do 325,45 g, sa prosečno 114,47 bobica u grozdu. Prosečna masa bobica sorte Žilavka izosila je 2,14 g, sa prosečno 1,76 semenki u bobici. Nešto veća variranja posmatranih svojstva, utvrđena su kod sorte Blatina što se može dovesti u vezu sa sortnom specifičnošću ove sorte prema procesu oprašivanja i oplodnje, te samim tim i zametanju bobica u grozdu.

Ključne reči: sorta, grozd, karakteristike

DIFFERENT POTASSIUM FERTILIZERS DOSES AND THEIR IMPACT ON CA:MG AND K:MG RATIO IN THE GRAPEVINE ORGANS

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Balanced nutrition and fertilization are essential components of the growing technology in vineyards in terms of achieving the required yields and quality of grapes. Magnesium is constituent of the chlorophyll and precursor of many enzymatic reactions. Calcium plays an important role in plant nutrition like growing of apical shoot and root meristem, carbohydrates translocation and is a constituent of the cell wall. In grape nutrition, potassium is generally recognized as one of the essential nutrient, which regulates most of the enzymatic reaction in the plant, affect the carbohydrates accumulation and also affect fruit quality and berries color. Research was carried out in the vineyard of the Faculty of Agriculture experimental station-“Radmilovac” on cv. Sauvignon blanc grafted to the rootstock *Berlandieri* x *Riparia* Kober 5BB. This research was to demonstrate effect of different potassium fertilizer application on Ca:Mg and K:Mg ratio in soil and vines organs. In experiment following treatments included increasing doses of potassium fertilizer (50, 100 and 150 kg K₂O/ha 50% KCl) and control (without fertilization). Treated soil was subjected for detail agrochemical soil analysis, while the soil samples was collected from the depth of 0-30, 30-60, 60-90 and 90-120 cm. Leaves for analysis were collected in august and shoots after pruning. The level of available potassium was (11,95-14,15 mg/100 g of soil), magnesium (20,2-23,7 mg/100 g of soil) and calcium (354-464 mg/100 g of soil). During the first year, Ca:Mg ratio was 5,8-14,4:1, in the second year 5,4-18,5:1 and at third year 4,9-25,2:1. The K:Mg ratio ranged from 0,08-0,21:1 in the first, 0,13-0,29:1 in the second and 0,11-0,21:1 in the third year of study. The Ca:Mg and K:Mg ratio were mostly influenced by 100 and 150 kg K₂O/ha potassium doses. The K:Mg ratio in the leaves and shoots did not change under influence of different potassium fertilizer doses, so that the antagonism between these two elements was not manifested.

Key words: potassium fertilizer, grapevine organs, Ca, Mg, K

EFFECT OF THE PRUNING ON THE SIZE OF CLUSTER OF THE TABLE GRAPES VARIETIES

Dragutin Mijatović, Tatjana Jovanović Cvetković, Dijana Pantić, Dajana Jović

The variety of grape have a very important role in Viticulture. Much higher than in other species. The quality of table varieties most suitable is viewed through the organoleptic characteristics of the cluster. In this paper, studied the influence of the position of the bud at the shoot on the size of bunches grape varieties as indicators of the quality of table grapes. The experimental part of the experiment was conducted in a collection vineyard Sjeverovci. In the experiment were included varieties: Lasta, Karmen, Palatine, Esther and Muscat Saint Vallier. The obtained data on individual varieties, four of the five tested varieties (Lasta, Karmen, Muscat and Palatine) had larger bunches on shoots developed from buds of the cane. Variety Esther had a larger cluster on shoots developed from buds of the spur. The results of work with the varieties types of interspecific hybrids this time showed that the varietal characteristics of specific and to the raising of the vineyard must be considered in order to ensure adequate Ampelotechnic in the production of high quality table grape.

Keywords: variety, type of pruning, cluster mass

UTICAJ DUŽINE REZIDBE NA VELIČINU GROZDA STONIH SORTI VINOVE LOZE

Dragutin Mijatović, Tatjana Jovanović Cvetković, Dijana Pantić, Dajana Jović

Sorta u vinogradarstvu ima veoma značajnu ulogu. Mnogo veću nego kod drugih vrsta. Kvalitet stonih sorte najcelishodnije se sagledava preko organoleptičkih karakteristika grozda. U ovom radu ispitivan je uticaj položaja koljenca na lastaru na krupnoću grozda sorte kao pokazatelja kvaliteta stonog grožđa. Eksperimentalni dio oglada obavljen je u kolekcionom zasadu Sjeverovci. U ogled su bile uključene sorte: Lasta, Karmen, Palatina, Esther i Muscat Saint Vallier. Na osnovu dobijenih podataka o pojedinim sortama, četiri od pet ispitivanih sorti (Lasta, Karmen, Muscat i Palatina) imale su veću krupnoću grozda na lastarima razvijenim iz okaca luka. Sorta Esther imala je krupniji grozd na lastarima razvijenim iz okaca kondira. Rezultati oglada sa stonim sortama tipa interspecies hibrida su i ovog puta pokazali da su sorte karakteristika specifične i da se prilikom podizanja vinograda moraju uzeti u obzir kako bi se obezbijedila odgovarajuća ampelotehnika u proizvodnji kvalitetnog stonog grožđa.

Ključne riječi: sorta, tip rezidbe, masa grozda



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Section 5. Vegetable Growing, Medicinal Plants

**VARIABILITY OF ESSENTIAL OIL OF MENTA PIPERITA L. GROWING IN
ALBANIA**

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Menta piperita L. (Labiatae family) grows wild in it is widely used in folk medicine for its anti-inflammatory, antispasmodic, expectorant actions, anticongestive and also were investigated for their antimicrobial properties. Variability of essential oil content and its composition of 10 Albanian accessions of *Menta piperita* L. collected on different areas during 2012 were studied. The composition of essential oils obtained from aerial parts of *Menta piperita* was analyzed by GC and GC-MS. The essential oils content showed considerable variation ranging from 0.31% to 1,17% (w/w). Twenty six components were identified in the oils and the major compounds were menthol (from 37 to 47,8 %), menthyl acetate (from 11 % to 19.4%) and menthone (from 9% to 15.7%). Cluster analysis of essential oils composition identified two groups. Relation between geographic distribution, chemical composition and significant variation was observed.

Keywords: *Menta piperita*; Albania, Essential oils; Cluster analyses

HYBRID EFFECT ON THE YIELD OF TOMATO GROWN IN GREENHOUSE

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In practice, there is increasingly present selection of large number of domestic and foreign tomato varieties and hybrids, so that the selection of varieties become one of the most important factors of successful production and high yields achievement. *Experiment with six tomato hybrids* (Rally, Belle, Mondial, Monroe, Berberana, Ombeline, Sultan, Minaret, Torquay) was conducted in the greenhouse without heating on the locality of Economy of Agricultural institute in Banja Luka during the year 2013. The growth technology on mulch with black PE-foil with drip irrigation was applied. The experiments was set up by randomized block system in four replications. Tomato fruit mass ranged from 105,30 g (Belle F1) to 235,45 g (Rally F1).

Key words: greenhouse, tomato, hybrids, yield.

UTICAJ HIBRIDA NA PRINOS PARADAJZA GAJENOG U PLASTENIKU

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U praksi je sve prisutnija ponuda velikog broja domaćih i inostranih sorti i hibrida paradajza, tako da izbor sortimenta postaje jedan od najvažnijih faktora uspješne proizvodnje i postizanja visokih prinosa. Ogled sa šest hibrida paradajza (Rally, Belle, Mondial F₁, Monroe, Berberana, Torquay) postavljen je u plasteniku bez grijanja na ekonomiji Poljoprivrednog instituta u Banjoj Luci u toku 2013 godine. Primijenjena je tehnologija uzgoja na malču od crne PE-folije sa sistemom za navodnjavanje kap po kap. Ogled je postavljen po slučajnom blok sistemu u četiri ponavljanja. Masa ploda paradajza je varirala od 105,30 g (Belle F₁) do 235,45 g (Rally F₁).

Ključne riječi: zaštićeni prostor, paradajz, hibridi, prinos.

**EFFECTS OF BIOFERTILIZERS APPLICATION ON THE LETTUCE
YIELD (*LACTUCA SATIVA* L.)**

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Recently, biofertilizers are recommended as an alternative or supplement for mineral nutrients. Active agents in biofertilizers are microorganisms that are involved with their activity in the preparation of herbal assimilative and other biotic substances for plant needs. In this study, the influence of Bioaktiv bioproduct on the lettuce yield was tested. Bioaktiv contains the active substance consisting of following microorganisms: *Bacillus subtilis*, *Azobacter sp.*, *Penicillium oxalicum* and *Fusarium sp.* The application of this bioproduct affected on earlier formation of the lettuce head and overall higher yield.

Kay words: biofertilizers, lettuce, yield.

**EFEKTI PRIMJENE BIOFERTILIZATORA NA PRINOS ZELENE SALATE
(*LACTUCA SATIVA* L.)**

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Biofertilizacija se u novije vrijeme preporučuje kao alternativa ili dopuna mineralnim hranivima. Aktivni činioci u biofertilizaciji su mikroorganizmi koji svojom aktivnošću učestvuju u pripremanju biljnih asimilativa i drugih biotičkih materija za potrebe biljaka. U ovom istraživanju ispitan je uticaj biopreparata Bioaktiv na prinos zelene salate. Bioaktiv sadrži aktivnu materiju koju čine sljedeći mikroorganizmi: *Bacillus subtilis*, *Azotobacter sp.*, *Penicillium oxalicum* i *Fusarium sp.* Primjena ovog biopreparata je uticala na ranije formiranje glavice i veći ukupan prinos.

Ključne riječi: biofertilizacija, salata, prinos.

APPLICATION OF ORGANIC LIQUID NUTRIENT VINASSE IN PEPPER PRODUCTION

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In this study, we examined the effect of organic liquid nutrients "Vinasse" on the yield and quality of peppers compared to standard fertilization with fertirrigation. In the experiment is used an organic liquid nutrient Vinasse, which is applied together with water-soluble fertilizer at a dose of 20 l/ha with four repetitions at intervals of 15 days. In a standard way of fertilization with fertirrigation during the development of the first root vessels was fertilized with water-soluble fertilizer Cristaland 13-40-13 at a dose 25 kg/ha . After 10 days during the vegetative growth of the plant to the start of flowering is fertilized with Cristaland 24-6-12 at a dose of 35 kg/ha . At the stage of flowering and fruit set of the first fruits was used Cristaland 13-40-13 at a dose of 35 kg/ha . After the fruit setting for a balanced development of plants and fruits is used Cristaland 20-20-20 at a dose of 40 kg/ha . For the development of the fruit until early ripening is used Cristaland 15-5-30 +2MgO at a dose of 50 kg/ha . The research referred to the total yield t/ha and fruit size of peppers . The studies carried out indicate that the use of organic nutrient liquid Vinasse increases yield and improves the quality characteristics of pepper fruits.

Keywords : organic liquid nutrient, Vinasse, water soluble fertilizers, peppers

PRIMJENA ORGANSKOG TEKUĆEG HRANJIVA VINASSE U PROIZVODNJI PAPRIKE

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U ovom istraživanju ispitan je učinak organskog tekućeg hranjiva „Vinasse“ na prinos i kvalitetu paprike u odnosu na standardni način ishrane fertirigacijom. U pokusu je korišteno organsko tekuće hranjivo Vinasse, koje je primjenjeno skupa s vodotopivim gnojivima u dozi 20 l/ha sa 4 ponavljanja u razmacima od 15 dana. Kod standardnog načina ishrane fertirigacijom u toku razvoja prvih korijenskih žila izvršena je prihrana sa vodotopivim gnojivom Cristaland 13-40-13 u dozi 25 kg/ha. Nakon 10 dana u toku vegetativnog rasta biljke do početka cvatnje prihranjivano je sa Cristaland 24-6-12 u dozi 35 kg/ha. U fazi cvjetanja i zretanja prvih plodova korišten je Cristaland 13-40-13 u dozi 35 kg/ha. Nakon zretanja prvih plodova, za ujednačen razvoj biljke i plodova korišten je Cristaland 20-20-20 u dozi 40 kg/ha. Za razvoj plodova do početka dozrijevanja korišten je Cristaland 15-5-30+2MgO u dozi 50 kg/ha. Istraživanja su se odnosila na ukupan prinos t/ha i krupnoću plodova paprike. Provedena istraživanja ukazuju na to da primjena organskog tekućeg hranjiva Vinasse povećava prinos i poboljšava kvalitativna svojstva plodova paprike.

Ključne riječi: organsko tekuće hranjivo, vinasse, vodotopiva gnojiva, paprika,

**INFLUENCE OF ENRICHMENT OF GREENHOUSE AIR CARBON DIOXIDE ON
GROWTH AND PRODUCTIVITY: TOMATO (LYCOPERSICUM ESCULENTUM
MILLER), PEPPER (CAPSICUM ANNUUM L.), CUCUMBER (CUCUMIS
SATIVUS L.)**

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The effect of enriching the air greenhouses to 1200 ppm CO₂ was studied in tomato (Hybrid Fondango), pepper (Hybrid Lipari) and cucumber (Super Hybrid Marketer). Analysis of growth parameters shows that the enrichment of CO₂ in the air stimulates the final stem height and growth rate, the differences are significantly different compared to grown under normal ambient CO₂ concentration plants. The number of fruits per plant and the average weight of a grown fruit are stimulated in air enriched with CO₂ highly significantly. Yield components, namely the number of fruits per plant and average weight of a fruit grown in CO₂-enriched air are highly significant. The increase in the actual performance of the treated cultures is: 88.45 per 100 for tomato 235.70 p 100 pepper 210.66 p 100 for cucumber The profitability of the system shows that the enrichment of air in greenhouses at 1200 ppm CO₂ allows additional gains: 69.14 per 100 for tomato 334.72 p 100 pepper 529.57 p 100 cucumbers compared to controls.

Keywords: CO₂, croissance, rendement, tomate, poivron, concombre.

QUANTITATIVE AND QUALITATIVE CHARACTERISTICS OF NEW VARIETIES OF ONIONS

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Many factors influence the structure and quality of onion, such as genetic factors (choice of varieties), external environment (climatic conditions and agricultural practices applied), harvesting time and storage methods. The aim of this paper is to present characteristics of new varieties of onion (Zenicki and Konjicki), created in the Federal Institute for Agriculture Sarajevo and their suitability for cultivation in Bosnia and Herzegovina. Tests were carried out over two years (2012 and 2013) at the site (Sarajevo - Butmir). The experiments were conducted on a randomized block system in five repetitions. The examination included productive traits of onion: yield and length of the growing season. Within the qualitative characteristics the contents of dry matters, sugars and proteins were determined in the bulb. For standard is used variety called Stuttgarter. New varieties are distinguished by the length of the growing period of 114-115 days. Variety Zenicki has achieved a higher yield of bulbs for 17%, and Konjicki for 31% comparing to Stuttgarter. Yields of bulbs in 2013 were higher by 15% comparing to 2012. These varieties are characterized by high quality, because the dry matter content is from 13.8 to 15.88%, total sugars from 8.20 to 10.98%, and proteins from 1.50 to 1.70%, with slightly spicy taste and well wrapped bulb.

Key words: onion, variety, yield, quality

KVALITATIVNE I KVANTITATIVNE OSOBINE NOVIH SORTI CRVENOG LUKA

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Mnogi činioci utiču na građu i kvalitet luka, kao što su genetski faktor (izbor sorte), spoljna sredina (klimatski uslovi i primjenjene agrotehničke mjere), vrijeme berbe i način skladištenja. Cilj rada je bio da se prikažu karakteristike novih sorti crvenog luka (Zenički i Konjički), stvorene u Federalnom zavodu za poljoprivredu, Sarajevo i njihovu pogodnost za uzgoj u Bosni i Hercegovini. Ispitivanja su obavljena tokom dvije godine (2012 i 2013) na lokalitetu (Sarajevo-Butmir). Ogledi su izvedeni po randomiziranom blok sistemu u pet ponavljanja. Ispitivane su proizvodne osobine crvenog luka: prinos i dužina vegetacije. U okviru kvalitativnih osobina utvrđen je sadržaj suhe materije, šećera i bijelančevina u lukovici. Za standard je korištena sorta Stuttgarter. Nove sorte se odlikuju dužinom vegetacije od 114 do 115 dana. Sorta Zenički je ostvarila viši prinos lukovica za 17%, a Konjički 31% u odnosu na Stuttgarter. U 2013. godini prinosi lukovica su bili viši za 15% u odnosu na 2012. godinu. Ove sorte odlikuje visok kvalitet, jer je sadržaj suhe materije bio od 13,8 do 15,88%, ukupnih šećera 8,20 - 10,98% i bjelančevina 1,50 - 1,70%, blago ljutog su ukusa i dobre obavijenosti lukovice.

Ključne reči: crveni luk, sorta, prinos, kvalitet

IMPORTANCE OF THE CHOICE VARIETIES OF TOMATOES ON THE DYNAMICS OF THE YIELD AND THE AMOUNTS OF REALIZED INCOME

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In the production of vegetables in protected areas in our country, tomatoes are the dominant cultures and occupies the largest area. Regionally, the largest producer of tomatoes in the Republic of Serbia is Mačvanski region (municipalities Ljubovija, Mali Zvornik, Krupanj, Sabac, Loznica, Koceljeva, Vladimirci and Bogatić), which provides 17% of domestic production. It is characterized by good environmental conditions, a tradition in vegetable production, proximity of markets and etc..Serbia is unfortunately importer of vegetable which can be produced in unlimited quantities. Just in year 2010. the import of tomatoes, cucumbers, onions and lettuce was nearly 19 million. Tomatoes are usually imported in the period when the no offer of domestic tomato in the market, but is not negligible its imports during the period when in the offer should be dominated by domestic tomato. In order to be less dependent on imports, the pace of production should be aligned with market demand. Choosing varieties in the greenhouse, may be crucial for the continuous supply of the market. In practice, we have increasing offer of a large number of the domestic and foreign varieties and hybrids of tomato, but only their testing under realistic production conditions can be obtain information on production characteristics of new varieties on the market. The aim of this paper is to examine at the farm of the individual producers, five commonly grown varieties in Mačvanski region and establish the importance choice of the variety on the dynamics of yield and actual gross income. The experiment was set up in Mala Vranjska with one producer and his family, who are engaged in the production of five varieties, „TROGIR F1”, „MONDIJAL F1”, „CINTO F1”, „CORVINUS F1” and „MATIAS F1” in greenhouses without supplementary heating. The results showed that for the achieving higher yield and income is not only important time of arrival on the market, but also it is important duration of the fruiting period. „CORVINUS F1” and „MATIAS F1” are first arrived to harvest, but considering that at the first variety were recorded only twelve picking it was the lowest gross income, while the other variety was characterized not only good earliness, but also the longest period of fruiting therefore achieved the largest income.

Keywords: tomato, variety, dynamics increase, income.

ZNAČAJ IZBORA SORTE PARADAJZA NA DINAMIKU FORMIRANJA PRINOSA I VISINU OSTVARENOG BRUTO PRIHODA

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U proizvodnji povrća u zaštićenim prostorima u našoj zemlji paradajz je dominantna kultura i zauzima najveće površine. Regionalno posmatrano, najveći proizvođač paradajza u Republici Srbiji je Mačvanski okrug (opštine: Ljubovija, Mali Zvornik, Krupanj, Šabac, Loznica, Koceljeva, Vladimirci i Bogatić), koji daje 17% domaće proizvodnje. Njega karakterišu dobri agroekološki uslovi, tradicija u povrtarskoj proizvodnji, blizina tržišta i sl. Srbija je nažalost uvoznik onoga što može proizvesti u neograničenim količinama. Samo u 2010. godini neto uvoz paradajza, krastavaca, luka i salate je gotovo 19 miliona eura. Paradajz se najčešće uvozi u periodima kada u ponudi nema domaćeg paradajza, ali nije zanemarljiv ni njegov uvoz u periodu kada bi u ponudi trebalo da dominira domaći paradajz. Kako bismo bili što manje zavisni od uvoza, dinamika proizvodnje treba da bude uskladen sa zahtevima tržišta. U zaštićenom prostoru izbor sorte može biti ključan za kontinuirano snabdevanje tržišta. U praksi je sve prisutnija ponuda velikog broja domaćih i inostranih sorti i hibrida paradajza, samo njihovim testiranjem u proizvodnim uslovima možemo dobiti informacije o proizvodnim karakteristikama novih sorti na našem tržištu. Cilj rada je da se kod individualnih proizvođača ispituju 5 najčešće gajenih sorti u Mačvanskom regionu i ustanovi značaj izbora sorte na dinamiku formiranja prinosa i ostvareni bruto prihod. Ogled je postavljen u mestu Mala Vranjska kod jednog proizvođača i njegove porodice, koji se bavi proizvodnjom pet sorti „TROGIR F1”, „MONDIJAL F1”, „CINTO F1”, „CORVINUS F1” i „MATIAS F1” u plastenicima bez dopunskog zagrevanja. Rezultati istraživanja su pokazali da za visinu ostvarenog prinosa i prihoda nije samo bitno vreme pristizanja na tržište, već i period plodonošenja. „CORVINUS F1” i „MATIAS F1” su prvi pristigli za berbu, ali s obzirom da je kod prve sorte bilo samo 12 branja ostvaren je i najniži bruto prihod, dok je drugu sortu odlikovala ne samo dobra ranostasnost već i najduži period plodonošenja zbog čega je ostvaren i najveći prihod.

Ključne reči: paradajz, sorta, dinamika porasta, prihod.

**USE OF HOME-MADE RAW MATERIAL IN ECHINACEA (*ECHINACEA* SP.) AND
THYME (*THYMUS VULGARIS*) NURSERY PLANT PRODUCTION**

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Various substrate mixtures are used in the production of medicinal plants, aromatic plants and herbs in the Republic of Serbia. Imported (standardized) substrates which considerably raise the price of nursery plant production, have been present on the market lately. Home-made domestic products, peat and zeolite, are still insufficiently used as soil component substrates in nursery plant production. The aim of this paper is to consider how various substrates, containing components of predominantly domestic origin, affect the quality of nursery plants of two echinacea cultivars (*E. angustifolia* and *E. purpurea*) and thyme (*T. vulgaris*). The experiment was carried out at a greenhouse within the Faculty of Agriculture of Belgrade in the period 2011 and 2012. Echinacea and thyme nursery plants were placed in pots type V 9B (ø 9 cm). The experiment included 12 varieties in total. Control varieties were a commercial substrate and clean dark peat. Ordinary treatment measures were applied throughout the nursery plant production. The relevant analysis included the following quality parameters with regard to nursery plants of examined cultivars: plant height (cm), number of leaves, number of branches and plant weight (g). As proved by the examinations, the best quality of echinacea and thyme cultivars is attained when produced on the substrate composed of dark peat and zeolite in ratio 70% : 30%. The results indicate that the use of home-made raw material in substrate mixtures for the production of medicinal plants, aromatic plants and herbs in Serbia are of great relevance and utterly justifiable. Research presented in the paper was financed by the Ministry of Education, Science and Technological Development Republic of Serbia, Project III46001

Key words: echinacea, thyme, nursery plant, zeolite

PRIMENA DOMAĆIH SIROVINA U PROIZVODNJI RASADA EHINACEJE (*ECHINACEA* SP.) I TIMIJANA (*THYMUS VULGARIS*)

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U proizvodnji rasada lekovitog, aromatičnog i začinskog bilja u Republici Srbiji koriste se različite supstratne smeše. Poslednjih godina u upotrebi su uvozni (standardizovani) supstrati koji znatno poskupljuju proizvodnju rasada. Upotreba domaćih sirovina, treseta i zeolita kao komponenti zemljišnih supstrata za proizvodnju rasada još uvek je nedovoljna. Cilj ovog rada je sagledavanje uticaja različitih supstrata čije su komponente dominantno domaćeg porekla na kvalitet rasada dve vrste ehinaceje (*E. angustifolia* i *E. purpurea*) i timijana (*T. vulgaris*). Ogled je izveden u stakleniku Poljoprivrednog fakulteta u Beogradu tokom 2011 i 2012. godine. Rasad ehinaceje i timijana je proizveden u saksijama tipa V 9B (Ø 9 cm). U ogledu je bilo ukupno 12 varijanti. Kontrolne varijante predstavljali su komercijalni supstrat i čist tamni treset. Tokom proizvodnje rasada primenjivane su standardne mere nege. Analizirani su sledeći parametri kvaliteta rasada ispitivanih vrsta: visina biljke (cm), broj listova, broj grana i masa biljke (g). Ispitivanja su pokazala da se najbolji kvalitet rasada ehinaceje i timijana dobija proizvodnjom na supstratu koji se sastoji od tamnog treseta i zeolita u odnosu 70%:30%. Dobijeni rezultati ukazuju na značaj i opravdanost korišćenja domaćih sirovina u supstratnim smešama u proizvodnji lekovitog, aromatičnog i začinskog bilja u Srbiji. Rezultati prikazani u radu su deo istraživanja Projekta III46001 finansiranog od strane Ministarstva prosvete, nauke i tehnološkog razvoja Republike Srbije

Ključne reči: ehinaceja, timijan, rasad, zeolit

**GROWTH AND DEVELOPMENT OF BASIL TRANSPLANTS (*OCIMUM
BASILICUM L.*) UNDER BIOSTIMULANTS APPLICATION**

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In this study the influence of biostimulants Radifarm[®] on basil transplants (*Ocimum basilicum L.*) growth and development was examined. Seedlings transplanted into the PVC containers \varnothing 9 cm, the plants were treated with the biostimulant concentration of 0.30% or untreated (control). During the experiment recorded the morphological indicators of growth and development of seedlings (plant height, number of leaves), and finally made measuring root length and fresh and dry weight of roots and above-ground parts. The aim of this study was to determine whether, to what extent and in what manner applied biostimulator impact on improved growth and root development of seedlings of basil, and thus improve the adaptation of the young seedlings in abiotical stress of transplanting into the open field. All the traits were affected by treatment with biostimulants a certain duration of the experiment. Research indicates that the use of biostimulants in the production of basil enhances the growth and development of roots and above-ground parts which is a prerequisite for faster plant adaptation on stress during transplanting.

Key words: basil, biostimulants, transplants

RAST I RAZVOJ RASADA BOSILJKA (*OCIMUM BASILICUM* L.) POD UTICAJEM BIOSTIMULATORA

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U ovom istraživanju ispitan je uticaj biostimulatora Radifarm® na rast i razvoj rasada bosiljka (*Ocimum basilicum* L.). Proizvedeni rasad presađen je u PVC posude ϕ 9cm i biljke su tretirane sa biostimulatorom u koncentraciji od 0,30% ili netretirane (kontrola). Tokom trajanja oglada evidentirani su morfološki pokazatelji rasta i razvoja rasada (visina biljka, broj listova), a na kraju je izvršeno mjerenje dužine korijena, te masa svježeg i suvog korijena i nadzemnog dijela. Cilj ovog istraživanja bio je utvrditi može li, u kojoj mjeri i na koji način primjenjeni biostimulator uticati na poboljšani rast i razvoj korijena rasada bosiljka te time poboljšati adaptaciju mladog rasada na abiotički stres prilikom presađivanja na otvoreno polje. Sva ispitivana svojstva su bila pod uticajem tretmana sa biostimulatorom u određenom vremenu trajanja oglada. Istraživanje ukazuje da primjena biostimulatora u proizvodnji rasada bosiljka poboljšava rast i razvoj korijena i nadzemnog dijela što je preduslov brže adaptacije biljaka na stres uslijed presađivanja.

Ključne riječi: bosiljak, biostimulator, rasad

Section 6. Plant Protection

**OLIVE WEEVIL *RHYNCHITES CRIBRIPENIS* DESBROCHERS (COLEOPTERA:
ATTELABIDAE) IMPORTANT OLIVE PEST IN MONTENEGRO**

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Prominent presence of the olive weevil *Rhynchites cribripennis* Desbrochers on Montenegrin seaside was detected 2004th in the province of peninsula Luštica in the Bay of Kotor. In the following years the pest was spread in the other regions on the entire seaside, in plantations of introduced varieties, as well as in the plantations of autochthonous variety Žutica. At the end of June 2013 on certain localities drying and falling of small olive fruits was observed, which can be connected to attack of the weevil. In order to determine the pest distribution, in period from early July to late September 2013, the presence of *R. cribripennis* was monitored at several localities in the region of Ulcinj, Bar, Budva and Bay of Kotor. Adults' activity was monitored using yellow sticky traps. In order to determine number of punctures, eggs and larvae 50 fruits per locality were examined. Traps and fruits were monitored once a week. The fruits were examined in laboratory, under stereomicroscope. The number of eggs and larvae of the weevil and the percentage of damaged fruit were detected. The results show that *R. cribripennis* is widespread pest at Montenegrin seaside. The most widespread autochthon variety Žutica is susceptible to attack of this pest. The presence of adults on most sites was registered by the beginning of August, but in some localities until the second half of August. First eggs in the fruit were detected in the first decade of July, and the last in early August. The larvae have been found in fruits from mid-July to late September. In all observations a high percentage of damaged fruits were observed.

Key words: olive weevil, *Rhynchites cribripennis*, distribution, punctures

**SURLAŠ MASLINE *RHYNCHITES CRIBRIPENNIS* DESBROCHERS
(COLEOPTERA: ATTELABIDAE) ZNAČAJNA ŠTETOČINA MASLINE U CRNOJ
GORI**

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Izraženije prisustvo surlaša masline *Rhynchites cribripennis* Desbrochers na crnogorskom primorju uočeno je 2004. godine na području poluostrva Luštica u Boki Kotorskoj. U narednim godinama registrovano je širenje i na druge lokalitete na cijelom crnogorskom primorju kako u zasadima sa introdukovanim sortama, tako i u zasadima autohtone sorte žutica. Krajem juna 2013. godine na pojedinim lokalitetima uočena je pojava sušenja i otpadanja tek zametnutih plodova masline, što se može vezati za napad surlaša. U cilju utvrđivanja rasprostranjenja štetočine u periodu od početka jula do kraja septembra 2013. godine praćeno je prisustvo *R. cribripennis* na više lokaliteta na području Ulcinja, Bara, Budve i Boke Kotorske. Aktivnost imaga praćena je pomoću žutih ljepljivih ploča, a u cilju utvrđivanja prisustva uboda, jaja i larvi pregledano je 50 plodova po lokalitetu. Pregled klopki i plodova vršen je jednom nedjeljno. Plodovi su pregledani u laboratoriji, pod stereomikroskopom. Utvrđivan je broj jaja i larvi surlaša, kao i procenat plodova sa ubodima. Rezultati istraživanja pokazuju da je *R. cribripennis* široko rasprostranjena štetočina na crnogorskom primorju. Napadu je podložna i najrasprostranjenija autohtona sorta žutica. Prisustvo imaga na većini lokaliteta registrovano je do početka avgusta, a na nekim lokalitetima do druge polovine avgusta. Prva jaja u plodovima utvrđena su u prvoj dekadi jula, a posljednja početkom avgusta. Larve su nalažene u plodovima od polovine jula do kraja septembra. U svim pregledima registrovan je visok procenat plodova sa ubodima.

Ključne riječi: surlaš masline, *Rhynchites cribripennis*, rasprostranjenost, ubodi.

**EFFICIENT PEST CONTROL OF POLLEN BEETLE (*MELIGETHES AENEUS* F.)
AND POSSIBILITIES FOR PROTECTING THE POLLINATORS IN OILSEED
RAPE AGROCENOSIS**

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Pollen beetle (*Meligethes aeneus* F.) is a damaging pest of oilseed rape. Its harmful activity directly threatens the production and in some years it could compromise the yield. In many cases, the products applied in pest control, turn to be less efficient due to the conditions under which they are applied and the restricted application regime. In order to avoid the development of resistance, it is necessary to use insecticides having different mechanisms of action, which continue for a long enough period of time, with the aim of limiting the application of chemical substances and protecting natural pollinators and bees. There is a combination of chemicals for a good control of Pollen beetle (*M.aeneus*). Knowing the mechanism of their action and their proper combination enables the increase of their efficiency. For achieving that, the insecticide activity of the chemical compounds indoxacarb, deltamethrin + thiacloprid and thiacloprid in the commercial products Avaunt 150 EC, Proteus 110 OD and Calypso 480 SC, applied separately and in a combination with the adjuvant Codacide (95% rape oil + 5% plant emulsifier), was studied. The results obtained showed that the product Avaunt 150 EC combined with the adjuvant Codacide, applied at the rate of 200 ml/da, provided an adequate protection against pollen beetle at the buttoning and flowering stages of oilseed rape, allowing the preservation of natural pollinators and providing an efficient pest control.

Key words: pollen beetle, chemical control, pollinators.

THE HARMFUL EFFECT OF CHERRY LEAF SPOT (*BLUMERIELLA JAAPII*) ON SOUR CHERRY AND THE INFLUENCE ON FRUIT YIELD

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The experiment was carried out in 2007-2012 in a sour cherry orchard with three cultivars – ‘Oblachinska’, ‘Schattenmorelle’ and ‘Heiman Ruby’, established in the region of the town of Hisar. In 2007 the control of cherry leaf spot (*Blumeriella jaapii*) was conducted at improper time and inaccurate rates. That induced leaf defoliation in August – 90% in the trees of ‘Heiman Ruby’ cultivar, 70% in ‘Schattenmorelle’ and 42% in ‘Oblachinska’, respectively. In 2007 the obtained fruit yield was good only from the trees of ‘Oblachinska’ cultivar – 1200 kg/da, while from the other two cultivars the yield was unsatisfactory – 500 kg/da from ‘Schattenmorelle’ and 600 kg/da from ‘Heiman Ruby’. In the next vegetation periods (2008-2012) the control of cherry leaf spot was carried out by applying fungicides at definite rates at the most critical time for the host-pathogen system. In 2008 the trees were strongly depressed and although the level of cherry leaf spot attack was low (‘Heiman Ruby’ – 5%, ‘Schattenmorelle’ – 4,3%, ‘Oblachinska’ – 2,5%), the yield was very low – ‘Schattenmorelle’ – 420 kg/da, ‘Heiman Ruby’ – 400 kg/da. A slight yield increase was reported only in ‘Oblachinska’ cultivar – 1300 kg/da. During the next four years (2009-2012) the trees of ‘Oblachinska’ cultivar yielded normally – 1300 kg/da, while the trees of the other two cultivars started improving their health status and the yield gradually increased, reaching up to 1600 kg/da for ‘Heiman Ruby’ and 1100 kg/da for ‘Schattenmorelle’.

Key words: sour cherry, *Blumeriella jaapii*, yield.

INCIDENCE AND INTENSITY OF WHEAT POWDER MILDEW IN VARIOUS MINERAL NUTRITION REGIMES AFTER LIMING

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Considering plant mineral nutrition, a special risk is nitrogen overdosing, which causes excess plant growth, so they are more susceptible to pests and disease causal agents. This study has been aimed to establish the effect of various mineral nutrition regimes on incidence and intensity of wheat powder mildew, in the conditions of natural infection. The investigation was carried out in 2013, at the experimental field of Secondary School of Agriculture in Kraljevo (Serbia). The trial was set in random complete block design (RCBD) with four replications. Cultivars Pobeda and Kruna were studied. Area of an elementary plot, used for a combination of fertilization and cultivar, was 2 m² (2x1). Single fertilizing combination contained certain quantity of macroelements N, P and K, with or without certain amount of liming material, CaO. Nitrogen was applied in two doses, at the level of 35 and 60 kg N/ha; phosphorus in three doses, at the level of 60, 100 and 120 kg P₂₀₅/ha; and potassium also in three doses, at the level of 60, 100 and 120 kg K_{2O}/ha. Liming was done by two doses of CaO – 2.5 t and 5.0 t/ha. In the period of pathogen's maximal development, plant reaction mode was estimated by determining infection type on a scale of 0-4 (Mains and Dietz, 1930) and infection intensity of 0-100% according to the modified scale of Cobb (Peterson et al., 1948). The average infection intensity, for given trial variants, in the cultivar Pobeda was 28.7%, and in the cultivar Kruna it was 20.0%. Moderately susceptible infection type 3 and infection intensity of 40% was observed in fertilization variants N60P100K100 and N35P60K60 + 2.5 t CaO. The lowest disease intensity of 20% was observed in variants with liming (N35P60K60 + 5.0 t CaO and N60P100K100 + 2.5 t CaO). The cultivar Kruna in the all fertilization variants reacted by resistant and moderately resistant infection type (1 and 2) and with a lower infection intensity (0-10%).

Key words: wheat, powder mildew, intensity, fertilization.

POJAVA I INTENZITET PEPELNICE PŠENICE PRI RAZLIČITIM REŽIMIMA ISHRANE NAKON KALCIFIKACIJE

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Sa aspekta ishrane biljaka, posebno je opasna preobilna upotreba azota, koja dovodi do prekomerne bujnosti biljaka, pa su one osjetljivije na štetočine i prouzrokovaoče bolesti. Cilj ovih istraživanja je utvrđivanje uticaja različitih režima ishrane nakon kalcifikacije na intenzitet pojave pepelnice u uslovima prirodne zaraze. Istraživanja su obavljena 2013. godine na imanju srednje poljoprivredne škole u Kraljevu (Srbija). Ogled je postavljen u blok sistemu (RCBD) sa četiri ponavljanja. Ispitivane su sorte Pobjeda i Krana. Osnovna parcelica, na kojoj je primenjena jedna kombinacija, imala je površinu 2 m² (2x1). Jedna kombinacija je podrazumevala određenu količinu makroelemenata N, P i K, sa ili bez određene količine krečnog materijala, CaO. Azot je primenjen u dve količine i to na nivou 35 i 60 kg N/ha, fosfor u tri količine, na nivou 60, 100 i 120 kg P₂O₅/ha i kalijum u tri količine, na nivou 60, 100 i 120 kg K₂O/ha. Kalcifikacija je obavljena sa dve količine CaO i to 2,5 t i 5,0 t/ha. U periodu maksimalnog razvoja patogena, ocenjivan je način reakcije biljaka određivanjem tipova infekcije po skali 0-4 (Mains and Dietz, 1930) i intenzitet zaraze 0-100% po modifikovanoj skali Cobb-a (Peterson et al., 1948). Prosečan intenzitet zaraze, za date varijante ogleda, kod sorte Pobjeda je iznosio 28,7%, a kod sorte Krana 20,0%. Srednje osjetljiv tip infekcije 3 i intenzitet zaraze 40% je zabeležen kod varijanti N₆₀P₁₀₀K₁₀₀ i N₃₅P₆₀K₆₀ + 2,5 t CaO. Najmanji intenzitet bolesti 20%, zabeležen je kod varijanti sa kalcifikacijom (N₃₅P₆₀K₆₀ + 5,0 t CaO i N₆₀P₁₀₀K₁₀₀ + 2,5 t CaO). Sorta Krana je u svim varijantama ogleda reagovala otpornim i srednje otpornim tipom infekcije (1 i 2) i nižim intenzitetom zaraze (0-10%).

Ključne reči: pšenica, pepelnica, intenzitet, đubrenje.

INVASIVE WEEDS IN BOSNIA AND HERZEGOVINA

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Plant species that originate from other floral area (non-native, adventive, alien), which by competition relations suppress native (local) species and win their habitats, and disperse more widely we call invasive. In fact, they are very aggressive species with a wide ecological valence for most environmental factors that become problem by entering in agrophytocenoses. These are the species with high reproduction potential that man accidentally or intentionally (ornamental, cultivated, honey) spread into new habitats. Most of them appear in mass on cultivated, rural and urban habitats. On the territory of Bosnia and Herzegovina were found 32 invasive adventive species of which significant number is on the official EPP0 list (*Ambrosia artemisiifolia* L., *Ailanthus altissima* (Mill.) Swingle, *Amorpha fruticosa* L., *Reynoutria japonica* Houtt., *Helianthus tuberosus* L., *Solidago canadensis* L., *Solidago gigantea* Aiton). Additionally, during the study, were found and other weed species that have invasive character: *Abutilon theophrasti* Med., *Xanthium strumarium* L., *Datura stramonium* L. and *Asclepias syriaca* L. This paper presents a detailed ecological characteristics of identified invasive species, distribution and control measures. In order to undertake effective monitoring and control measures of this species, it is necessary to form official list of invasive alien weed species, with precision distribution maps by UTM principle, as it is done in most countries of the region.

Keyword: invasive weeds, monitoring, control.

INVAZIVNI KOROVI U BOSNI I HERCEGOVINI

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Biljne vrste koje vode porijeklo iz drugih flornih oblasti (alohtone, adventivne, strane), koje kompeticijskim odnosima potiskuju autohtone (domaće) vrste i samim tim osvajaju njihova staništa, te se sve više šire možemo nazvati invazivnim. Naime, radi se o veoma agresivnim vrstama sa širokom ekološkom valencom za većinu faktora životne sredine koje posebno postaju problematične ulaskom u agroflocenoze. To su vrste sa velikim reprodukcionim potencijalom koje čovjek slučajno ili namjerno (ukrasne, gajene, medonosne) prenosi na nova staništa. Većina njih se masovno pojavljuje na obradivim, ruralnim i urbanim staništima. Na teritoriji Bosne i Hercegovine konstatovane su 32 invazivne adventivne vrste od kojih značajan broj se nalazi na zvaničnoj EPPO listi (*Ambrosia artemisiifolia* L., *Ailanthus altissima* (Mill.) Swingle, *Amorpha fruticosa* L., *Reynoutria japonica* Houtt., *Helianthus tuberosus* L., *Solidago canadensis* L., *Solidago gigantea* Aiton). Osim navedenih, tokom istraživanja, konstatovane su korovske vrste koje pokazuju invazivni karakter: *Abutilon theoprastrti* Med., *Xanthium strumarium* L., *Datura stramonium* L. i *Asclepias syriaca* L. U radu su detaljno predstavljene ekološke osobine konstatovanih invazivnih vrsta, rasprostranjenost i mjere suzbijanja. U cilju efikasnog monitoringa i preduzimanja mjera kontrole ovih vrsta, neophodno je formirati zvaničnu listu invazivnih adventivnih korovskih vrsta, sa precizno urađenim kartama rasprostranjenosti po UTM principu, kao što je urađeno u većini zemalja okruženja.

Ključne riječi: invazivni korovi, monitoring, kontrola.

CHANGE OF THE MODULUS OF ELASTICITY OF OAKWOOD UNDER THE INFLUENCE OF FUNGUS *CONIOPHORA PUTEANA*

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During the period of intensive growth of wood processing industry, the demands for wood raw materials of the highest quality are also on the rise. The physical, mechanical and aesthetic properties of oak make it a particularly significant species and put it into the category of the noblest broadleaved species. Being directly linked to preservation of wood properties, preservation and extension of the durability of wood and wood products necessitate follow-up of changes of these properties as a logical course of action. Knowledge on basic characteristics of wood destruction agents and consequences of their influence represents the basis of a rational fight against them. Testing samples were collected from the medulla of healthy oak trees at the site Debeli Lug in Eastern Serbia, from the association of *Quercetum montanum*. Over the periods of 2, 4 and 6 months the wood samples were exposed to influence of the mycelia of the fungus causing cubical brown rot on oak *Coniophora puteana* (Schumm. ex Fr.) Karst. Depending on the conditions and time of influence of the fungus, the process of wood destruction results in damage to wood cell walls, which leads to decrease or total loss of wood properties. Given that static modulus of elasticity provides the quickest and clearest way to observe destruction caused by epixylous fungi, this paper researched the decrease in modulus of rupture of Sessile oak wood due to influence of causers of cubical brown rot. Results of the research have demonstrated that the lowest dispersion of data (coefficient of variation) occurred in the control group of samples (18.35), while the highest was after 2 and 6 months of exposure to *C. puteana* (28.78 and 31.82), which is a consequence of the non-homogenous wood structure and uneven colonization of wood by the fungus. After 2, 4 and 6 months under the effect of the fungus, the static modulus of elasticity of oak wood substantially decreased compared to the initial value (100%) and amounted to 61.07%, 60.61% and 51.38% respectively. The largest decrease of static modulus of elasticity occurred during the first 2 months – the modulus of elasticity went down by 38.93% compared to the control. In the period between 2 and 4 months the process of destruction slowed down and the loss amounted to only 0.46%. In the period between the months 4 and 6 the destruction mildly rose and the modulus of elasticity dropped by another 9.23%. The regression line obtained through data processing opened the possibility to prognosticate the changes of wood properties in certain time periods of the effect of the fungus under the unchanged external conditions, which is significant for practical purposes in terms of taking protective measures and wood usability.

Key words: Sessile oak, modulus of elasticity

PRESENCE OF TRIAZINE HERBICIDES AND THEIR METABOLITES IN CANAL WATER

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Considering the purpose of water from irrigation canals and drainage systems, it is important to examine the presence of herbicide residues, especially the persistent ones (triazines). Secondary effects of the presence of herbicides in the aquatic ecosystem are reflected on the growth, survival, population abundance and reproduction of living organisms. The samples for water analyses were taken from DTD canal from the locality of Vrbas (45°34'10"N/ 19°38'16"E) away from the zone of direct influences of waste waters and tributaries influx. The water samples were taken according to the guidelines for taking samples of surface water from rivers and streams SRPS ISO 567-6. A multi-residue method was used for the determination of seven triazine herbicides (atrazine, cyanazine, metazachlor, metamitron, propazine, simazin, terbuthylazine) and the products of their transformation with atrazine-d5 as an internal standard in surface water using LC-MS/MS. The detected concentrations of atrazine, prometryn, terbuthylazine and terbuthylazine-desethyl (metabolite of terbutylazine) were low. The presence of herbicides and their metabolites in water can contribute to reducing the yield of plants and affect their biological properties, due to the adoption of their residues. The influence of their presence in canal water was studied in aquatic species *Lemna minor* L. (duckweed) in semi-controlled conditions. After measuring duckweed, plants material (3 g) was transmitted in the courts with the drinking (control) and canal water (sample). The measurements of biological parameters were performed after 24, 48, 72 and 120 h. The content of photosynthetic pigments (chlorophylls a, b and carotenoids) (Weltstein, 1957), as well as the total quantity of fresh weight and the content of water-soluble protein by Kjeldahl method, were determined. The quantities of photosynthetic pigments (chlorophylls a, b and carotenoids) were higher in the measured values of the sampled water in comparison with the control. The content of triazine herbicides and their metabolites of the canal water had affected the fresh weight of a plant, which was greater in the plants grown in the control (3.504 to 4.021) in comparison with the sample (2.025 to 2.805). The quantities of soluble protein (%) had higher values of the control (35.24 to 48.52) in comparison with the sample (31.24 to 40.78).

Key words: triazine herbicides, terbutylazine-desethyl, canal water, LC-MS/MS, photosynthetic pigments

Acknowledgments. The authors acknowledge the financial support of the Ministry of Education and Science, Republic of Serbia, Project Ref. TR43005.

**THE POSSIBILITY OF SPREADING LEPTOSPHAERIA MACULANS AND
LEPTOSPHAERIA BIGLOBOSA RAPESEED**

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Stem cancer (blackleg) is economically the most important disease of oilseed rape worldwide. This disease is caused by two species of pathogenic fungi of the genus *Leptosphaeria*: *Leptosphaeria maculans* (Desm.) ces. and de Not anamorf *Phoma lingam* (Tode. Fr.) Desmas, that causes stem cancer and blackleg root and *Leptosphaeria biglobosa* Shoem and Brun, that causes symptoms such as cancers of the upper part of the stem usually causing less damage, and can cause serious damage in countries with higher summer temperatures. Pathogenic fungi from one area to another in addition to ascospores are transmitted by contaminated (infected) seed. In order to prove the modes of transmission of parasites, the test is done transmitting the parasite seeds. Disinfected seeds of oilseed rape cultivars Quinta were submerged in the suspension of pycnospores. Submerged seeds were kept at $20^{\circ}\text{C} \pm 1^{\circ}\text{C}$ and 12 h photoperiod for 48 h. After planting, plastic containers were kept at $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ and 12h photoperiod. In this experiment the following isolates were used: C-5, L-5, K-7, LJ-3, S-11, St-1, GS-3 and Lm as a reference isolate (*L. maculans*) followed by K-113, K-115 and Lb as a reference isolate (*L. biglobosa*). The symptoms were assessed after 7 and 14 days after emergence. Ratings were made with + = visible symptoms on cotyledons or hypocotyl and = healthy plants. After 7 days, the isolates (Lm, C-5, L-5, K-7, LJ-3, S-11, St-1, GS-3) were caused disease symptoms on plants of oilseed rape. This pathogenicity is reflected in the number of seedlings, leaf spot and stalk lodging cotyledons. At isolate Lb (reference isolate *L. biglobosa*) K-113 and K-115 after 7 and 14 days was not observed pathogenicity on canola plants. The control variety seeds were soaked in distilled water. The trial was set in 6 reps, and pathogenicity of fungal isolates in relation to the control was tested using Dunette's test. After 14 days re-isolation of pathogen was done.

Key words: *Leptosphaeria maculans*, *Leptosphaeria biglobosa*, pathogenicity, pycnospores, seeds, stem cancer

**PLANT-PARASITIC NEMATODES OF MUNICIPALITIES TREBINJE AND
LJUBINJE**

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Nematology research in Bosnia and Herzegovina was carried out from 50-s till 80-s of last century intensively by Olga Klindić. It was mainly focused on root-knot nematodes and PCN. However, since then there was no research on this topic until 2010. This survey was done in autumn in 2012 with an aim to look into presence of genera of plant-parasitic nematodes in sampled area. 25 soil samples were taken from agricultural fields in municipalities of Trebinje and Ljubinja in East Hercegovina. Soil samples were taken from greenhouses where tomato, paprika, salads and cucumber were grown, from open fields from paprika, tobacco and spinach fields, an nursery, cherry and apple orchards and vineyards. Motile stages of nematodes were extracted from soil by Oostenbrink elutriator and identified under dissection microscope. Nematode genera were identified by morphological characters. 12 genera of plant-parasitic nematodes were identified: *Pratylenchus*, *Meloidogyne*, *Tylenchus*, *Aphelenchus*, *Rotylenchus*, *Paratylenchus*, *Xiphinema*, *Tylenchorinchus*, *Helicotylenchus*, *Zygotylenchus*, *Ditylenchus* and *Criconea*. *Meloidogyne* and *Tylenchorinchus* were the most dominant genera, present in 17 and 16 samples respectively. Distribution of nematode genera is presented and discussed in the paper.

FITOPARAZITNE NEMATODE NA PODRUČJU OPŠTINA TREBINJE I LJUBINJE

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Intenzivna istraživanja na fitoparazitnim nematodama u Bosni i Hercegovini vršena su od 50-tih do 80-tih godina prošlog vijeka od strane Olge Klindić. Ta istraživanja su uglavnom bila fokusirana na korjenove galove nematode i krompirove cistolike nematode. Nakon toga do 2010. gotovo da se nije ništa radilo iz ove oblasti, te se nameće potreba da se utvrdi situacija iz ove oblasti. Jedno od takvih istraživanja rađeno je 2012. godine a cilj je bio da se utvrdi distribucija rododva fitoparazitnih nematoda na istraživanom području. Uzeto je ukupno 25 uzoraka sa područja opština Trebinje i Ljubinje, Istočna Hercegovina. Uzorci su uzeti iz platenika gdje je gajena paprika, paradajz, salata i krastavac, otvorenog polja gdje su gajeni paprika, duvan i špinat, te iz rasadnika, voćnjaka jabuke i vinograda. Aktivni stadijumi nematoda su ekstrahovani iz zemljišnih uzoraka ostnbrinkovim ekstraktorom i identifikovani pod binokularom. Rodovi nematoda su identifikovani na osnovu morfoloških karakteristika. Ukupno je identifikovano 12 rodova fitoparazitnih nematoda: *Pratylenchus*, *Meloidogyne*, *Tylenchus*, *Aphelenchus*, *Rotylenchus*, *Paratylenchus*, *Xiphinema*, *Tylenchorinchus*, *Helicotylenchus*, *Zygotylenchus*, *Ditylenchus* i *Criconema*. *Meloidogyne* i *Tylenchorinchus* su najčešće pronađeni rodovi, prisutni u 17 odnosno 16 uzoraka. Distribucija nematoda i potencijalni značaj su diskutovani u radu.

WEED VEGETATION IN ROW CROPS OF WESTERN SREM

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Western Srem area covers about 256,625 hectares of farmland. For row crops (corn, soybean, sunflower, sugar beet) 162,198 ha is used, or 63.20% of total arable land. One of limiting factors in production of row crops in western Srem are weeds. In order to seek the most effective ways for their suppression, studying weed association in row crops of western Srem was conducted. Phytocoenological tests were conducted during the 2012/2013th year at 11 sites using combined method of Swiss-French school (Braun-Blanquet, 1951). Life forms are determined by Ujvarosi (1957) which supplements Raunkier's system. Floral elements are determined by Gajić (1980), and ecological indices by Landolt (1977). Syntaxonomic position of weed association in row crops of western Srem was determined by Kojić, 1975, 1982; Stepić, 1984; Vera Milošević, 2008. Weed vegetation in row crops of western Srem consists of 35 taxa, distributed in 17 families. In syntaxonomic terms weed vegetation belongs to: classis: Stellarietea mediae Tx., Loxm., Prsg, 1950. ordo: Chenopodietalia albi Tx. Lohm. Et Prsg, 1950. bound: Polygono-Chenopodion Koch, 1926. Em Sissing, 1946. association: Panico-Ambrosietum artemisifoliae Milošević, 2008. The characteristic species of association Panico-Ambrosietum artemisifoliae are Panicum cruss-galli and Ambrosia artemisiifolia occurring at all locations. The association has extremely therophyte character (71.42%) with a high proportion of perennial weeds, geophytes, of 23.71%. The high share of therophytes is result of applied quality processing and preparation of land in the production of row crops. The values of ecological indices show that soil of western Srem is slightly acidic to neutral (R), rich in nitrogen (N), middle-provided in organic matter (H), moderately aerated (D), unsalted (S). Correspond to light dominate weed species adapted to full sun light (L) and warm habitats adapted subcontinental climate (T). Ecological indices entirely suit to habitat conditions of western Srem. Phytogeographic characteristics clearly indicate presence of weed species with wide distribution (Eurasian, Cosmopolitan, Circumpolar and Adventive) with 74.60%. There is also a significant share of floral elements of Mediterranean area of 11.40% (Stachys annua L., Sambucus ebulus L., Hibiscus trionum L., Heliotropium europaeum L.). The study results clearly show that a good knowledge of weed vegetation is a basis in selection of herbicides for quality and effective weed control in row crops of western Srem.

Key words: row crops, association, life form, floral elements, ecological indices

KOROVSKA VEGETACIJA OKOPAVINA ZAPADNOG SREMA

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Područje zapadnog Srema obuhvata oko 256.625 hektara obradivih površina. Na okopavine (kukuruz, soja, suncokret, šećerna repa) otpada 162.198 hektara, ili 63,20% od ukupno obradivih površina. Jedan od ograničavajućih faktora u proizvodnji okopavina na području zapadnog Srema predstavljaju i korovi. U cilju traženja najefikasnijeg načina za njihovo suzbijanje izvršeno je proučavanje korovske vegetacije okopavina zapadnog Srema. Fitocenološka ispitivanja su obavljena tokom 2012/2013. godine na 11 lokaliteta kombinovanom metodom švajcarsko-francuske škole (Braun-Blanquet, 1951). Životni oblici su utvrđeni prema Ujvarosiu (1957) koji predstavlja dopunu Raunkier-ovog sistema. Florni elementi su određeni prema Gajiću (1980), a ekološki indeksi prema Landoltu (1977). Sintaksonomski položaj korovske vegetacije okopavina zapadnog Srema je određen prema Kojiću, 1975; 1982; Stepiću, 1984; Milošević Vera, 2008. Korovsku vegetaciju okopavina zapadnog Srema čini 35 taksona raspoređenih u 17 familija. U sintaksonomskom pogledu korovska vegetacija pripada: klasa: Stellarietea mediae Tx., Loxm., Prsg, 1950. red: Chenopodietalia albi Tx. Lohm., Prsg, 1950. sveza: Polygono-Chenopodion Koch, 1926., Em Sissing, 1946. asocijacija: Panico-Ambrosietum artemisifoliae Milošević, 2008. Karakteristične vrste asocijacije Panico-Ambrosietum artemisifoliae su Panicum cruss-galli i Ambrosia artemisifolia koje se javljaju na svim ispitivanim lokalitetima. Asocijacija je izrazito terofitnog karaktera (71,42%) uz visoko učešće višegodišnjih korova, geofita, od 23,71%. Visoko učešće terofita je posledica primenjene kvalitetne obrade i pripreme zemljišta u proizvodnji okopavina. Vrednosti ekoloških indeksa pokazuju da su zemljišta zapadnog Srema slabo kisela do neutralna (R), bogata azotom (N), srednje obezbeđena organskim materijama (H), umereno aerisana (D), nezaslanjena (S). Prema svetlosti dominiraju korovske vrste prilagođene punoj dnevnoj svetlosti (L) i toplim staništima adaptiranim subkontinentalnoj klimi (T). Ekološki indeksi potpuno odgovaraju stanišnim prilikama zapadnog Srema. Fitogeografske karakteristike jasno pokazuju prisustvo korovskih vrsta širokog rasprostranjenja (Evroazijski, Kosmopolitski, Cirkumpolarni i Adventivni) sa 74,60%. Takođe je značajno učešće flornih elemenata mediteranskog područja od 11,40% (Stachys annua L., Sambucus ebulus L., Hibiscus trionum L., Heliotropium europaeum L.). Rezultati istraživanja jasno pokazuju da dobro poznavanje korovske vegetacije predstavlja osnovu prilikom izbora herbicida za kvalitetno i efikasno suzbijanje korova u okopavinama zapadnog Srema.

Ključne reči: okopavine, asocijacija, životna forma, florni elementi, ekološki indeksi

**NUMBER OF COUGHT SPECIMENS OF WESTERN CORN ROOTWORM
(*DIABROTICA VIRGIFERA VIRGIFERA* LECONTE, COL.: CHRYSOMELIDAE) ON
PHEROMON AND YELLOW STICKY TRAP IN FIELD OF DIFFERENT HISTORY**

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Monitoring of western corn rootworm (WCR) (*Diabrotica virgifera virgifera* LeConte, Col.: Chrysomelidae) was done in the period of July 4th, when pheromon and yellow sticky trap were located, to August 29th 2010, when last controll was done. Investigation, after survilience of area and preliminary inspections for detecton WCR in fields on Svilajnac area, done on three chosen locality with field of differet history. It is locality Bizičina – uncultivated lend, locality Lovački dom – wheat cultivated in previous year and locality Ada – corn in monocropping. To monitor adults in experiment two tipe of traps were used to compare number of cach specimens, pheromon Csalomon PAL+(Hungary) and yellow sticky traps (Pinus TKI d.d, Slovenia). Pheromon traps are placed on July 4th in 2010 on all three localities, 5-10 m from edge of plot in kernel zone. Yellow sticky traps are deployed in July 18 (localities Ada and Lovački dom) and 25 on locality Bizičina. Two replicates were set up in localities Bizičina and Lovački dom and five on locality Ada. Control inspections of traps were done weekly from July 11. to August 29, in the morning hours. First male specimens were couth in July 11th on sticky bases of pheromone traps, locality Ada. The highest number (Ada-68, Lovački dom-16 and Bizičina-12) of caught specimens was recorded in August 1st on all three localities on sticky bases of pheromone traps. On the yellow sticky traps first specimens were recorded on July 25, loc. Ada. The highest number of caught WCR (15) recorded in August the 1st. The total number of catch male specimens fluctuated among localities (Ada-496, Lovački dom-66 and Bizičina-49). The total number of captured adult on yellow sticky traps also vary (Ada-53, Lovački dom-6 and Bizičina-6). On both tipe of traps the highest number of specimens caught in August the 1st. History of field considerably influence on the WCR adult number. The highest number of WCR adult was caught in the plot with corn in monocropping.

Key words: *Diabrotica virgifera virgifera*, field history, corn, pheromon traps, yellow sticky traps

RESPONSE OF *SORGHUM HALEPENSE* (L.) PERS. TO NICOSULFURON

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Sorghum halepense (L.) Pers. population R survived the application of nicosulfuron in the corn field. This population has been treated with ALS (acetolactate synthase) inhibiting herbicides 5 consecutive years. The seeds of susceptible population (S) collected from area which had not been treated previously with any herbicide. The response of populations R and S to nicosulfuron was investigated in a whole-plant bioassay in controlled environment. Plants about 20 cm high were treated with following rates of nicosulfuron: 0, 10, 20, 40, 60 and 80 g a.i.ha⁻¹. Visual injury estimation and vegetative parameters (fresh weight, dry weight, leaf area) were recorded 7 days after herbicide application. ALS enzyme activity in different herbicide concentrations was determined *in vitro*. The statistical analyses were carried out using the statistical environment R with the extension package *drc*. GR₅₀ values for vegetative parameters were greater for the R (fresh weight: 218.58 g ha⁻¹; dry weight: 298.86 g ha⁻¹; leaf area: 52.62 g ha⁻¹) than for the S population (fresh weight: 55.72 g ha⁻¹; dry weight: 85.09 g ha⁻¹; leaf area: 27.39 g ha⁻¹), while I₅₀ values for ALS activity were similar for both populations (R: 0.0227 μM; S: 0.0231 μM). Based on vegetative parameters R population was 1.92-3.92-fold less susceptible than S population, but on the enzyme level there was no differences. Therefore, resistance was not confirmed for R population, although this population showed somewhat decreased susceptibility to nicosulfuron, which can be regarded as an early stage of resistance development.

Keywords: ALS enzyme activity, nicosulfuron, response, *Sorghum halepense*.

Authors thank the Ministry of Education and Science of Serbia for support in this investigation (Project III46008) and EU project FP7-REGPOT-AREA 316004.

**BIOLOGICAL METHODS OF DETECTION AND NUMEROSITY CONTROL OF
TUTA ABSOLUTA ON TOMATO**

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Tomato leaf miner (*Tuta absoluta* Meyrick, *Lepidoptera: Gelechiidae*) is native in South America. In Europe, it is observed for the first time in 2006 in Spain. It has spread in most of Mediterranean countries, since then. The first recorded occurrence in Serbia was in October 2010 in village Navalin, near Leskovac. Until next year, during summer it was ascertained in entire Republic of Serbia territory. Tomato moth is extremely dangerous, quarantine (EPPO A2) and economically important pest of tomato crops. It can cause 100% damage to cultivated crops for a very short time. Suppression of tomato moth is difficult, because this pest has a large number of generations during the year and a numerous of host plants. Often use of chemical preparations with the same action mechanism quickly leads to resistance. Integral protection program of tomato in greenhouses largely relies on the use of biological protection methods i.e. introducing predators to control the most dangerous, harmful insects that occur during the growing of tomatoes crop. The paper presents the possibility of using predatory beetle *Macrolophus caliginosus*, *Heteroptera, Miridae* in order to control the number of tomato moth in greenhouse production. Pheromone traps with pheromone capsules *Pherodis Tuta absolutae* were used for detection of moth. Beetle *Macrolophus caliginosus*, *Heteroptera, Miridae* is entered in amount of 0.5 individuals per m² when the tomato moth appears and up to 5 individuals per m² in a situation of stronger attack. Beetles are located on the leaves in a thin layer, and at least 50 individuals at the same place. When a new generation develops, amount of individuals is sufficient to fully control *Tuta absoluta*, because an adult sucks 40-50 tomato moth eggs per day.

Keywords: tomato, moth, biological control, predator

**BIOLOSKE METODE DETEKCIJE I KONTROLE BROJNOSTI TUTA ABSOLUTA NA
PARADAJZU**

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Miner lista paradajza (*Tuta absoluta* Meyrick, *Lepidoptera: Gelechiidae*) je poreklom iz Južne Amerike. U Evropi je prvi put uočen 2006. godine u Španiji. Od tada se proširio na veći broj zemalja mediterana. Prva registrovana pojava u Srbiji se desila u oktobru 2010. godine u selu Navalin kod Leskovca. Do sledeće godine, konstatovan je tokom leta, na celoj teritoriji republike Srbije. Moljac paradajza je izuzetno opasna, karantinska (EPPO A2) i ekonomski značajna štetočina u usevu paradajza. On može za kratko vreme pričiniti i 100% štetu na gajenim kulturama. Suzbijanje moljca paradajza je teško, jer štetočina ima veliki broj generacija tokom godine i veći broj biljaka domaćina. Često korišćenje preparata sa istim mehanizmom delovanja dovodi do brze pojave rezistentnosti. Program integralne zaštite paradajza u zaštićenom prostoru u velikoj meri se oslanja na korišćenje metoda biološke zaštite, odnosno unošenje predatora u kontroli najopasnijih, štetnih insekata koji se javljaju tokom vegetacije useva paradajza. U radu je prikazana mogućnost upotrebe predatorske bube *Macrolophus caliginosus*, Heteroptera, Miridae u cilju kontrole brojnosti moljca paradajza u plasteničkoj proizvodnji. Za detekciju moljca korišćene su feromonske klopke sa feromonskim kapsulama *Pherodis Tuta absolutae*. Kod pojave paradajzovog moljca unosi se 0,5 jedinki po m², a kod jačeg napada u žarištima i do 5 jedinki po m². Bube se raspoređuju na listovima u tankom sloju, a najmanje 50 jedinki na istom mestu. Kada se razvije nova generacija, broj jedinki je dovoljan da u potpunosti kontroliše *Tuta absoluta*, jer odrasla jedinka isisa 40 -50 jaja paradajzovog moljca na dan.

Ključne reči : paradajz, moljac, biološka zaštita, predator

INFLUENCE OF THE CALIBRATION, TARAGE AND ADJUSTMENTS OF THE MODERN ATOMIZER ON THE QUALITY OF APPLICATION

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In this research are showed results of the exploatational research of the new, modern, high-accuracy dragged atomizer under field conditions in the treatment of young apple orchards. The task of the research is to determine the actual loss of the liquid due to inadequate adjustment and to provide directive to the conditions of treatment in order to reduce the loss of the liquid. The study has a task to detremine the optimal work mode that allows you to reduce bouth drift, of the air and of the soil, and with that to minimize the loss of protective agents outside the treatment zone. The aim of the research is to increase efficiency through increased distribution efficiency and accuracy of the device. During the research it was recorded the norm of the treatment of 520 l / ha while the average coverage of the crown was 35.29%. With that norm were recorded losses of the working fluid from 17.21% in the form of air drift and 34.98% in the form of soil drift. After calibration and adjustment of the atomizer it was achieved an average coverage of the crown of 38.05% with norm of the treatment of 290 l / ha. In less norm loss in the form of land drift come to only 8.56% and 14.71% of air drift, which means that the coverage of the plate, which measures the losses, is considerably reduced. Test results indicate losses that occur due to soil and air drift, which are highly expressed in young seedlings in which the crown is underdeveloped. It is important to emphasize that in this study in a young plantation standard treatment from 520 l / ha was reduced to 290 l / ha while retaining the quality and even with a slight improvement in terms of coverage of the crown, and efficiency of protection. Test results show that despite the use of modern and expensive atomizer, due to incorrectly settings, comes to significant losses in the form of drift. The above problems can be minimized by proper adjustment of the calibration and tarage of the device.

Keywords: calibration, tarage, applications, drift losses.

UTICAJ KALIBRACIJE, BAŽDARENJA I PODEŠAVANJA ATOMIZERA SAVREMENE KONCEPCIJE NA KVALITET APLIKACIJE

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U radu su prikazani rezultati eksploatacionih ispitivanja novog, savremenog, visokopreciznog vučenog atomizera u poljskim uslovima pri tretiranju mladog zasada jabuke. Zadatak ispitivanja je utvrditi stvarne gubitke radne tečnosti usled neadekvatne podešenosti i dati smjernice prema uslovima tretiranja za smanjenje istih. Ispitivanja imaju zadatak utvrditi optimalni režim rada koji omogućava smanjenje drifta kako vazdušnog tako i zemljišnog, a smim tim minimizirati gubitak zaštitnog sredstva van tretirane zone. Cilj istraživanja je povećati efikasnost kroz povećanje distribucione efikasnosti i preciznosti samog uređaja. Pri istraživanju je evidentirana norma tretiranja od 520 l/ha dok je prosječna pokrivenost krune iznosila 35,29 %. Pri toj normi evidentirani su gubici radne tečnosti od 17,21 % u obliku vazdušnog drifta i 34,98 % u obliku zemljišnog drifta. Nakon kalibracije, baždarenja i podešavanja atomizera ostvarena je prosječna pokrivenost krune od 38,05 % uz normu tretiranja od 290 l/ha. Pri umanjenoj normi gubici u obliku zemljišnog drifta iznose svega 8,56 %, a vazdušnog 14,71 %, tj. pokrivenost pločica koje mjere gubitke je znatno smanjena. Rezultati ispitivanja ukazuju na gubitke koji se javljaju usled zemljišnog i vazdušnog drifta, a koji su jako izraženi kod mladih zasada kod kojih je kruna slabo razvijena. Značajno je istaći da je pri ovom istraživanju u mladom intenzivnom zasadu norma tretiranja sa 520 l/ha umanjena na 290 l/ha uz zadržavanje kvaliteta pa i uz blago poboljšanje sa aspekta pokrivenosti same krune, a tim i efikasnosti zaštite. Rezultati ispitivanja pokazuju da i pored primjene savremenih i skupih koncepcija atomizera usljed loše podešenosti istih, dolazi do izraženih gubitaka u obliku drifta. Navedene probleme je moguće smanjiti na minimum uz adekvatno podešavanje kroz kalibraciju i baždarenje samog uređaja.

Ključne riječi: kalibracija, baždarenje, aplikacija, drift, gubici.

Section 7. Agroecology, Organic agriculture, Soil science

**INFLUENCE OF AIR POLLUTION ON THE DENSITY OF STOMATA IN THE
STUDIED SPECIES SYCAMORE MAPLE AND WHITE ASH IN BRCKO
DISTRICT**

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The aim of the study was to determine the effect of air pollution on the density of stomata in the studied tree species sycamore maple and white ash, which are located in alleys and parks of the Brcko District . Two locations were examined in Brcko district with various air pollution : the first location is a park in the center of the Brcko district , which is separated from the road , where air pollution is minimal or absent and the second location is near transit avenue with large amounts of traffic . The level of air pollution between the two sites is very different. Leaf samples were taken from two positions on the tree and the first position is of the outer part of the tree top with fully exposure to the light, up to 2 meters high and the other position is inside tree top with lower exposure to light at a height of 2 meters .The results show a significant effect of air pollution on the density of stomata in the geographical position and the position of the leaf.

Keywords : air pollution , the density of stomata, sycamore maple, white ash, Brcko district

UTICAJ AEROZAGAĐENJA NA GUSTINU STOMA ISPITIVANIH DRVENASTIH VRSTA JAVOROLISNOG PLATANA I BIJELOG JASENA U USLOVIMA BRČKO DISTRIKTA

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Cilj rada je da se utvrdi uticaj aerozagađenja kod ispitivanih drvenastih vrsta javorolisnog platana i bijelog jasena, koji se nalaze u drvodredima i parkovima distrikta Brčko, na gustinu stoma. Ispitivane su dvije lokacije u distriktu Brčko različitih aerozagađenja i to: prva lokacija je park u užem centru distrikta koji je odvojen od saobraćajnica, gdje je aerozagađenje minimalno ili ga uopšte nema; druga lokacija je drvodred kraj tranzita gdje je velika frekvencija saobraćaja. Stepent aerozagađenja između ove dvije lokacije je veoma različit, a cilj istraživanja je upravo to, da se vidi kako navedene lokacije koje imaju različite uslove za život ispitivanih vrsta drvenastih biljaka utiču na fiziološke procese kao što su transpiracija i fotosinteza. Uzorci listova su uzimani sa dva položaja na stablu i to: prvi položaj je vanjski dio krošnje sa potpunom osvjetljenošću lista na visini do 2 metra visine i drugi položaj je unutrašnjost krošnje sa manjom osvjetljenošću na visini do 2 metra. Rezultati pokazuju visoko značajan uticaj aerozagađenja na gustinu stoma kod geografskog položaja i položaja lista na stablu bez obzira na ispitivanu vrstu.

Ključne riječi: aerozagađenje, gustina stoma, javorolisni platan, bijeli jasen, Brčko distrikt.

ASSESSMENT OF IRRIGATION WATER SUITABILITY OF THE SUŠICA RIVER CATCHMENT, TRIBUTARY OF THE TREBIŠNJICA RIVER

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The Sušica is a left side Tributary of the Trebišnjica, on the part of the course between Grančarevo and Gorica dams. Due to the dominant presence of Triassic dolomites in the catchment, it is characterized by normally developed river system. From the Zaslavnica spring to the Gorica Reservoir, the Sušica River is 12 km long. According to Milanović (2006), Sušica is a mudflow, with a catchment area of about 485 km², and large variation of flow, between $Q_{min} < 0.2$ m³/s up to $Q_{max} = 150$ m³/s. The prevailing water types in the Sušica Rive Catchment are Ca-Mg-HCO₃ and Mg-Ca-HCO₃. This water types are, in fact, a reflection of the predominant carbonate material, especially dolomites. The water samples for assessing the suitability for irrigation are collected from the Trebišnjica Hydro Power Plant Company (HET), mostly four times per year between 2002 and 2011. The sampling sites were: Lastva stream, Lastva spring, Sušica spring in Vučja, The Sušica near scout camp, Jazina and Mirotinij fishponds. Three measures were used for assessing the suitability for irrigation: salinity hazard, sodium adsorption ratio (SAR) and magnesium hazard (MH). According to the classification of the United States Salinity Laboratory (1954 cited Subrahmanyam and Yadaiah 2001), based on salinity hazard, water in the Sušica River Catchment belong to the class C2. Class C2 is the medium salinity water, and can be used if a moderate amount of leaching occurs. Crops of moderate salt tolerance (potatoes, maize, wheat, oats and lucerne) can be irrigated with C2 water without any special practices. In addition to salinity hazard, classification of the United States Salinity Laboratory also involves sodium adsorption ratio (SAR), whereby the suitability of water for irrigation in the Sušica River catchment is classified into the class S1. This class includes water with low sodium content, which is considered to be excellent water for irrigation on almost all soils. Spring water of the studied area can cause some problems in the development of plants, in terms of magnesium hazard (MH). The MH values exceeding 50 meq/l is considered harmful and unsuitable for irrigation use (Szabolcs and Dorab 1964 cited AquaChem 2010.1, User's Manual). Out of the 26 water samples which were taken at the Lastva spring, value in 14 samples exceed the reference level, with a maximum value of 57 meq/l (13 April 2009).

Keywords: Irrigation water suitability, Sušica River catchment, Trebišnjica River, Bosnia and Herzegovina

APPLICATION OF SAPROPEL IN AGRICULTURAL PRODUCTION

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Organic agriculture is related to the production which is regulated by law and it includes monitoring and certification of entire production process and the products themselves. Opportunities for development of agriculture in certain regions of the Balkans can be found in the promotion of organic farming. The basis of this type of agricultural production are the inputs being used, ie, by avoiding the use of artificial, chemical substances and encouraging the use of fertilizers and additives that are based on natural substances. The main advantages of organic production are reflected in the healthier final output and positive impact on the environment by reducing pollution, rational use of resources, preservation of soil fertility, etc. The organic production points out the huge importance of organic fertilizers being used because they improve the properties of the soil and final products. This work refers to the introduction of organic fertilizers, which are based on sapropel and its impact on growth and development of plants. Sapropel refers to the sediments at the bottom of lakes, and this type of fertilizer is relatively new concept in agricultural production.

Keywords: organic farming, organic fertilizer, soil fertility, sapropel

PRIMJENA ORGANSKIH ĐUBRIVA U POLJOPRIVREDNOJ PROIZVODNJI

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Organska poljoprivredna proizvodnja, je proizvodnja koja je regulisana zakonom, koji podrazumijeva kontrolisanje i sertifikaciju cjelokupne proizvodnje i samih proizvoda. Šansa za razvoj poljoprivrede u pojedinim regijama na Balkanu se ogleda upravo u promociji organske proizvodnje hrane. Osnovu organske proizvodnje predstavljaju inputi, izbjegava se korišćenje vještačkih, hemijskih materija (m.đubriva i sredstava zaštite) dok se podstiče korišćenje đubriva i aditiva koja su bazirana na prirodnim organskim materijama. Prednosti organske proizvodnje ogledaju se u zdravim finalnim proizvodima hrane kao i pozitivnom uticaju na prirodnu sredinu, kroz smanjenje stepena zagađenja, racionalnije korišćenje resursa, i očuvanje plodnosti zemljišta. U organskoj proizvodnji hrane ogroman značaj se daje organskim đubrivima, jer ona poboljšavaju strukturu i plodnost zemljišta kao kvalitet i ispravnost gotovih proizvoda. Ovaj rad se odnosi na proučavanje i primjenu organskih đubriva koja se baziraju na spropelu, i njegov uticaj na rast i razvoj biljaka. Organsko đubrivo Spropel predstavlja organske sedimente koji se nalaze na dnu jezera, a njegoa eksploatacija i tehnološka obrada sa tresetom predstavlja novitet u poljoprivrednoj proizvodnji.

Ključne riječi: organska proizvodnja, organska đubriva, plodnost zemljišta, spropel

THE GROSS ALPHA AND BETA RADIOACTIVITY CONCENTRATION OF CHERNOZEM SOIL FROM STATIONARY EXPERIMENTS

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Soil contains a variable quantity of alpha and beta emitters from decay of uranium and thorium and their daughters, together with ⁴⁰K. Monitoring of any release of radioactivity material to the environment is necessary for environmental protection. Measurement of natural radioactivity in soil is very important to determine the amount of change of the natural background activity with time as a result of any radioactivity release. On the other hand, the determination of radioactivity in soil samples from agricultural soils is a crucial task in relation to the soil protection, animal and human health. An investigation of radioactivity in agricultural soil of the Novi Sad was conducted in two seasons (spring and autumn) of 2013. The soil samples were collected from the experimental field of the Institute of Field and Vegetable Crops at Rimski Šančevi within different locations (long-term field experiments) and different levels of fertilization. Samples were taken from two depths of 0–15 cm and 15–30 cm. The results of measurements the gross alpha and gross beta activities for 7 soil samples from depth of 0–15 cm, varied between < MDA (minimum detectable activity) and 253 Bq/kg and between 764 and 1172 Bq/kg, respectively. The results of measurements the gross alpha activity for 7 soil samples (depth of 15–30 cm) were < MDA, while the gross beta activities ranged from 900 to 1120 Bq/kg.

Key words: gross alpha and beta radioactivity, chernozem soil, long-term experiment.

**AGROMETEOROLOGICAL CONDITIONS DURING CROP GROWING CYCLE
2013 IN REPUBLIC OF SRPSKA**

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This paper analyzes the precipitation and air temperature in the Republic of Srpska from March to October 2013 year and their impact on agricultural production. Based on the data of the National Meteorological and Hydrological Institute, 2013 year was warmer than the annual average. Negative effects on agricultural production were: in Spring frosts (in March), snow cover and cold soil at the beginning of the growing season, high temperatures in the second half of April and early May, and in summer drought from mid-July to the end of the second week of August. Although the period from March to October was more rainy than the previous two years, the northern part of Republika of Srpska precipitation was below of the mean for that period of -30% in the northwest to -9.5% in the northeast, in the central region of -15% to -7%, while in the southern was surplus up to +40%. From the viewpoint of agro-meteorology, conditions in 2013 year had been unfavorable for some crops. Lower quality and quantity of the yield of certain crops, beside extreme temperatures and adverse combination of conditions of heat and moisture during periods of the 2013 year, which coincided with the sensitive stages of their development and influenced by the lack of implementation of appropriate agro-technical measures. In areas where these measures are applied adverse impact of unfavorable weather conditions was lower, and yields were higher. In the Republic of Srpska was produced 179922 tons of wheat, which is 20.9% more than last year's production: surplus of triticale for 29.0%, barley 6.0%, rye 1.7% and 1.0% for oats. Regarding the yield of maize in the Republic of Srpska produced 550 254 t of maize (45.3% more than last year's production). Finally, it should be noted that the production of plums in the 2013 compared to 2012 year increased by 104.9%.

Key words: climate anomalies, agrometeorology production, triticale, maize, plums

OVERBURDEN MATERIALS OF KOSOVO COAL MINES, AS A SUBSTRATE FOR SEMIRECLAMATION

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Kosovo area belongs among the richest coal deposits in Europe. Thanks to the fact that first coal layers lay even several meters under the surface, and having the thickness of 120 m, this coal mining area enable surface mining of lignite. Lignite itself has very low energetic value, which causes large quantities of various waste products: fly-ash, slag, etc. One of the most serious problems caused by surface out-digging the coal are huge deposits of overburden materials, which have to be uncovered in order to come to the coal layer. These overburden materials covers about 600 ha of arable land of the highest quality soil properties. This fact emphasizes need for reclamation very much. The texture of the overburden materials is extremely clayey, and according to the colloidal clay content (>60%), this overburden material belongs to the most clayey which can be found in the literature. There is no possibility for covering the material with humic layer, thus indirect reclamation is disabled. Therefore we have done trials with direct reclamation, by using different kinds of fertilizing, including barley as a typical crop of the area. Fertilizing we have done included application of 50mt/h of stable manure, with addition of N45P45K45, N60P60K60, N75P75K75, and we have left a variant without fertilizing as a control. Sowing has been done with 30% higher quantity of barley seeds than in being applied in natural soils. The yields of barley vary from only 750 kg/ha in the control, up to 2750kgs in the fertilizing variant N75P75K75. Considering difference between that variant and variant N60P60K60 appeared as significant, that took us to the conclusion fertilizing is crucial if we want to have any crop on the geogenic substrate like this. There have been determined significant changes of a substrate properties before and after the experiment.

Key words: overburden, semirecultivation, Kosovo coal mines, barley

**IMPACT OF AGRICULTURE ON NITRATE-NITROGEN (NO₃-N) LEACHING IN
WATER PROTECTED AREAS - THE RIVER DRAVA ALLUVIAL PLAIN,
SLOVENIA**

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The aim of research was to determine how changes in the management of agricultural land (cultivation technics, fertilisation, type of crop, crop rotation) influence on the leaching of nitrogen from the soil profile in the Drava river plain in Slovenia. The impact of 31 different scenarios of potential agricultural land management was evaluated using Soil and Water Assessment Tool (SWAT) model. Research was located on the shallow alluvial bedrock with carbonate and silicate layers, which is the main source of drinking water in the area. Results of the Soil and Water Assessment Tool model version 2009 showed that with the constant climate and land management technology magnitude of nitrogen leaching from the soil profile is mainly influenced by soil properties. The most drastic effect on the increase of nitrogen leaching showed vegetable production technology, followed by cereals (corn, wheat, barley). Vegetable production even in ecological production by Slovenian standards can result in similar leaching potential as conventional farming, due to unfavourable conditions origination from soil properties (shallow soil profile). Effects of grassland production may lead to 76 to 98% reduction in nitrogen loss from soil profile in comparison to current practices.

Key words: nitrate nitrogen, water protection zone, SWAT, leaching, alluvial aquifer

**MICROBIOLOGICAL ACTIVITY OF DEPOSOL IN PROCESS OF
RECLTIVATION AT THE LOCATION OF COAL MINE STANARI**

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Surface mining, as a way of intensive exploitation of mineral resources, especially coal, is increasingly being used around the world, affecting more damage to the soil in the form of destruction. Biological recultivation of deposol have to reduce negative consequences of the exploitation. Deposol, as many other technogenic soil, are usually low fertility. Microorganisms present very important link in soil/plant system and have grate contribution in soil nutrient increase. The number of some systematic and physiological groups of microorganisms and their activities provide correlative information of the soil biological activity. Grass - legume mixture have important role in the revitalization and revival of anthropogenic soil. At the location of *disposal of overburden* in coal mine Stanari, grass legume mixture has sowed into the pre-treated deposol in 2011th year. The objective of this investigation has been to evaluate the biological value of deposol in process of recultivation on the basis of the presence of different groups of microorganisms and soil dehydrogenase activity. General soil biological activity was assessed on the basis of the total number of microorganisms, the number of azotobacters, ammonifiers, oligonitrophyls actinomycetes and fungi and the activity of dehydrogenase enzymes. The results indicate a greater number and dehydrogenase activity of deposol in the process of biological cultivation compared to deposol (control).

Key words: deposol, microorganisms, dehydrogenase activity.

MIKROBIOLOŠKA AKTIVNOST DEPOSOLA U PROCESU REKULTIVACIJE NA LOKACIJI RUDNIKA UGLJA STANARI

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Površinska eksploatacija, kao način intenzivne eksploatacije ležišta mineralnih sirovina, a pogotovo uglja, sve se više primjenjuje u svijetu, pa su i oštećenja zemljišta u vidu destrukcije sve veća. Biološka rekultivacija deposola treba da smanji štetne posljedice nastale eksploatacijom. Deposoli, kao i većina drugih tipova tehnogenih zemljišta, su najčešće niske plodnosti. Mikroorganizmi predstavljaju značajnu kariku u sistemu zemljište - biljka i doprinose poboljšanju plodnosti zemljišta. Brojnost pojedinih sistematskih i fizioloških grupa mikroorganizama i njihova aktivnost daju korelativnu informaciju o biološkoj aktivnosti zemljišta. Važnu ulogu u revitalizaciji i oživljavanju antropogenih površina imaju travno leguminozne fitocenoze. Na lokalitetu odlagališta otkrivke u rudniku Stanari, u 2011. god. izvršena je sjetva travno leguminoznih smješa u prethodno obrađeni deposol. Cilj istraživanja je da se na osnovu zastupljenosti pojedinih grupa mikroorganizama i aktivnosti dehidrogenaze sagleda biološka aktivnost deposola u procesu biološke rekultivacije. Opšta biološka aktivnost deposola u procesu rekultivacije određena je na osnovu ukupnog broja mikroorganizama, zastupljenosti azotobaktera, amonifikatora, oligonitrofila, aktinomiceta i gljiva i aktivnosti enzima dehidrogenaze. Rezultati istraživanja ukazuju na veću brojnost i dehidrogenaznu aktivnost deposola u procesu biološke rekultivacije u odnosu na deposol (kontrola).

Ključne riječi: deposol, mikroorganizmi, dehidrogenazna aktivnost

**EFFECT OF LONG-TERM PHOSPHORUS FERTILIZATION ON
AGROCHEMICAL PROPERTIES OF ACIDIC CLAY SOIL AND THE CONTENT
OF AVAILABLE FE, MN AND ZN**

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Long-term and regular use of mineral fertilizers, in order to maintain and improve yields of cultivated crops, directly and indirectly causes changes in chemical, physical and biological properties of soils. Getting to know the type and character of soil changes caused by application of fertilizers, it is only possible in the system of their long-term application, in the system of perennial fertilization. This is of particular importance in acid soil, which typically represent an unfavorable environment for growing the plants, and whose characteristics depend on the type of applied fertilizers, in long term can improve soil properties, but worsen as well. Investigations were carried out on the experimental field of the Center for Small Grains in Kragujevac. The experiment was established in 1978. on the Vertisol soil type, and it's acid variety. In the experiment it have being grown wheat and maize in the alternately two field system. During the period of research it has being applied phosphorous regularly in different variants, individually in two dosages (60 and 100 kg P₂O₅/ha), and in combination with nitrogen (NP), and nitrogen and potassium (NPK). After 33 years it have been carried out soil analysis and determined the pH (in H₂O and nKCl), humus content, total N, available P₂O₅ and K₂O, and available forms of Fe, Mn and Zn, in order to determine the direction and volume of changes of the observed parameters after a 33 year regular application of phosphorus. Long-term application of fertilizer led to a bigger or lower changes of the observed chemical properties of Vertisol. It has been determined significant decrease oh pH, especially in combinations wherein NP and NPK fertilizers have being applied. Simultaneously content of available P₂O₅ has been significantly multiplied (from 4 to a maximum of 26 mg/100 g soil), and to a certain extent content of available Fe too (from 97.2 to a maximum of 122.5 ppm).

Keywords: iron, manganese, zinc, long-term fertilizing, Vertisol

**UTICAJ VIŠEGODIŠNJEG ĐUBRENJA FOSFOROM NA OSNOVNE
AGROHEMIJSKE OSOBINE BESKARBONATNE SMONICE I SADRŽAJ
PRISTUPAČNOG FE, MN I ZN**

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Dugogodišnja i redovna upotreba mineralnih đubriva, pored održavanja i poboljšanja prinosa gajenih kultura, direktno i indirektno izaziva promene hemijskih, fizičkih i bioloških osobina zemljišta. Upoznavanje sa vrstom i pravcem promena izazvanih primenom mineralnih đubriva moguće je u režimu njihove višegodišnje primene, odnosno u sistemu višegodišnjeg đubrenja. Ovo je od posebne važnosti kod kiselih zemljišta, koja po pravilu predstavljaju nepovoljnu sredinu za gajenje biljaka i čije se osobine u zavisnosti od vrste primenjivanih đubriva, dugoročno mogu popraviti i/ili pogoršati. Istraživanja su obavljena na oglednom polju Centra za strna žita u Kragujevcu. Ogled je formiran 1978. godine na beskarbonatnoj smonici, kisele reakcije in a njemu su naizmenično, u dvopoljnom sistemu, gajeni pšenica i kukuruz. Tokom istraživanja svake godine je unosen fosfor u različitim varijantama: samostalno u dve količine (60 i 100 kg P₂O₅/ha), zatim u kombinaciji sa azotom (NP) i azotom i kalijumom (NPK). Posle 33 godine utvrđeno je stanje pH (H₂O i nKCl), zatim sadržaja humusa, ukupnog N, pristupačnog P₂O₅ i K₂O i pristupačnih Fe, Mn i Zn, sa ciljem da se utvrdi pravac i nivo njihovih promena. Dugogodišnja primena đubriva je, uglavnom doprinela promeni posmatranih osobina smonice. Utvrđeno je značajno smanjenje pH, posebno kod varijanti gde su primenjivana NP i NPK đubriva. Višestruko je povećan sadržaj pristupačnog P₂O₅ (od 4 do 26 mg/100 g zemljišta) i do izvesne mere sadržaj pristupačnog Fe (od 97,2 do 122,5 ppm).

Ključne reči: fvožde, mangan, cink, višegodišnje đubrenje, smonica

CLIMATE CHANGE AS A COMPLEX PROCESS IN BALKAN REGION

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Regional climate change is a major and important environmental issue facing southeastern Europe. The Balkans are getting warmer and are projected to continue on this warming trend. Similarly, the region is receiving less precipitation and is projected to experience further decreases, although precipitation patterns will continue to vary according to terrain, elevation and proximity to the sea. The effect of warmer temperature on evaporation, together with the decline in precipitation, will make the region drier. Rising temperatures and disruptions in the precipitation regime are the most significant exposures for the region. All Balkan countries face more frequent and more intense droughts and floods, and the countries with coastal areas also face potential hazards associated with a rising sea level. Exposure to these hazards will play out in public health and biodiversity and in key economic sectors – water resources, agriculture, forestry, energy and tourism. The Balkan countries have fresh water resources sufficient to meet the needs of sustainable development, but climate change is expected to disrupt water regimes. As the requirements for drinking water grow, and the demands for hydropower production increase, the water resources of the region may come under pressure from users with conflicting interests. Agriculture has a significant role in the Balkans' sensitivity to climate change. Almost half of the land in the region is used for agriculture and the sector is an important employer in the region. Higher temperatures combined with more frequent and intense droughts increase the risk of forest fires, and the environmental damage includes loss of habitat, soil erosion and greenhouse gas emissions. The region's exposure to more frequent and intense floods has implications for the economies of the countries and for the environment. Adaptation is a risk management strategy that intends to respond to the inevitable effects of climate change, and to enhance resilience. Ecosystems with a higher capacity to adapt are less vulnerable to the effects of climate change. For regions or countries or economic sectors, the capacity to adapt similarly determines their degree of vulnerability. The Balkan countries face several challenges to their capacity to adapt. Countries with well established, effective governance and strong, stable economies have a distinct advantage in their adaptive capacity. A country's adaptive capacity may be evidenced at the systemic level (governance, economy), the institutional level (ministries, organizations) and at the individual level (household, farm). Strong regional cooperation also increases adaptive capacity. Balkan countries must work together on regional adaptive strategies. Climate change is a complex process that can exacerbate threats caused by poverty, by weak institutions for the management of resources and by mistrust between communities and nations and by inadequate access to vital natural resources such as water and arable land.

Key words: climate change impacts, adaptation, adaptive capacity, agriculture

GOING WITH THE FLOW: RESPONSIBLE USE OF WATER IN AGRICULTURE

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In the Targeted Research Project (CRP), Slovenian waters have been tested in an innovative bid to improve water management to maintain the vital balance between protection of ecosystems and development of commercially viable agricultural crops. The CRP consortium has masterminded a system of dialogue forums and assessment tools for use by agricultural water users. The project is financed by the Agency for Research of the Republic of Slovenia and the Ministry for Agriculture, Forestry and Food of the Republic of Slovenia to aid to start an official Slovenia's irrigation strategy which will be in compliance with European Union water regulations, as well. The CRP research shows that reservoir maintenance lacks collaboration between sectors. The CRP points to this lack of cooperation as the reason why the reservoirs are being used below their potential with respect to irrigation. Some irrigation reservoirs have already been built for use in limited sectors, such as flood protection and aquaculture. The CRP project promotes access for all water users and has conducted in depth research, posing a number of viable solutions. Slovenian water legislation requires that bodies of water retain an ecology-supporting flow. This is in accordance with European Union Water Frame Directive requirements. The Regulation on the designation and method for monitoring and reporting ecologically acceptable flow provides an exception granting leniency for water use in specific projects, such as irrigation. There are deep-seated issues around water availability for irrigation. To smooth out these problems, the CRP project has created a platform for dialogue on water use in agriculture. The CRP team strategically pin-points areas of agricultural land near to water sources, analyses the flow and indicates what quantity of the water that is available for use. A part of these studies also reveals data on which locations can be used to collect surface runoff in small reservoirs. CRP assesses the availability and accessibility of groundwater in order to develop a model for improved plant production. Analysis indicated that there was an abundance of water as a resource; however, these areas are not evenly spread across Slovenia, presenting a major barrier to accessibility.

Key words: water, irrigation strategy, ecology-suported flow, water sources for irrigation

DAMAGE ASSESMENT OF ASSIMILATION ORGANS AGAINST OZONE

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Ozone is one of the most important pollutants in large parts of Europe. There is evidence that ambient concentrations of ozone found in Europe caused by a number of effects on vegetation, including visible leaf injury, growth and yield reduction, and change the sensitivity of conifers to biotic and abiotic factors. Increasing concentrations of tropospheric ozone have regularly made the headlines, especially in the warmer half of the year, when ozone values climb depending on the weather and the increased anthropogenic activities. Depending on the sensitivity of the plant species and the ozone concentration, visible leaf or needle damage appears. The harmful effects of ozone are difficult to prove because it leaves behind no chemical residue that can be analyzed or measured. Visible leaf or needle damage is therefore the only effect that experts can easily detect and characterise. Following the leaf-sampling procedure, from each conifer main tree we took 5 branches, as small as possible, but they have the first- and second- year needles. It was be pruned from the sun-exposed portion of the upper part of the crown. The chlorotic mottling will be scored for each needle age class in percentage of total surface affected, and then the corresponding score (0-3) for that percentage will be assigned (1% to the 100%). Depending on the test results, it is concluded that on the point Level II there are no damage caused by the influence of elevated ozone concentrations. General health of the study sites shows no visible signs of chlorosis on the needles within the stands and on the edges. A basic goal of visible ozone injury on the selected area is to evaluate the effects of tropospheric ozone at locations where are Monitoring of ozone injury, as well as to contribute to the risk assessment of ozone effects in European forest ecosystems. Additional ozone research and monitoring is needed for the Level II in Serbia and shall be continued through monitoring technologies, development of more sophisticated pollution distribution and biological response models, integrated monitoring networks, alternative ways to assess ozone uptake and injury, identification of additional bioindicator species.

Keywords: Ozone, biomonitoring, injury, forest health monitoring.

WATER QUALITY DEGRADATION OF THE KRIVAJA WATERCOURSE

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Surface waters in the Vojvodina provide good opportunities for multipurpose use. The abundance of water in major rivers, relatively dense network of natural and artificial watercourses and many reservoirs have great value as water management resources and as specific ecosystems of this area. However, these water bodies also serve as a recipient of mostly untreated wastewaters from municipalities and industries. In addition, surface waters are exposed to the effects of diffuse source pollution, primarily from agriculture, such as pesticides, fertilizers, organic matter, etc. Because of the environment in which they are located, natural and most of all anthropogenic conditions, systematic violation of water quality is symptomatic for some typical locations (not just in individual accidental episodes but rather permanently). One of these small streams in Vojvodina is the Krivaja watercourse in which has already registered unsatisfactory and even alarming situation in terms of water quality several years ago. Based on the monthly monitoring of relevant indicators of surface water quality during the period of analysis, from year 2006 to 2011, an unsatisfactory ecological status and frequent occurrence of the worst quality class was noted in the Krivaja watercourse. This situation considerably limits or prevents the use of water from this river for any purpose. Also, based on the data from the three measuring stations, the longitudinal distribution of the analyzed parameters and the degradation of water quality along the Krivaja watercourse were found. Protection, revitalization and rational management of Krivaja waters as an important water resource of the areas it flows through, would make this watercourse to be deleted from the surface water quality "black spots" list. Overcoming the identified problems, besides as a wastewater recipient, Krivaja could be used for other purposes without risk of adverse effects and its waters and coastline again make attractive and usable (including for irrigation of the surrounding farmland and for the safe food production).

Key words: Krivaja stream, water quality, quality indicators

DEGRADACIJA KVALITETA VODE VODOTOKA KRIVAJA

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Površinske vode u Vojvodini pružaju povoljne mogućnosti za višenamensko korišćenje. Bogatstvo vodom velikih reka, relativno gusta mreža prirodnih i veštačkih vodotoka i brojne akumulacije imaju veliku vrednost i kao vodoprivredni resursi i kao specifični ekosistemi ovog područja. Međutim, ova vodna tela istovremeno služe i kao recipijent uglavnom neprečišćenih otpadnih voda iz naselje i industrije. Pored toga, površinske vode su izložene i uticajima rasutog zagađenja, pre svega iz poljoprivrede, kao što su pesticidi, mineralna đubriva, organske materije i sl. Zbog okruženja u kome se nalaze, prirodnih i pre svega antropogenih uslova, za neke karakteristične lokalitete je simptomatično sistematsko narušavanje kvaliteta vode (ne samo u pojedinačnim akcidentnim epizodama nego permanentno). Jedan od takvih manjih vodotoka u Vojvodini je Krivaja kod koga je već više godina unazad registrovano nezadovoljavajuće, pa čak i zabrinjavajuće stanje u pogledu kvaliteta vode. Na osnovu mesečnog monitoringa relevantnih indikatora kvaliteta površinskih voda, tokom analiziranog perioda 2006-2011. godine, kod vodotoka Krivaja konstatovan je nezadovoljavajući ekološki status i učestala pojava najlošije bonitetne klase kvaliteta. Ovakvo stanje u znatnoj meri ograničava ili onemogućava upotrebnu vrednost vode iz ovog vodotoka u ma koje svrhe. Na osnovu podataka sa tri merne stanice, takođe je ustanovljena je longitudinalna distribucija analiziranih parametara i pogoršanje kvaliteta vode duž toka Krivaje. Zaštita, revitalizacija i racionalno upravljanje vodama Krivaje kao značajnog vodnog resursa područja kroz koje protiče, učinili bi da se ovaj vodotok izbriše sa liste "crnih tačaka" kvaliteta površinskih voda. Prevazilaženjem uočenog problema Krivaja bi se osim kao recipijent otpadnih voda mogla koristiti bez opasnosti od negativnih efekata i u druge svrhe, a njene vode i obale ponovo učiniti privlačnim i upotrebljivim (između ostalog i za navodnjavanje okolnih obradivih površina i proizvodnju zdravstveno bezbedne hrane).

Ključne reči: Krivaja, kvalitet vode, indikatori kvaliteta

RECUITIVATION OF AGRICULTURAL LAND AFTER CONSTRUCTION OF HYDROPOWER PLANT BASIN

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Several hydropower plants have been constructed on the river Sava since the eighties. Soils on the banks of river Sava are very fertile and important for agricultural production as arable land in plains is limited in Slovenia. Due to the construction of dam for hydropower plant Krško subsequent increase of the saturated zone in the adjacent soils was expected, which would constrict conditions for plant growth and tillage. For continuation of agricultural production after the construction of hydropower plant on the river bank agricultural land was elevated and recultivated as part of meliorative measures. Land reclamation works can partially or completely alter soil characteristics, which also thus changing production potential of the soil. Recultivation measures expedite restoration of the damaged agricultural land and help achieve similar or same production potential as before. Based on the intended land use as well as data on soil characteristics before and after land reclamation, additional meliorative measures have been recommended for the time immediately after the elevation. The measures were deep mandatory ploughing, broadcast application of phosphorous and potassium fertilizer, and grass legume mixture cover for three years after the land reclamation. Depending on the land owner leveled arable areas underwent different recultivation practices. Preliminary results indicate that hasty intensive agricultural use of such soils, particularly in combination with wet climatic conditions, extends the time needed to achieve soil full production potential. Grass clover mixture had favorable influence and showed short-term beneficial influence on soil characteristics. Recultivation period of such arable land should be extended until the set soil quality goals are achieved.

Key words: Land reclamation, recultivation, meliorative measures

**FLORA AND VEGETATION OF KANINA CASTLE IN VLORA DISTRICT
(ALBANIA)**

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Walls are man-made habitats, typical of human settlements and exposed to strong anthropogenic influences. Nevertheless, they provide new ecological niches in built-up areas and can be occupied by different types of plant. Flora of castle walls is composed of a high number of accidental species with a low degree of habitat fidelity and low cover. Species composition of wall flora is influenced by many factors. Besides the local abiotic conditions, macroclimate and availability of diaspores from the surrounding ruderal or seminatural vegetation types, a human influence play a significant role in shaping the species composition on walls. A detailed study of flora and vegetation of Kanina castle, located in Vlora city is presented in this paper. Field work was carried out in the period 2011 - 2013. The total number of species recorded to be growing in the area was 64, implementing 31 genus and 27 families. All plants dominated the whole area of the castle, including the castle walls, rocks within the castle area and directly adjacent to the castle. In the life – spectrum, therophytes were overrepresented (about 40% of the total number of species). Seventeen chorological groups are distinguished, where the Euro-Mediterranean elements (about 26%) predominated. Of all plant species recorded, a considerable part belonged to medicinal plants, which covered about 17% of the total number.

Key words: castle flora, life forms, chorology, medicinal plant

**FLORA AND VEGETATION OF AMPHITHEATRE WALL IN DURRËS
DISTRICT (ALBANIA)**

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Flora and vegetation of the Amphitheatre in Durrës city is described based on a field research conducted during 2011 - 2013. Although they are known to have artificial origin, location in the urban and rural landscape as well as the technology of the wall building can influence a wide range of plant species, which are able to colonize this habitat. Results showed that the flora of the Durrësi Amphitheatre is composed by a high number of plant species. Conclusively, 39 plant species, 35 genus and 19 families were found to be growing on the castle walls and in the rocks within the castle area. In the life – spectrum, therophytes are overrepresented, covering about 51%. Eleven chorological groups are distinguished, with Eur- Mediterranean elements (17%) being dominant. Several alien species, typical of the Mediterranean region, can be often found in this Amphitheatre, mostly as a consequence of escape from cultivation (e.g. *Aster squamatus*, *Ailanthus altissima*).

Keywords: Amphitheatre flora, life forms, chorology, alien species

**DETERMINING OF THE PLANT SPECIES TO REMAIN UNDER PAZARYOLU
DAMP LAKE, CHORUH VALLEY**

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The project of "Determining of the plant species to stay under Pazaryolu Damp Lake" has been implemented for investigating flora of the damp reservoir as economic (medicinal and aromatic etc .) value , endemic , local endemic, rare and/or endangered plant species and determining the potential habitats for portable species to adopt climate, soil and other ecological characteristics. The project was carried out between May-October 2013 and the following conclusions were reached. Based on flora records, 191 species, 39 subspecies and 11 varieties belonging to 44 families have been identified in Pazaryolu Dam and surroundings. Field studies and literature records show that there are 71 species, 15 subspecies and 3 varieties belonging to 22 families and only one species *Genista aucheri* is endemic. Besides, *Sedum album* belonging *Crassulacea* family is not endemic or rare species but can be used for dryland landscaping practices in progressing importance of global warming and climate change in recent years.

Key words: Damp project, flora, endemic and rare plants, Choruh valley



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