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Agroekologija, ekološka poljoprivreda i zaštita okoliša

Zbornik sažetaka

Ekološka svijest: Percepcija okoliša i ekoloških problema

Katica Arar[1], Zrinka Knezović[1], Stano Zlopaša[2], Anđel Mrvalj[2]

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Sažetak

Cilj ovog rada je istraživanje ekološke svijesti s aspekta percepcije okoliša i ekoloških problema. Ispitivanje stavova mladih o okolišu i ekološkim problemima provedeno je na Agronomskom i prehrambeno-tehnološkom fakultetu Sveučilišta u Mostaru unutar studentske populacije na uzorku od 150 studenata, kao i među članovima udruge mladih „Tajna prirode“ na uzorku od 30 članova. Procjena stavova mladih značajne su jer ukazuju na njihovu osjetljivost/neosjetljivost na probleme zaštite okoliša i spremnost za njegovo očuvanje. Istraživanjem su obuhvaćene sve četiri godine studija. Veličina stratificiranih uzoraka određena je relativnim udjelom broja studenata određene godine studija u ukupnom broju studenata. Za svaki stratum studenti su odabrani slučajnim izborom. Istraživanjem su postavljene dvije hipoteze: H 1: Studenti su svjesni ekoloških problema i H 2: Studenti su zainteresirani za zaštitu okoliša, ali o tome nedovoljno znaju. Analiza je pokazala zanimanje studenata za ekološke probleme, ali i nedovoljno znanje o okolišu i nedovoljno angažiranje ispitanika u zaštiti okoliša.

Ključne riječi: okoliš, ekologija, svijest, percepcija, mladi

Ecological consciousness: The perception of the environment and ecological issues

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Summary

The aim of this study is to investigate environmental awareness in terms of perception of the environment and ecological issues. Examining the attitudes of young people about the environment and environmental issues was conducted at the Faculty of Agriculture and Food Technology University of Mostar, within the student population in a sample of 150 students, as well as among members of youth associations "Tajna prirode" on a sample of 30 members. The attitude of young people is important because they indicate their sensitivity/insensitivity to environmental problems and a willingness to preserve it. There were included all four years of study. Stratified sample size is determined by the relative share of the number of students some years of study in the total number of students. For each stratum students were selected randomly. The survey placed two hypotheses: H 1: Students are aware of environmental problems and H 2: Students interested in protecting the environment, but they know enough about it. Analysis showed interest in students to environmental problems, and lack of knowledge about the environment and the insufficient involvement of the respondents in the environment.

Key words: environment, ecology, consciousness, perception, youth

Pilot farms of IPA project in Serbia: Soil fertility levels and measures for improvement

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Summary

Investigations were carried out in the framework of the IPA project Agriculture Contribution towards Clean Environment and Healthy Food on three pilot farms located in Srem, the border region of Serbia. Regarding production system, one farm is specialized for crop production, second one for field crop, vegetable, fruit and livestock production, and the third crop and livestock production. The aim of the study was assessment of current status of soil fertility and fertilizer application on the basis of soil samples and information collected from the farms, and recommendation of economic, technological and ecological measures for optimization and improvement of food production on these farms. Results of soil fertility on the tested farms show that all parameters have large variations not only between the farms but also between the plots on the same farm. Economic optimization measures are based on the rational application of organic and mineral fertilizers, which are calculated for each plot by model for optimization of fertilization based on Soil fertility control and fertilizer recommendation system. Technological measures include improvement of soil quality and technology of food production. Measures for protection of agro-ecosystems resulting from compliance within optimization of economic and technological measures on the farm and education of the farmers about the importance of environmental protection in the production of safe food.

Key words: soil fertility, economic, technological and environmental measures

Dinamika toksičnih teških metala kadmija, kroma i olova u intenzivnom nasadu jabuke

Hamdija Čivić[1], Senad Murtić[1], Sanela Muratović[1], Marija Vukobratović[2], Želimir Vukobratović[2]

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Sažetak

Cilj ovog istraživanja je bio ispitati sadržaj toksičnih teških metala Cd, Cr i Pb u intenzivnom nasadu jabuke sorte Idared, smještenom na području općine Goražde, te utvrditi njihovu akumulaciju u plodovima jabuke. Sadržaj Cd, Cr i Pb u ispitivanim uzorcima tla i plodova jabuke određen je metodom atomske apsorpcijske spektrofotometrije. Prosječni sadržaj kadmija u ispitivanom tlu je iznosio 0.15, kroma 43.98, a olova 47.48 mg kg^{-1} suhe tvari. Akumulacija navedenih elemenata u plodovima jabuke je bila izuzetno niska. Prisutnost olova i kadmija u plodovima jabuke nije niti determinirana, dok je utvrđeni sadržaj kroma bio znatno ispod graničnih vrijednosti, propisanih od strane WTO (Svjetske zdravstvene organizacije). Rezultati istraživanja su pokazali da se tlo na ispitivanom lokalitetu može smatrati pogodnim za proizvodnju zdravstveno ispravnih plodova jabuke, pod uvjetom da se uzgoj obavlja u skladu s principima integrirane proizvodnje.

Ključne riječi: tlo, plod, teški metali

Dynamics of toxic heavy metals cadmium, chromium and lead in intensive apple orchards

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Summary

The aim of this study was to examine the content of heavy metals Cd, Cr and Pb in soil of apple orchards located in the community Goražde and to determine the accumulation of these elements in apple fruits. The content of Cd, Cr and Pb in soil samples and apple fruits was determined by atomic absorption spectrophotometry. Average content of Cd in examined soil was 0.15, for Cr 43.98 and for Pb 47.48 mg kg-1 of dry matter. The accumulation of these elements in apple fruits was extremely low. The presence of cadmium and lead in apple fruits was not determined, while the chromium content was significantly below the limits prescribed by the WTO (World Health Organization). The research results showed that the soil on the examined location can be considered as suitable for the production of healthy apple fruits, provided that the cultivation is done in accordance with the principles of integrated production.

Key words: soil, fruit, heavy metals

Effect of the plant hormone kinetin on reducing the intensity of brown spot disease on tobacco

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Summary

Brown spot disease is economically important disease which has a particular impact on the reduction of tobacco leaves quality and, hence, on the total economic effect. The main factors for its occurrence are the climate and irrational use of agrotechnical practices. Ontogenetic age of leaves has also a big influence on disease attack, i.e. its intensity increases with aging of the leaves. A number of fungicides are applied in the control of this disease. The aim of integral protection, however, is to include preventive measures and to reduce the number of treatments. Also, the biointensive model of integral protection aims to replace them by natural resources. Our objective was to study the effect of plant hormone kinetin on the intensity of attack of brown spot disease. Two concentrations of kinetin were applied (30 mg/l and 60 mg/l), with one and two treatments of tobacco plants. They were inoculated with a suspension of pure culture of the pathogenic fungus Alternaria alternata - the causing agent of the disease. It was concluded that kinetin treatment has a positive effect on reducing the disease intensity. The lowest intensity in the two-year investigation was recorded in plants with a single treatment of kinetin -60 mg/l. Among treatments with 30 mg/l, lower intensity was recorded when two treatments were applied. Histological investigations of tobacco leaves confirmed the effect of kinetin in reduction of the possibilities for infection. The investigations point out to the possibility for application of the plant hormone kinetin in tobacco as a biological and preventive measure in the control of brown spot disease.

Key words: brown spot disease, intensity of attack, kinetin, reduction, preventive measure

Teški metali u tlu i procjednoj vodi na području vodocrpilišta Vinokovšćak

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Sažetak

Stacionarno lizimetrijsko istraživanje provedeno je u razdoblju 2003-2006. u oraničnom sloju semiglej-aluvijalnog tla u blizini vodocrpilišta Vinokovšćak, u Varaždinskoj županiji. Glavni cilj istraživanja bio je utvrditi stupanj onečišćenja tla i procjedne vode teškim metalima (Cd, Cu, Pb i Zn). U tu svrhu praćene su: dinamika koncentracija teških metala u u tlu i vodi iz tenziometarskih i gravitacijskih lizimetara, količina ispranih teških metala procjednom vodom i ocijenjeno je onečišćenje tla i procjednih voda sukladno zakonskoj regulativi. Koncentracije teških metala u sloju tla 0-30 cm varirale su kako slijedi: Cd (0,28 - 0,83 mg/kg), Cu (16,0-44,0 mg/kg), Pb (18,9 – 40,0 mg/kg), Zn (42,1 – 93,0 mg/kg). Prema stupnju onečišćenja So ovo je tlo povećane onečišćenosti s Cu, Pb i Zn (0,25-0,50) i velike onečišćenosti s Cd (0,50-1,00). U procjednoj vodi gravitacijskih lizimetara koncentracije teških metala kretale su se u sljedećim rasponima: Cd (1,5 -4,8 mg/l), Cu (4,4-78,0 mg/l), Pb (6,0-52,0 mg/l) i Zn (18,0 – 268,0 mg/l). Sukladno vrijednostima MDK, utvrđene koncentracije Cu odgovarale su petoj (V), Cd i Pb četvrtoj (IV), te Zn prvoj (I) vrsti voda. Količina ispranih teških metala procjednom vodom kretala se od: 2,8 - 3,8 g Cd/ha, 17,0 – 42,7 g Cu/ha, 25,9 – 40,1 g Pb/ha i 86,4 – 142,0 g Zn/ha. U istraživanom razdoblju prisutno je znatno onečišćenje tla i procjednih voda. Ubuduće bi se trebalo više pažnje usmjeriti k stalnom praćenju kakvoće tla i procjednih voda, posebno na ovakvim osjetljivim vodozaštitnim područjima.

Ključne riječi: teški metali, tlo, procjedna voda, onečišćenje, lizimetri

Heavy metals in soil and percolated water at Vinokovscak water supply area

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Summary

Stationary lysimetric study was conducted in the period 2003-2006 in the ploughed layer of semigley-alluvial soil near water wells Vinokovščak in Varazdin county. The main objective was to determine the degree of soil and leachate pollution by heavy metals (Cd, Cu, Pb and Zn). For this purpose, it was monitored the dynamics of the concentration of heavy metals in soil and water from tenziometric and gravity lysimeters, the amount of leached heavy metals by percolated water and evaluated the soil and leachate pollution in accordance with legislation. Concentrations of heavy metals in the soil layer 0-30 cm ranged as follows: Cd (0,28 to 0,83 mg / kg), Cu (16,0 to 44,0 mg / kg), Pb (18,9 to 40,0 mg / kg), Zn (42,1 to 93,0 mg / kg). According to the degree of pollution So, this soil was strongly polluted with Cu, Pb and Zn (0,25 to 0,50) and highly polluted with Cd (0,50 to 1,00). The heavy metal concentrations in percolated water were in the following ranges: Cd (1,5 -4,8 mg / l), Cu (4,4 to 78,0 mg / l), Pb (6,0 to 52,0 mg/l) and Zn (18,0 to 268,0 mg/l). According to the MAC, concentrations of Cu were corresponded fifth (V), Cd and Pb fourth (IV), and Zn first (I) of the water category. The amount of leached heavy metals ranged from: 2,8 to 3,8 g Cd /ha, from 17,0 to 42,7 g Cu /ha, from 25,9 to 40,1 g Pb /ha and 86,4 to 142,0 g Zn /ha. In this period the soil and leachate were highly polluted by heavy metals. In the future, should pay more attention to the constant monitoring of the quality of soil and leachate, especially on such sensitive water protection areas.

Key words: heavy metals, soil, percolated water, pollution, lysimeters

Utjecaj gnojidbe dušikom na status dušika ozime pšenice sorti Srpanjka i Lucija

Krunoslav Karalić, Zdenko Lončarić, Vladimir Ivezić, Brigita Popović, Mario Matek, Marija Vuković

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Sažetak

Cilj rada je bio utvrditi status dušika u sortama pšenice Srpanjka i Lucija na temelju koncentracije dušika i koncentracije klorofila u listu pšenice u fenofazi klasanja. Proveden je poljski pokus gnojidbe pšenice dušikom u tri razine (140, 160 i 180 kg N) i kontrolnim tretmanom (78 kg N) na dva lokaliteta Josipin dvor i Kolođvar. Analiza dinamike suhe tvari provedena je u fenofazama busanja, vlatnja i klasanja. Koncentracija klorofila u listu zastavičaru pšenice određena je SPAD klorofilmetrom, te metodom spektrofotometrijskog određivanja koncentracije. Koncentracija N je utvrđena metodom destilacije. Tretmani optimalne gnojidbe sa 160 kg N i povećane gnojidbe sa 180 kg N značajno su povećali prosječnu vrijednost ukupne nadzemne mase za obje sorte pšenice u fenofazama busanja, vlatanja i klasanja. Najintenzivnije prosječno povećanje koncentracije pigmenata u listu zastavičaru obje sorte zabilježeno je za klorofil a (41,1% - 41,8%) i za klorofil a+b (36,5% - 37,5%) gdje su sve razine gnojidbe dušikom rezultirale značajanim utjecajem. Na prosječno povećanje koncentracije klorofila b (22,0% - 24,9%) značajno su utjecale optimalna i povećana gnojidba dušikom, dok je na prosječno povećanje koncentracije karotenoida (20,0% - 25,3%) značajno utjecala samo razina povećane gnojidbe dušikom. Za sortu Srpanjka je utvrđena snažna međuovisnost SPAD očitanja sa koncentracijom klorofila a+b, zatim sa koncentracijom karotenoida i sa koncentracijom dušika u listu. Snažna međuovisnost je za sortu Lucija utvrđena između SPAD očitanja i koncentracije klorofila a+b, te između SPAD očitanja i koncentracije dušika u listu pšenice. Značajna pozitivna korelacija utvrđena je između koncentracije dušika i koncentracije klorofila a+b u listu zastavičaru sorte Srpanjka. Prema tome, SPAD korofil metar je moguće koristiti kao pouzdan pokazatelj statusa dušika u sortama pšenice Srpanjka i Lucija.

Ključne riječi: gnojidba dušikom, pšenica, dinamika suhe tvari, SPAD indeks, pigmenti

Impact on nitrogen fertilization on nitrogen status in winter wheat cultivars Srpanjka and Lucija

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Summary

Objective of this study was to determine nitrogen status in wheat cultivars Srpanjka and Lucija based on concentration of nitrogen and concentration of chlorophyll in wheat leaf at ear formation phenophase. Experiment of wheat fertilization with nitrogen in three levels (140, 160 and 180 kg N) and control treatment (78 kg N) was carried out on two localities Josipin Dvor and Kolođvar. Analysis of dry matter dynamics was conducted in tillering, stalk formation and ear formation phenophases. Chlorophyll concentration in wheat flag leaf was determined by SPAD chlorophyll meter and by spectrophotometric concentration determination. N concentration was measured by destilation method. Treatments of optimal fertilization with 160 kg N and increased fertilization with 180 kg N significantly increased average values of total above ground wheat mass for both cultivars in tillering, stalk formation and in ear formation phenophases. Most intensive average increment of pigments in flagleaf for both cultivars was recorded for chlorophyll a (41,1% - 41,8%) and chlorophyll a+b (36,5% - 37,5%) where all the levels of fertilization with nitrogen resulted with significant influence. Optimal and increased fertilization with nitrogen significantly impacted on average increase of chlorophyll b (22,0% - 24,9%) concentracion, while average increment of carotenoids (20,0% - 25,3%) was affected only by increased level of fertilization with nitrogen. Strong interdependence for Srpanjka cultivar was determined for SPAD index with concentracion of chlorophyll a+b and with concentracion of carotenoides as well as with leaf nitrogen concentration. Strong interdependence for Lucija cultivar was determined between SPAD index and concentracion of chlorophyll a+b and between SPAD index and nitrogen leaf concentration of wheat. Significant positive correlation was determined between concentracion of nitrogen and concentracion of chlorophyll a+b from flag leaf cultivar Srpanjka. Therefore, it is possible to use SPAD chlorophyll meter as a reliable indicator of nitrogen status in winter wheat cultivars Srpanjka and Lucija.

Key words: nitrogen fertilization, wheat, dry matter dynamics, SPAD index, pigments

Provedba IPA projekta „Doprinos poljoprivrede čistom okolišu i zdravoj hrani“

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Sažetak

Područje istraživanja u okviru IPA projekta „Doprinos poljoprivrede čistom okolišu i zdravoj hrani“ obuhvaća Osječko-baranjsku i Vukovarsko-srijemsku županiju u Hrvatskoj, te Sremski i Južnobački okrug u Srbiji. Do sada na istraživanom području nije uspostavljena sustavna kontrola utjecaja poljoprivredne proizvodnje na okoliš. Dakle, razina opterećenja tla poljoprivrednom proizvodnjom u prekograničnom području nije utvrđena i ne postoji baza s relevantnim podacima o utjecaju poljoprivrede na okoliš. Cilj projekta je doprinijeti uspostavi održivog sustava kontrole opterećenja tla poljoprivrednom proizvodnjom, te povećati razinu svijesti o utjecaju poljoprivrede na okoliš i na proizvodnju zdrave hrane. Analiza trenutnog stanja s prikupljanjem podataka na 6 pilot farmi u prekograničnom području obuhvaća utvrđivanje plodnosti tla s naglaskom na sadržaj mikroelemenata i potencijalno toksičnih teških metala u tlu, biljnom materijalu i organskim gnojivima, te utvrđivanje rezidua pesticida u tlu i poljoprivrednim proizvodima. Do sada je analizirano oko 3/4 uzoraka tla, biljne tvari i organskih gnojiva predviđenih za prvu godinu provedbe projekta, te je anketnim upitnikom analizirana poljoprivredna proizvodnja na oko 2.500 ha. Utvrđeno je kako postoji potreba optimizacije gnojidbe mineralnim gnojivima s povećanjem upotrebe organskih gnojiva, te mogućnost optimizacije zaštite bilja. Provedena će analiza biti osnova za razvoj zajedničkog sustava optimalne gnojidbe s planom zbrinjavanja organskog poljoprivrednog otpada. Navedeni sustav koristit će se za edukaciju i trening proizvođača u prekograničnom području.

Ključne riječi: poljoprivredna proizvodnja, okoliš, ekološko opterećenje, teški metali, rezidue pesticida

Implementation of IPA project „Agriculture contribution towards cleen environment and healthy food“

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Summary

The research area of IPA project „Agriculture Contribution Towards Cleen Environment and Healthy Food“ includes Osijek-Baranja County, Vukovar-Srijem County in Croatia and Srem and South Bačka district in Serbia. So far, control of agricultural production impact on the environment wasn't established in the study area. Accordingly, the level of soil pollution from agricultural production in the cross border area has not been determined and therefore there is no database with relevant informations of the agriculture impact on environmental pollution. The aim of the project is to contribute to the establishment of a sustainable control system of soil pollution from agriculture and to enhance community awareness about the impact of agriculture on the environment and on the food quality. The analysis of present conditions on 6 pilot farms in cross border region includes determination of soil fertility focusing on micronutrients and potentially toxic heavy metals content in soil, plant material and organic fertilizers, and on pesticide residues in soil and agricultural products. So far, about 3/4 of samples scheduled for first year of project were collected and agricultural production on 2.500 ha was analysed using questionnaire. It has been found that there are possibilities for fertilization optimization with increased use of organic fertilizers, and for optimization of plant protection. Conducted analyses will be basis for joint management plan for optimal fertilization, organic agricultural residues management and plant protection. This system will be used for farmers education and training in cross border region.

Key words: agriculture production, environment, pollution, heavy metals, pesticide residues

Pilot farms of IPA project in Serbia: The status of trace elements in soil

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Summary

The concentration of trace elements (TEs) in soil is an indicator of possible excesses or deficiencies for plant nutrition and finally animal and human health and environmental protection. Conventional agricultural production is characterized by intensification and high input of fertilizers and pesticides, which can cause both - TEs deficiencies (due to increasing demand for one or few TEs), or high accumulation of TEs (due to unbalanced fertilization and improper use of pesticides). As cross-border Serbia-Croatia region is characterized by intensive agricultural production and as there is no systematic control of fertilizer and pesticides impact on soil and environment, the aim of this investigation, done under the IPA project Agriculture Contribution towards Clean Environment and Healthy Food, is to assess status of TEs in soil. In Serbia, in the region of Srem, three pilot farms with total arable land of 155 ha and with 70 production plots with different history of farming practices were selected. Regarding production system, one farm is specialized for crop production, second one for field crop, vegetable, fruit and livestock production, and the third crop and livestock production. The results of investigation show that total TEs concentrations in soils are under maximum allowance values and therefore risk of TEs contamination is low. However, low level of plant available TEs, particularly zinc (Zn), is found on the most of the investigated plots on all three farms.

Key words: trace elements (TEs), total concentration, plant available concentration, zinc (Zn)

Cd, Cu, Pb i Zn u Terra rossi Dalmacije

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Sažetak

Cilj rada je bio utvrditi koncentracije kadmija, bakra, olova i cinka u horizontima Terra rosse Dalmacije. Istraživanje je provedeno na 105 uzoraka tla, uzetih iz A i (B)rz horizonata 61 pedološkog profila. Cd, Cu, Pb i Zn su ekstrahirani zlatotopkom (HRN ISO 11466), a njihove koncentracije u ekstraktu tla, određene su optičkom emisijskom spektrometrijom induktivno spregnutom plazmom (ICP-OES). Prema HRN ISO standardima su analizirana i osnovna svojstva tla: pH, sadržaj humusa, P2O5, K2O i teksturni sastav. Sadržaj kadmija u površinskom horizontu varirao je od 0,65 do 8,53 mg/kg, a u dubljem 0,55 do 7,56 mg/kg. Bakar se kretao od 16,5 do 70,5 mg/kg u površinskom, te 17,0 do 50,2 mg/kg u dubljem horizontu. Olovo je bilo u rasponu 25,2 do 55,2 mg/kg u A horizontu i 15,8-49,8 mg/kg u (B)rz horizontu, dok je cink varirao između 53,1 i 129,7 mg/kg u površinskom i 49,7 do 132,4 mg/kg u dubljem horizontu. Prosječna koncentracija kadmija u površinskom horizontu bila je 2,19 mg/kg, bakra 37,77 mg/kg, olova 40,98 mg/kg i cinka 99,47 mg/kg, a u dubljem horizontu kadmija je bilo prosječno 2,13 mg/kg, bakra 36,10 mg/kg, olova 35,58 mg/kg i cinka 98,15 mg/kg. Odnos srednjih vrijednosti koncentracija analiziranih metala u površinskom i dubljem horizontu kreće se od 1,01 za cink do 1,15 za olovo. Utvrđena vertikalna ujednačenost koncentracije analiziranih elemenata u profilu tla upućuje na njihovo geogeno porijeklo.

Ključne riječi: Terra rosa, Dalmacija, Cd, Cu, Pb, Zn

Cd, Cu, Pb i Zn in Terra rossa of Dalmatia

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Summary

The aim of this study was to determine the concentrations of cadmium, copper, lead and zinc in horizons of Terra rossa in area of Dalmatia. The study was conducted on 105 soil samples, taken from A and (B)rz horizons of 61 soil profile. Cd, Cu, Pb and Zn were extracted by aqua regia (HRN ISO 11466), and their concentrations in soil extracts were determined by optical emission spectrometry inductively coupled plasma (ICP-OES). The basic soil properties: pH, humus content, P2O5, K2O and texture were analyzed according to HRN ISO standards. Cadmium content in the surface horizon varies from 0.65 to 8.53 mg/kg, and in deeper (B)rz horizon ranged from 0.55 to 7.56 mg/kg. Copper concentrations ranged from 16.5 to 70.5 mg/kg in the surface horizon and from 17.0 to 50.2 mg/kg in the deeper horizon. Lead was in the range 25.2 to 55.2 mg/kg in the A horizon and from 15.8 to 49.8 mg/kg in (B)rz horizon, while zinc varied between 53.1 and 129.7 mg/kg at the surface horizon and from 49.7 to 132.4 mg/kg in the deeper horizon. The average concentrations of cadmium, copper, lead and zinc in the surface horizon were: 2.19 mg/kg, 37.77 mg/kg, Pb 40.98 mg/kg and 99.47 mg/kg, respectively. In deeper horizon average concentration of cadmium was 2.13 mg/kg, copper 36.10 mg/kg, lead 35.58 mg/kg and zinc 98.15 mg/kg. The ratio of mean metal concentrations in surface and deeper horizon ranges from 1.01 for zinc to 1.15 for lead. Established vertical uniformity of metal concentrations in soil profile suggests their geogenic origin.

Key words: Terra rossa, Dalmatia, Cd, Cu, Pb, Zn

Utjecaj folijarne prihrane ratarskih kultura na sadržaj mikroelemenata u zrnu

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Sažetak

Moderna poljoprivreda visoke prinose bazira kako na suvremenim sortama, tako i na agrotehnici, gdje gnojidba zauzima ključno mjesto u ostvarivanju visine prinosa svih poljoprivrednih kultura. Osim kao čimbenik stabilnosti prinosa, gnojidba kao agrotehnička mjera, sve je više u slubi biofortifikacije, odnosno, povećanja kakvoće prinosa. Kombinirana NPK folijarna gnojiva, s dodatkom ostalih makro i mikro elemenata koriste se u poljoprivrednoj proizvodnji za razne kulture s različitim učinkom na povećanje koncentracije mikroelemenata u zrnu. Stoga je cilj ovog istraživanja bio utvrditi utjecaj folijarne prihrane gnojivom Mortonic na promjenu koncentracije mikroelemenata u zrnu ratarskih kultura (pšenica, kukuruz i soja) u Republici Hrvatskoj. Pokusi su postavljeni na tri različita lokaliteta u Osječko-baranjskoj županiji, na tri različite površine tvrtki: Novi Agrar d.o.o. PC Klisa-kukuruz hibrid PR34N43; PPK Valpovo PC Zelčin-pšenica sorta Matea i soja sorta Julijana. Pokus je postavljen u tri tretmana: kontrola (standardna gnojidba i prihrana u tlo), jedna prihrana Mortonicom folijarno (soja), dvije prihrane Mortonicom folijarno za kukuruz i pšenicu. Mortonic je kompleksno folijarno gnojivo, proizvođača iz Grčke, pogodno za primjenu u prihrani s omjerom hraniva NPK 19-9-27, te obogaćeno mikroelementima Fe, Zn, B, Mn, Cu. Nakon vegetacije utvrđena je koncentracija Cu, Mn, Fe i Zn u zrnu pri čemu je najveću prosječnu koncentraciju mikroelemenata imala soja (Cu 12,47 mg/kg, Mn 22,66 mg/kg, Fe 74,84 mg/kg, Zn 47,16 mg/kg) zatim pšenica (Cu 3,57 mg/kg, Mn 38,29 mg/kg, Fe 31,68 mg/kg, Zn 19,95 mg/kg), a najniže koncentracije zabilježene su kod kukuruza (Cu 1,42 mg/kg, Mn 4,26 mg/kg, Fe 18,71 mg/kg, Zn 14,05 mg/kg). Prihrana Mortonicom rezultirala je povećanjem svih navedenih mikroelemenata u zrnu kod istraživanih kultura. Utvrđen je statistički značajan utjecaj ($P \leq 0,05$) primjene Mortonica na povećanje sadržaja Fe, Zn, Mn i Cu posebice nakon prvog tretmana dok je drugi tretman utjecao statistički značajno na povećanje koncentracije mikroelemenata samo u zrnu kukuruza.

Ključne riječi: folijarna prihrana, mikroelementi, pšenica, kukuruz, soja

Effect of foliar top dressing on the content of microelements in the arable crops grain

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Summary

Modern agriculture bases high yields on modern cultivars and technology, where fertilization is a crucial part in achieving of agricultural crops yields. Except as a factor of yield stability, fertilization as agro-technical measure is increasingly in function of biofortification in order to increase the quality of yield. Combined NPK foliar fertilizers, with the addition of other macro and micro elements are used in agricultural production for different cultures with different effect on the microelements concentration increase in the grain. Therefore, the aim of this study was to determine the effect of foliar top dressing by Mortonic fertilizer on trace elements concentration change in the grain of field crops (wheat, corn and soybean) in the Republic of Croatia. Trials were set up in different locations in Osijek- Baranja County: Novi Agrar PC Klisa - corn hybrid PR34N43; PPK Valpovo PC Zelčin - wheat cultivar Matea and soybean cultivar Julian. The trial was set up with three treatments: control (standard fertilization and top dressing applied in the soil), one application of Mortonic foliar top dressing (soybean), two applications of Mortonic foliar top dressing (corn and wheat). Mortonic is the complex foliar fertilizer produced in Greece, suitable for use in top dressing with ratio of NPK nutrients 19-9-27, and enriched with microelements Fe, Zn, B, Mn, Cu. After the growing season, the concentration of Cu, Mn, Fe and Zn in the grain where determned and the highest average concentration of trace elements was found in soybean grain(Cu 12,47 mg/kg, Mn 22,66 mg/kg, Fe 74,84 mg/kg, Zn 47,16 mg/kg) , then in wheat (Cu 3,57 mg/kg, Mn 38,29 mg/kg, Fe 31,68 mg/kg, Zn 19,95 mg/kg), while the lowest concentration was observed in maize (Cu 1,42 mg/kg, Mn 4,26 mg/kg, Fe 18,71 mg/kg, Zn 14,05 mg/kg). Tretaments with Mortonic increased concentration of the microelements in grain for all studied cultures. Statistically significant effect ($P \leq 0.05$) of Mortonic application was determined for Fe, Mn, Zn and Cu content increase especially after the first top dressing while the second top dressing significantly impacted on the microelements concentration increase only for maize.

Key words: foliar top dressing, microelements, wheat, corn, soybean

INEMAD projekt – europska poljoprivredna praksa za novu europsku članicu

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Sažetak

Hrvatsku su, ulaskom u Europsku Uniju, dočekali brojni izazovi i mogućnosti, a poseban naglasak je stavljen na upravljanje hranjivima u poljoprivrednom sektoru. Stoga je Sisačko-moslavačka županija, zajedno s partnerima iz 7 europskih zemalja (Belgija, Nizozemska, Njemačka, Francuska, Mađarska, Danska i Bugarska) odlučila aktivno pratiti novonastale promjene i uključiti se u projekt INEMAD. Projekt INEMAD - Unaprijeđeno upravljanje hranjivima i energijom korištenjem procesa anaerobne digestije je financiran sredstvima FP7 programa, te ima za cilj povezati stočarsku i ratarsku proizvodnju na održiv način, uvođenjem međukoraka - bioplinske proizvodnje. Nadalje, projekt je usmjeren na potpuno recikliranje energije (proizvodnja bioplina) i hranjiva (proizvodnja digestata). Budući da u provedbi sudjeluje 13 partnera, projekt ima sveobuhvatnu namjeru uključiti različite interesne grupe: poljoprivrednici u ratarskoj i stočarskoj proizvodnji, prerađivačka industrija i u konačnici kreatori politike. Prva faza se sastoji od prikupljanja podataka o postojećim načinima korištenja hranjiva, dok će se u drugoj fazi izdvojiti strategije koje su najoptimalnije za recikliranje hranjiva. Budući da se zakonodavstvo vezano uz recikliranje nutrijenata razlikuje od zemlje do zemlje, projektni partneri će predložiti konkretne zakonodavne mjere. Cilj rada, kao i projekta, je transfer znanja o tehnikama i strategijama za optimizaciju recikliranja nutrijenata, s posebnim naglaskom na istovremenu proizvodnju energije iz obnovljivih izvora.

Ključne riječi: bioplin, ratarstvo, stočarstvo, digestat, hranjiva

INEMAD project – european agriculturural practice for the new European member

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Summary

With the July, 1st and Croatia becoming a member of the European Union, new challenges and opportunities rise and a special emphasis is placed towards nutrient management in the agricultural sector. Therefore, Sisak-Moslavina County, together with 7 European member states (Belgium, The Netherlands, Germany, France, Hungary, Denmark and Bulgaria) decided to enter the INEMAD project. The FP7 funded INEMAD (Improved Nutrient and Energy Management through Anaerobic Digestion) project aims at reconnecting livestock and crop production in a sustainable way by implementing an intermediate step – biogas production. Furthermore, the project is focused on the complete recovery of energy (biogas production) and nutrients (digestate). Since the project´s consortium is compiled of 13 partners, it has a comprehensive aim to include different stakeholders, in particular livestock and crop farmers, processing units and policy creators. In a first phase an inventory of existing nutrient management techniques in production and processing systems was made. Furthermore, the meetings with stakeholders will result in a prioritization of different strategies for optimal nutrient recovery. At the end, because the policies on the nutrient recycling are diverse among the member states, a concrete legislative measures will be proposed. The objective of the paper and project itself is a transfer of knowledge on the techniques and strategies for optimization of nutrient recovery. At the same time, special attention was given to the production of energy from the renewable sources.

Key words: biogas, animal production, crop production, digestate, nutrients

Utjecaj Fertilactyl Starter na prinos soje *Glicine max* (L.) Merr i uljane repice *Brassica napus* (L.)

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Sažetak

Cilj pokusa je bio utvrditi učinak folijarne primjene Fertilactyl Starter na prinos soje i uljane repice na dvije lokacije (Gornja Vrba i Jagodnjak) tijekom 2013. godini. Uzimajući u obzir rezultate kemijske analize tla gnojidba za soju obavljena je s 30 kg N /ha, 90 kg/ha P2O5 i 90 kg/ha K2O i folijarno Fertiacttyl Starter u dozi od 3 l/ha. Gnojidba za uljanu repicu obavljena je s 123,50 kg/ha N, 40 kg/ha P2O5 i 60 kg/ha K2O i folijarno Fertilactyl Starter u dozi 3 l/ha. Fertilactyl starter sadrži 13% N, 5% P, 8% K, 4% C, 6,1 % humiske kiseline te 0,9 % fulvo kiseline. Dobiveni rezultati pokazali su statistički opravdane razlike između ispitivanih kultura tretiranih Fertilactyl Starter i kontrolne varijante. Primjenom Fertiacttyl Startera u fazi druge troliske soje ostvareno je prosječno povećanje prinosa za 10,25% s prosječnim sadržajem ulja većim za 4,8 % te hektolitarskom masom većom za 5,37%. Primjenom Fertilactyl Startera pred formiranje cvjetnih pupova uljane repice ostvaren je veći prinos za 7,16 %, sadržaj ulja za 2,97%, sadržaj vlage u zrnu je bio manji za 3,26%, a urod ulja veći za 6,37%.

Ključne riječi: folijarna gnojidba, Fertilactyl Starter, prinos, soja, uljana repica

Impact of use of Fertilactyl Starter on yield of soya bean *Glicine max*. (L.) Merr and oilseed rape *Brassica napus* (L.)

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Summary

The aim of the trial was to establish the effect of foliar application of Fertilactyl Starter on yield of soya bean and oilseed rape on 2 locations (Gornja Vrba and Jagodnjak). The trial was conducted in 2013. Based on the results of chemical analysis of soil the fertilization for soya bean was done by 30 kg of N/ha, 90 kg/ha of P2O5 and 90 kg/ha of K2O and foliar the Fertilactyl Starter in dose of 3 l/ha. Fertilactyl starter contains 13% N, 5% P and 8% of K, 4% C, 6, 1% humic acid and 0,9 % fulvic acid. The results showed statistically significant differences in tested crops between treated with Fertilactyl Starter and control. Using Fertilactyl Starter in the phase of second trifoliolate leaf of soya bean it was achieved average increase of yield by 10,25% with average content of oil higher by 4,8 % and hectolitre mass higher by 5,37%. Using Fertilactyl Starter before formation of flower buds of oilseed rape it was achieved higher yield by 7,16% and higher oil content by 2,97% while the moisture content in grain was lower by 3,26% and yield of oil was higher by 6,37%.

Key words: foliar fertilisation, Fertilactyl Starter, yield, soya bean, oilseed rape

Utjecaj gnojidbe dušikom na visinu prinosa i biomase pšenice

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Sažetak

U okviru VIP projekta „Prilagodba klimatskim promjenama optimizacijom gnojidbe ratarskih usjeva dušikom“ postavljen je gnojidbeni pokus dušikom gdje je cilj bio ispitati utjecaj smanjene i povećane gnojidbe na prinos pšenice. Na dva lokaliteta u blizini Osijeka (Josipin dvor i Kolođvar) posijana je pšenica sorte Srpanjka. Pokus se sastojao od tri gnojidbena tretmana i kontrole sa četiri ponavljanja. Tretmani su se odnosili na optimalnu gnojidbu, povećanu i smanjenu gnojidbu ureom (160 kg/ha N, 180 kg/ha N i 140 kg/ha N) a kontrola je bila samo osnovna gnojidba (78 kg/ha N). Rezultati pokazuju statistički značajne razlike u koncentracijama dušika u zrnu ($p<0,05$) i slami ($p<0,01$) s obzirom na tretmane. Kao što se očekivalo kontrola je uvijek imala najmanje koncentracije dušika a povećana najveće, no povećana gnojidba nije značajno utjecala na povećanje dušika s obzirom na optimalnu pa čak ni na smanjenu gnojidbu. No, ako analiziramo rezultate sa samo jednog lokaliteta (Josipin Dvor) dobivamo rezultate gdje je kontrola ponovo najmanja, no ovaj put imamo i značajne razlike između povećane i smanjene gnojidbe dok razlike između optimalne i povećane te optimalne i smanjene i dalje nisu značajne. Gnojidba dušikom se isto tako odrazila i na prinos pa možemo zaključiti da smanjenom gnojidbom dobivamo manje troškove gnojidbe a slične rezultate kao i optimalnom gnojidbom dok s druge strane povećanom gnojidbom povećavamo trošak a krajnji proizvod tj. prinos nam se ne mijenja značajno.

Ključne riječi: dušik, gnojidba, optimizacija, prinos, srpanjka

Influence of nitrogen fertilization on wheat yield and biomass

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Summary

As part of the VIP project "Adaptation to climate change by optimizing nitrogen fertilization in crop production" the nitrogen fertilization trial has been set up at two sites near Osijek (Josipin Dvor and Kolođvar) with wheat cultivar Srpanjka. The aim of the filed trial was to investigate the impact of increased and decreased fertilization of nitrogen on wheat yield and biomass. The experiment consisted of three fertilizer treatments and control (78 kg/ha N), and four replications. Treatments were related to optimum fertilization (160 kg/ha N), increased (180 kg/ha N) and decreased fertilization (140 kg/ha N). The results show statistically significant differences in the concentrations of nitrogen in the grain ($p < 0.05$) and straw ($p < 0.01$) due to treatment. As expected control had lowest nitrogen concentrations while increased fertilization had highest, however increased fertilization did not significantly caused increase of nitrogen in grain or straw with respect to optimum and reduced fertilization. If we analyse the results from only one location (Josipin Dvor), we obtain results where control is again the lowest, but this time we have a significant difference between the increased and reduced fertilization while the difference between optimal and increased and optimal and reduced is still not statistically significant. Nitrogen fertilization has also influenced the yield, so we can conclude that the reduced fertilization results in lower costs of fertilization and yet it has no negative impact on the yield, on the other hand increased fertilization increases the cost of the crop production but the yield is not significantly higher.

Key words: nitrogen, fertilization, yield, srpanjka cultivar

Pogodnost kompostiranog biorazgradivog komunalnog otpada u proizvodnji presadnica

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Sažetak

Zakon o održivom gospodarenju otpadom (NN 94/2013) određuje da najveća dopuštena masa biorazgradivog komunalnog otpada na odlagalištima do kraja 2013. iznosi 75% mase odložene u 1997. Najprihvatljiviji način zbrinjavanja toga otpada je kompostiranje čime se dobije masa komposta, koji bi prodajom mogao pokriti dio troškova. Stoga se i mnoge jedinice lokalne samouprave odlučuju za taj postupak. Cilj ovog istraživanja je utvrditi pogodnost komposta proizvedenog u komunalnom poduzeću grada Koprivnice za proizvodnju presadnica. Pokus je postavljen u ljeto 2013. po slučajnom bloknom rasporedu u tri ponavljanja. Tretmani su bili: kompost od biorazradivog komunalnog otpada (OK), isti kompost uz prihranjivanje presadnica tekućim gnojivom NPK 10:5:4 s dodatkom mikroelemenata (OKP) i komercijalni supstrat (KS) kao kontrola. Analizom je utvrđeno da kompost komunalnog otpada ne sadrži nedozvoljene količine štetnih tvari. Test kultura je endivija (*Cichorium endivia* L.) kao jedna od osjetljivijih biljnih vrsta. Rezultati pokazuju da je statistički značajno veće nicanje i masa korijena u OK nego u KS. Masa cijele biljke veoma se značajno razlikuje ovisno o tretmanima pa je najveća u KS, a najmanja u OKP. Na duljinu biljke i duljinu korijena vrsta komposta nije statistički značajno utjecala. Temeljem preliminarnih istraživanja može se zaključiti da je kompost od biorazgradivog komunalnog otpada moguće koristiti u proizvodnji presadnica, budući da nema inhibitorno djelovanje na endiviju.

Ključne riječi: biorazgradivi komunalni otpad, kompost, uzgoj presadnica

Suitability of composted biodegradable municipal waste in the production of seedlings

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Summary

Act on Sustainable Waste Management (Official Gazette 94/2013) stipulates that the permitted weight of biodegradable municipal waste on landfills at the end of 2013 can amount to maximum 75% of the mass deposited in 1997. The most acceptable way of disposing of that waste is by composting it, which produces a mass of compost that can be sold to cover part of the costs. Therefore, many local governments opt for this process. The aim of this study was to determine the suitability of the compost produced in the utility services company of the town of Koprivnica for the production of seedlings. The experiment was set in the summer of 2013 in a randomized block design with three replications. Treatments were: biodegradable compost from municipal solid waste (OK), the same compost with seedlings additionally fertilized with NPK 10:5:4 with the addition of trace elements (OCD) and a commercial substrate (KS) as a control. The analysis showed that composted municipal waste did not contain unacceptable levels of harmful substances. The test culture was endive (*Cichorium endivia* L) as one of the more sensitive species. The results show significantly higher germination and root mass in OK than in KS. The mass of the whole plant differs significantly depending on the treatment and is largest in KS, and lowest in OCD. Plant and root lengths were not significantly affected by the compost types. Based on preliminary research, it can be concluded that the compost from biodegradable municipal waste can be used in the production of seedlings, since it does not have inhibitory effect on endive.

Key words: biodegradable municipal waste, compost, growing seedlings

Utjecaj sustava gnojidbe na prinos zrna i sastavnice prinosa zrna suncokreta (*Helianthus annuus* L.)

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Sažetak

Suncokret, kao jedna od najvažnijih ratarskih kultura, na poljoprivrednim površinama Hrvatske zauzima sve značajnije mjesto šireći se od istoka na zapad države. Zbog toga je cilj ovog rada bio utvrditi utjecaj različitih vrsta gnojiva na prinos zrna i sastavnice prinosa zrna hibrida suncokreta PR63E82-X018. Pokus je postavljen u Križevcima po slučajnom bloknom rasporedu u tri ponavljanja, a gnojidbeni tretmani su bili: mineralna gnojidba s 670 kg/ha NPK 7:20:30 i 100 kg/ha UREE, organsko-mineralna s 18 t/ha stajskog gnoja i 380 kg/ha NPK 7:20:30 i gnojidba s 36 t/ha stajskog gnoja. Rezultati istraživanja pokazuju da je ostvaren prinos od 3555 do 4143 kg/ha zrna, prosječni promjer glave od 19,2 do 19,9 cm, masa glave od 348,3 do 355,0 g, prosječna masa zrna po glavi od 108,4 do 126,3 g, hektolitarska masa od 29,6 do 30,8 kg/hl i masa 1000 zrna od 66,3 do 74,5 g. Na temelju analize varijance možemo zaključiti da gnojidba različitim oblicima i kombinacijama gnojiva, nije izvršila statistički značajan utjecaj na prinos zrna suncokreta, kao ni na sastavnice prinosa, iako su najbolji rezultati postignuti u varijanti organsko-mineralne gnojidbe. Da bi se mogli donijeti relevantniji zaključci potrebno je pokus provoditi u kontinuitetu kroz više godina.

Ključne riječi: suncokret, gnojidba, prinos zrna, sastavnice prinosa zrna

Effect of fertilization on yield and yield components of sunflower grain (*Helianthus annuus* L.)

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Summary

Sunflower, as one of the most important agricultural crops, occupies an increasingly important place in farming on agricultural land in Croatia, expanding from east towards the west of the state. Therefore, the aim of this study was to determine the effect of different types of fertilizers on the grain yield and yield components of sunflower PR63E82-X018. The experiment was set in Križevci according to the randomized block design in three replications, fertilizer treatments were: mineral fertilization with 670 kg/ha of NPK 7:20:30 and 100 kg/ha of urea, organic mineral fertilization with 18 t/ha of manure and 380 kg/ha of NPK 7:20:30 and organic fertilization with 36 t/ha of manure. The research results show that the yield of sunflower seeds was 3555 to 4143 kg/ha, the average diameter of the head 19,2 to 19,9 cm, weight of the head 348,3 to 355,0 g, average seed weight per head of 108,4 to 126,3 g, hectoliter weight from 29,6 to 30,8 kg/hl and weight of 1000 seeds 66,3 to 74,5 g. Based on the analysis of variance, we can conclude that different forms and combinations of fertilizers did not make a statistically significant effect on grain yield of sunflower, nor on the yield components, although the best results were achieved with variant of organic-mineral fertilization. To be able to make relevant conclusions, this experiment should be conducted continuously over a number of years.

Key words: sunflower, fertilization, grain yield, components of grain yield

Book of Abstracts

Agricultural Economics and Rural Sociology

02

Agroekonomika i ruralna sociologija

Zbornik sažetaka

Segmentacija i stavovi potrošača prema ekološkim proizvodima na splitskom tržištu

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Sažetak

Proizvodnja i potrošnja ekološki proizvedenih poljoprivrednih proizvoda u općem je porastu, kako u svijetu, tako i u Republici Hrvatskoj (RH). RH je pristupanjem u Europsku uniju (EU) prihvatila i implementirala sve zakone EU o ekološkoj proizvodnji poljoprivrednih proizvoda (NN 139/10). Cilj ovoga rada bio je utvrditi segmente potrošača i njihove stavove prema ekološki proizvedenim jabukama i rajčicama na splitskom tržištu u 2012 godini. Podaci su prikupljeni anketnim ispitivanjem 258 slučajno odabranih ispitanika. Rezultati ispitivanja su pokazali da najviše ispitanika konzumira ekološke poljoprivredno prehrambene proizvode svakog tjedna, a kupuju ih u supermarketima. Istraživanje je također pokazalo da gotovo svi ispitanici poznaju način i principe ekološke proizvodnje. Anketirani ispitanici najveću važnost pri kupovini ekoloških proizvoda posvećuju vanjskom izgledu proizvoda i certifikatu. Izdvojena su i opisana tri potrošačka segmenta.

Ključne riječi: ekološka proizvodnja, splitsko tržište, anketa potrošača

Segmentation and consumer attitudes towards organically produced food in the Split market

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Summary

Production and consumption of organically produced agricultural food products in general is increasing, both in the world and in the Republic of Croatia. Croatia's accession to the European Union (EU) adopted and implemented all EU legislation on organic production of agricultural food products (NN 139/10). The aim of this study was to identify consumer segments and their attitudes towards organically grown apples and tomatoes at the Split market in 2012. Data were collected by examining 258 randomly selected respondents. The survey results showed that most respondents consumed organic agricultural food products each week and buy them in supermarkets. The survey also found that almost all respondents knew the method and principles of organic farming. For surveyed respondents when purchasing organic products, the most important thing is appearances and product certification. In this paper are singled out and describe three consumer segments.

Key words: organic farming, Split market, consumer survey

Izrada specifikacije za zaštitu «Vrgoračke jagode» oznakom zemljopisnog podrijetla

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Sažetak

Kako na domaćem, tako i na međunarodnom tržištu poljoprivredno prehrambenih proizvoda prisutna je velika konkurencija za plasman proizvoda na tržište. U takvim uvjetima velike konkurencije, potrošači su počeli sve više cijeniti autohtone proizvode, odnosno proizvode koji se ističu iznimnom kvalitetom i prepoznatljivošću. Vrgoračka jagoda, svakako spada u skupinu proizvoda koje su potrošači prepoznali i koja je postala iznimno tražena i cijenjena na tržištu u Republici Hrvatskoj, te na inozemnom tržištu. Posljednjih godina, proizvođači i potrošači su svjedočili i patvorevinama i imitacijama jagoda koje su se na tržištu prodavale kao Vrgoračke. U cilju zaštite potrošača i samih proizvođača, Udruga proizvođača «Vrgoračka jagoda», je pokrenula inicijativu za zaštitom Oznakom zemljopisnog podrijetla. Europska unija je uvela sustav zaštite poljoprivredno prehrambenih proizvoda Oznakom izvornosti (OI) i zemljopisnog podrijetla (OZP) još 1992 godine, kojima je cilj zaštiti proizvođače i potrošače od imitacija i patvorenja poljoprivrednih proizvoda. RH je pristupanjem u EU implementirala sve Uredbe EU za zaštitu poljoprivrednih proizvoda jednom od oznaka (NN 102/12, EEC 1898/96). Najvažniji dokument za zaštitu proizvoda je tzv. «specifikacija» koja predstavlja suštinu cijelog procesa od dobivanja samog proizvoda, do konačnog pakiranja i plasmana na tržište. Prema tom dokumentu, certifikacijsko tijelo (akreditirano od Ministarstva poljoprivrede) čini Plan kontrole za izdavanje potvrde o suglasnosti.

Ključne riječi: Vrgorac, zaštita Oznakom zemljopisnog podrijetla, Vrgoračka jagoda, specifikacija

Development of specification for protection of "Vrgorac strawberries" with geographical indication label

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Summary

We are witnessing of a great competition for the placement of products on the domestic and on the international market of agricultural food products. In such conditions of high competition, consumers have begun to increasingly appreciate the authentic products, or products that are characterized as high quality products. Vrgoračka strawberry, certainly belongs to the group of products that consumers recognize and which has become extremely popular and successful on the market in the Republic of Croatia and on the international market. Recently, producers and consumers have witnessed of fake creation and imitations of strawberries that were sold in the market as Vrgorac strawberry. In order to protect consumers and producers, the Association of producers "Vrgoračka strawberry", has launched an initiative for the protection of geographical indications. The European Union has introduced a system of protection of agricultural and food products with labels of Designations of Origin (PDO) and Geographical indications (PGI) since 1992, which aim to protect producers and consumers from imitation and adulteration of agricultural products. With accession to the EU, Croatia implemented all EU regulations for the protection of agricultural products to one of the label (NN 102 /12, EEC 1898/96) . The most important document for the protection of the product is called "Specification " which is the essence of the whole process of getting the product to the final packaging and placement on the market. According to the document, the certification body (which is accredited by the Ministry of Agriculture) makes control plan for the issuance of the certificate of approval.

Key words: Vrgorac, protection of geographical indications (PGI), Vrgoračka strawberries specification

Računovodstvene posebnosti poljoprivrede

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Sažetak

Poljoprivredna djelatnost ima mnogobrojne specifičnosti zbog čega se u računovodstvu posebno regulira. Sve se intenzivnije razvija računovodstvo obiteljskih farmi, i u Europskoj uniji, i u Hrvatskoj, a samo vrednovanje biološke imovine posebno je područje reguliranja Međunarodnih standarda financijskog izvještavanja, prihvaćenima i u Hrvatskoj. Uz financijsko računovodstvo, koje je u poljoprivredi, prije svega, usmjereno obračunu poreza, sve se više i u poljoprivrednu djelatnost uvode metode interno usmjerenih računovodstava, prije svega menadžerskog računovodstva, kojima se formiraju potrebne informacije za donošenje odluka poduzetnika u poljoprivredi, koji, na osnovi tih informacija osiguravaju informacijsku osnovicu za donošenje menadžerskih odluka. Pri mjerenju rezultata poslovnih aktivnosti u poljoprivredi treba uvažiti njezine računovodstvene posebnosti: (a) vrijednost poljoprivredne imovine mjeri se i na početku i na kraju razdoblja po fer tržišnoj vrijednosti, i (b) u menadžerskom se računovodstvu za svaku pojedinu vrstu imovine daje poseban izvještaj. Uz ilustraciju financijskih osnovnih financijskih izvještaja zahtijevanih od FADN (Farm Accountancy Dana Network), posebno se predlaže primjena metoda menadžerskog računovodstva, uvažavajući posebnosti poljoprivrede.

Ključne riječi: računovodstvene informacije, menadžersko računovodstvo, ključne veličine za donošenje odluka o potrebnom proizvodnom kapacitetu, doprinosi pokrića troškova, ciljna dobit

Accounting Particularities of Agriculture

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Summary

Agricultural activity has many specific features for which the accounting in this sector is regulated separately. All the more intensively developed accounting of family farms in the European Union and Croatia, and valuation of biological assets is an area of particular regulation International Financial Reporting Standards, adopted in Croatia. In addition to financial accounting, which is in agriculture, primarily focused tax calculation, all the more in agricultural activities introduce methods internally focused accountancy, primarily managerial accounting, which formed the necessary information for decision-making entrepreneurs in agriculture, which, on the basis of these information provided information base for making management decisions. In measuring the results of business activities in agriculture should recognize its particularities of accounting methods: (a) the value of agricultural assets are measured at the beginning and end of the period at fair market value, and (b) in a managerial accounting for each type of property should prepare a special report. With an illustration of the financial specifics of financial statements required by the FADN (Farm Accountancy Data Network), especially will propose and illustrate the application of management accounting methods, taking into account the particularities of agriculture.

Key words: accounting information, managerial accounting, key values to make decisions about the necessary production capacity, ranges of contribution margin to cover the costs, the target profit.

Navike djece osnovnoškolskog uzrasta u igri i percepcija zelenih javnih površina

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Sažetak

Urbane zelene površine pomažu u promicanju zdravlja i boravkom na gradskim zelenim površinama djeca su u neposrednom kontaktu s biljkama bez obzira kojom se aktivnošću bave. Moderna stambena naselja imaju malo funkcija i odražavaju nedovoljnu slojevitost urbanog života. Potreba za boravkom u prirodi i za bijegom iz stresnog ritma grada predstavljaju važan razlog zbog čega ljudi posjećuju parkove, što zapravo najviše čine stariji ljudi i mlađa djeca. Cilj ovog istraživanja bio je utvrditi navike u igri djece osnovnoškolskog uzrasta iz urbanog područja te njihovu percepciju javnih prostora grada Zagreba. Podaci su prikupljeni metodom ankete. Od ukupnog broja ispitanika 60% je bilo dječaka i 40% djevojčica. Raspon dobi ispitanika varira od 5 do 13 godina. Rezultati istraživanja su pokazali da većina djece preferira igru na otvorenom i to u parkovima i na dječjim igralištima pri čemu su za djecu trava i drveće važni elementi prostora. Djeca izražavaju pozitivan stav prema uređenosti i boravku na velikim javnim površinama grada Zagreba (Sljeme, Park Maksimir, Jezero Jarun). Kako djeca rastu, tako sve više vole boraviti u zatvorenom prostoru i/ili za kompjuterom. Ta spoznaja može poslužiti kao naznaka kreatorima prostora da i za ovu populaciju osmisle sadržaje koji bi ih potakli da više vremena provode u igri na otvorenom.

Ključne riječi: djeca, igra, javne površine, percepcija

Habits of children of primary school age in the game and the perception of green public spaces

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Summary

Urban green areas help in promoting healthy lifestyle and by spending time in these areas children are in direct contact with plants no matter what activities they practice. Modern urban areas have insufficient functions and they reflect the disadvantages of urban life. The need to spend time in natural settings and the need to escape the stress of the cities are the main reasons why people visit parks, mostly elderly and young children. The goal of this research was to determine the playing habits of elementary school children in an urban area and their perception of public spaces in the City of Zagreb. The data were collected using the method of survey. There were 60% of boys and 40% of girls in our sample and their age ranged from 5 to 13 years. Results showed that most children prefer to play in the open spaces, especially in parks and playgrounds and they point out grass and trees as important elements of the space. Children have a positive attitude towards spending time in large public areas of the City of Zagreb (Sljeme, Maksimir Park, Jarun Lake). As children grow, they increasingly prefer to stay indoors and/or spend time with a computer. This knowledge can serve as an indication that the creators of the space develop content that would encourage this population to spend more time playing outdoors.

Key words: children, play, public areas, perception

Novo lice ruralne diverzifikacije

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Sažetak

Još u osamdesetim pod pojmom „diverzifikacija u poljoprivredi“ uobičajeno se razumjevala pozicija malih mješovitih (eng. part-time) gospodarstava u smislu onih koji egzistiraju na marginama poljoprivrede, korak prema siromaštvu. Klasični ekonomski pristup definirao je ovu skupinu kao kočnicu u procesu intenzifikacije i razvoja poljoprivrede. U to se vrijeme, posebno u zemljama bivšeg socijalističkog bloka, različitim politikama utjecalo na njihovo slabljenje do konačnog izlaska iz poljoprivrede, odnosno prodaje zemlje u korist većih gospodarstava. Međutim, tijekom 90tih, problem raslojavanja ruralne vlasničke strukture kao i pitanje zapošljavanja ruralnog stanovništva dobivali su sve veću dimenziju, što je utjecalo da se danas sve više afirmira mikro-poduzetnički pristup u ruralnoj ekonomiji kroz primjenu različitih modela socijalne inkluzije i samozapošljavanja. Ovaj pristup podržan je kroz programe Zajedničke agrarne i Kohezijske politike Europske unije, a najviše, politikom ruralnog razvoja i socijalnom politikom. Cilj ovog rada je predstaviti rezultate različitih inicijativa i projekata Poljoprivrednog fakulteta u Osijeku, Zavoda za agroekonomiku, koji su doprinijeli stvaranju pretpostavki za konkurentnu participaciju mikro poduzeća iz ruralnih područja na lokalnim i globalnim tržištima. Nadalje, definirano je područje ekonomskog djelovanja mikro-poduzeća kao „ruralna ekonomija s rizikom siromaštva“ (RERS), te su definirana polazišna istraživačka pitanja vezana uz promociju, potporu i izbor modela RERS-a. Na temelju prezentcije izabranih primjera dobre prakse, izveden je zaključak kojim se RERS preporučava kao učinkovit model ublažavanja rizika od siromaštva u okvirima strategija za krize i nesigurnost.

Ključne riječi: diverzifikacija, ruralna politika, socijalna politika, ruralna ekonomija s rizikom siromaštva (RERS)

New face of rural diversification

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Summary

Back in the eighties, the term „diversification in agriculture“ was commonly understood as position of part-time farms in a sense of those who exist on the margins of agriculture, step closer to poverty. Classic economy approach defined this group as a hold up in process of intensification and agriculture development. At the time, especially in Eastern Bloc countries, their weakening was affected with various policies until the final exit from agriculture, with reference to selling the land for the benefit of bigger farms. However, during the '90s, rural ownership structure layering problem, as well as the question of employment of rural population, were given increased dimension, which led to today increasingly affirmed micro-entrepreneurial approach to the rural economy through the application of different models of social inclusion and self-employment. This approach is supported through the programs of the Common Agriculture and Cohesion policy of the European Union, and mostly with rural development policy and social policy. Aim of this paper is to present the results of various initiatives and projects of Faculty of Agriculture in Osijek, Agroeconomics department, who contributed to creating preconditions for competitive participation of micro enterprises from rural areas in local and global markets. Furthermore, the area of economic activity is defined as „rural economy at risk of poverty“ (RERS), and are defined starting research issues related to the promotion, support and choice of RERS models. On the basis of presentation selected examples of good practice, the conclusion is that RERS is recommended as effective model for risk of poverty mitigation in terms of strategies for crisis and uncertainty.

Key words: diversification, rural policy, social policy, rural economy at risk of poverty (RERS)

Book of Abstracts

Genetics, Plant Breeding and Seed Production

03

Genetika, oplemenjivanje bilja i sjemenarstvo

Zbornik sažetaka

Reakcija sjemena engleskog ljulja na vodni stres nakon uskladištenja na različitim temperaturama

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Sažetak

Uvjeti skladištenja sjemena, unos vode u sjeme u ranoj fazi klijanja i reakcija različitih kultivara na manjak vode tijekom tog unosa od velike su važnosti za rast, razvoj i realizaciju visoko kvalitetnih prinosa engleskog ljulja. Cilj ovog istraživanja bio je ispitati reakciju sjemena engleskog ljulja na vodi stres (izazvan polietilen glikolom (PEG) 6000) nakon pet godina skladištenja na 10, -20 i -80 °C. Sjeme dva kultivara engleskog ljulja (Bartwingo i Calibra) različite razine ploidnosti (2x i 4x) podvrgnuto je sljedećim tretmanima: 1. nabubreno u destiliranoj vodi (kontrola), 2. nabubreno u 15% PEG 6000 (-0,312 MPa) i 3. nabubreno u 30% PEG 6000 (-1,074 MPa) tijekom 20 sati pri temperaturi od 22 °C. Nabubreno sjeme naklijavano je u tamnoj komori pri stalnoj temperaturi od 17 °C na podlozi navlaženoj destiliranom vodom. Nakon 120 sati naklijavanja utvrđen je postotak klijavosti i izmjerena je dužina korjenčića i stabljičice. Na postotak klijavosti značajno je utjecao (p=0,05) genotip, temperatura skladištenja, osmotski potencijal pri nabubravanju te interakcija genotipa i temperature skladištenja. Na dužinu korjenčića i stabljičice značajno je (p=0,01) utjecao genotip, osmotski potencijal te interakcija genotip x osmotski potencijal pri nabubravanju. Interakcija genotip x temperatura skladištenja x osmotski potencijal pri nabubravanju bila je značajna (p=0,01) za dužinu stabljičice. Dobiveni rezultati ukazuju na složenost mehanizma obrane biljaka na vodni stres.

Ključne riječi: engleski ljulj, temperatura skladištenja, vodni stres, klijavost, rani rast biljke

Reaction of perennial ryegrass seed on water stress after storage at different temperatures

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Summary

Storage conditions, seed water uptake in the early stage of germination and reaction of different cultivars to water deficit during that water uptake are of great importance for growth, development and realisation of highly qualitative yields of perennial ryegrass. The aim of this study was to investigate the reaction of perennial ryegrass seed on water stress (induced by polyethylene glycol (PEG) 6000) after 5-years of storage at 10, -20 and -80 °C. Seeds of two perennial ryegrass cultivars (Bartwingo and Calibra) with different ploidy level (2x and 4x, respectively) were under following treatments: 1. imbibed in distilled water (control); 2. imbibed in 15% PEG 6000 (-0.312 MPa); and 3. imbibed in 30% PEG 6000 (-1.074 MPa) during 20 hours at 22 °C. Imbibed seeds were germinated in dark chamber at the constant temperature of 17 °C on media moisturised by distilled water. Percentage of germination was estimated and radicle and hypocotyls lengths were measured after 120 hours of germination. The effects of genotype, storage temperature, osmotic potential during imbibing and interaction genotype x storage temperature were significant ($p = 0.05$) for the percentage of germination. Genotype, osmotic potential, and interaction genotype x osmotic potential during imbibing significantly ($p = 0.01$) affected the radicle and hypocotyls length. The interaction of cultivar x storage temperature x osmotic potential during imbibing was significant ($p = 0.01$) for the hypocotyls length. The results indicate the complexity of the defence mechanism of plants to water stress.

Key words: perennial ryegrass, storage temperature, water stress, germination, early plant growth

Učinak GxO interakcije na prinos silaže OS hibrida kukuruza

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Sažetak

Učinak okoline na prinose svježe mase kukuruza za silažu te interakcija genotipa s okolinom najvažniji su izvor varijacije realiziranih prinosa svježe mase kukuruza za silažu. Stoga identifikacija hibrida koji realiziraju visoke prinose u različitim okolinskim uvjetima ima važnu ulogu u povećanju stabilnosti prihoda poljoprivrednih gospodarstava. Cilj ovog rada bio je ispitati učinak šest različitih okolina u regijama istočne i sjeverozapadne Hrvatske na prinos svježe mase pet OS hibrida kukuruza visokih genetskih potencijala rodnosti za svježu masu te procijeniti interakciju hibrida s okolinom sa svrhom identifikacije hibrida visokih prinosa svježe mase postojanih u različitim okolinskim uvjetima rasta i razvoja. Učinak regije i lokacije sjetve na prinos svježe mase kukuruza za silažu, te interakcije hibrida s lokacijom i regijom bile su značajne ($p=0,01$). Prosječni prinosi svježe mase hibrida bili su za 19,31% viši na lokacijama sjeverozapadne Hrvatske. Najviše prosječne prinose hibridi su ostvarili na lokaciji Novačka (63,76 t ha^{-1}), a najniže na lokaciji Bošnjaci (36,86 t ha^{-1}). Najviše prinose u prosjeku za cijelo istraživanje ostvarili su hibridi OSSK 602 i OSSK 617 (53,47 i 50,30 t ha^{-1}). Rezultati ukazuju da bi izborom ovih hibrida za sjetvu poljoprivredna gospodarstva i u nižeprinosnim okolinama mogla ostvariti zadovoljavajuće prinose.

Ključne riječi: kukuruz, hibrid, lokacija, prinos svježe mase, silaža

Effect of GxE interaction on silage yield of OS maize hybrids

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Summary

Effect of environment on yields of fresh maize mass for silage, as well as interaction of genotype by environment are the most important source of variation in production of fresh mass maize yields for silage. Therefore, identification of hybrids that realise high yields in different environmental conditions has important role in increasing stability of farms incomes. The aim of this study was to investigate the effect of six different locations at regions of east and north-west Croatia on fresh mass yields of five OS maize hybrids with high genetics yield potential for fresh mass production and to evaluate the interaction of hybrids with environment in order to identify high fresh mass yielding hybrids stable in different environmental conditions of growth and development. The effects of region and sowing location on fresh mass maize yields for silage and interactions of hybrids with locations and regions were significant (p=0.01). The average fresh mass yields of hybrids were higher for 19.31% at locations of North West Croatia. The highest average yields hybrids realised at location Novačka (63.76 t ha^{-1}) and the lowest at location Bošnjaci (36.86 t ha^{-1}). The highest yields in average for investigation were recorded for OSSK 602 and OSSK 617 hybrids (53.47 and 50.30 t ha^{-1}). Results suggest that by selecting these hybrids for sowing at lower yielding environments farmers might expect satisfying yields.

Key words: maize, hybrid, location, fresh mass yield, silage

Morphological characteristics and quality values of Kahramanmaras red pepper population

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Summary

Morphological characteristics, fresh and dried chili yield of 72 lines selected from Kahramanmaras red pepper population were determined with this study. The ASTA colour values, pungency level and processed yield output values were determined as quality characteristics in the study, as a result of cluster analysis genotypes are grouped under five groups. Creation of groups by morphological characters was identified through two-way cluster analysis. The fruit and plant characteristics as well as yield data, contributed to grouping the genotypes in three separate groups. The ASTA colour value was in the group of plant traits. Fruits of the genotypes generally had cone shaped, sharp pointed, oval transverse and triangular longitudinal section and hump-shaped fruit stalks. Fresh red pepper and dried yield of genotypes ranged from 1954 kg da^{-1} to 3030 kg da^{-1} and from 419 kg da^{-1} to 735 kg da^{-1} respectively. ASTA values varied between 32.39 and 155.39 processed yield output varied between 57 % and 41 %. Average fruit weight was determined between 3.2 g and 17.8 g, fruit width between 18.3 mm and 34.5 mm, fruit length between 49.3 mm and 103.7 mm, fruit flesh thickness between 1.0 mm and 2.5 mm; fruit number per plant between 56 and 138; plant height between 61 cm and 79 cm, leaf length between 5.2 cm and 10.9 cm, pungency level 7000 SHU between 87000 SHU, leaf width between 2.4 cm and 6.2 cm.

Key words: red pepper, pungency, colour, yield

Heubach test kao mjera za kontrolu kvalitete tretiranja sjemena

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Sažetak

Jedna od učinkovitih mjera suzbijanja i zaštite usjeva od štetočina je sjetva sjemena tretiranog insekticidom. No u današnje vrijeme, tretman sjemena insekticidom, pored svoje primarne zadaće zaštite, mora ispunjavati i uvjete koji su u skladu s postojećim mjerama zaštite okoliša i zdravlja ljudi. Precizan test kojim se brzo određuje kvaliteta tretiranog sjemena, tj. koncentracija čestica insekticida otpalih sa sjemena je Heubach analiza. Cilj ovog rada bio je utvrditi razinu kvalitete tretmana sjemena po Heubach-u 60 partija hibrida kukuruza Poljoprivrednog instituta Osijek tijekom dvije sezone dorade (2012./2013.) sa svrhom procjene variranja vrijednosti otpalih čestica insekticida te detekcije i neutralizacije eventualnih nedostataka koji bi mogli negativno utjecati na okoliš i zdravlje ljudi. Rezultati istraživanja ukazali su na značajan učinak godine, partije i interakcije godina x partija na vrijednost otpalih čestica (p=0,01). Prosječna vrijednost otpalih čestica iznosila je 0,98 g na 100 kg tretiranog sjemena u 2012. godini i 0,69 g na 100 kg tretiranog sjemena u 2013. godini. Utvrđene vrijednosti bile su znatno manje od gornje dopuštenih vrijednosti za sjeme kukuruza (2 g na 100 kg tretiranog sjemena). Varijacijski koeficijent za svojstvo bio je za dvije godine istraživanja 51,19%. Rezultati ukazuju da je tretman bio pravilno izvršen, te da bi se sjetvom pravilno tretiranog sjemena hibrida mogli smanjiti rizici utjecaja na okoliš i zdravlje ljudi.

Ključne riječi: kukuruz, tretiranje sjemena, insekticid, Heubach test

Heubach test as a measure of seed treatment quality control

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Summary

One of the effective measures for pest management and crop protection is sowing of seed treated by insecticides. But recently, seed treatment beside its primary goal of protection has to fulfil some conditions that are in accordance with existing measures of environment and human health protection. Precise test for fast analysis of seed treatment quality, e.g. for analysis of insecticide floating dust and abrasion particles concentrations is Heubach analysis. The aim of this study was to determine the level of seed treatment quality according to Heubach for 60 seed lots of maize hybrids created at Agricultural Institute Osijek during two seasons of seed processing (2012/2013) in order to evaluate a variation of insecticide floating dust values and to detect and neutralize possible flaws that might negatively influence on environment and human health. The results revealed the significant effect of year, seed lot and year x seed lot interaction on dust values (p=0.01). The average value of dust was 0.98 g per 100 kg of treated seed in year 2012 and 0.69 g per 100 kg of treated seed in year 2013. The recorded values were significantly lower than highest permitted values for treated maize seed (2 g per 100 kg of treated seed). Trait variability coefficient was 51.19% in average for two years of investigation. Results indicated that seed was properly treated and suggested that environmental and human health hazards can be minimized by sowing of properly treated hybrid seed.

Key words: maize, seed treatment, insecticide, Heubach test

Utjecaj roka sjetve na genetski potencijal rodnosti hibrida kukuruza pri različitim gustoćama sjetve

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Sažetak

Gustoća sklopa hibrida kukuruza jedan je od najvažnijih čimbenika prinosa. Hibridi kraće vegetacije (ranijih FAO grupa) siju se u gušćem sklopu, a hibridi duže vegetacije (kasnijih FAO grupa) siju se u rjeđem sklopu. Na optimalni sklop utječe više čimbenika kao što su habitus biljke i dužina vegetacije, plodnost tla, opskrbljenost tla vodom i gnojivima. U 2013. godini postavljen je mikropokus s ciljem testiranja hibrida na prinos u različitim gustoćama sklopa i različitim rokovima sjetve. Pokus je posijan u Altınovi (zapadna turska regija Balıkesir). Posijano je 10 hibrida kasnih FAO grupa 600-700, po slučajnom bloknom rasporedu, u 4 ponavljanja i 2 roka sjetve (09. 05. i 10. 07.). Hibridi su posijani u 4 različite gustoće sklopa na bazi 55000, 65000, 75000 i 85000 biljaka/ha. Pokusi su provedeni u uvjetima navodnjavanja kišenjem i natapanjem (oko 400 mm). Rezultati pokazuju da su hibridi sijani u najgušćem sklopu u prosjeku dali najveće prinose (15,20 t/ha), dok su hibridi sijani u najrjeđem sklopu dali najmanje prinose (10,95 t/ha). Neki hibridi su se pokazali tolerantniji na gušći sklop, dok su neki hibridi dali bolje prinose u rjeđem sklopu. Procjena je da će hibridi sijani u 2. roku sjetve dati 20-30% niže prinose. Može se zaključiti da je veća gustoće sklopa jedna od mogućnosti povećanja prinosa te da rok sjetve utječe na genetski potencijal rodnosti hibrida. Očekuje se povećanje broja hibrida tolerantnih na gušći sklop i daljnji rad na kreiranju takvih hibrida.

Ključne riječi: kukuruz, hibridi, gustoća sklopa, prinos, genetski potencijal

Effect of sowing time on genetic yield potential of maize hybrids at different plant density variants

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Summary

Plant density is one of the most important elements of hybrid maize yield. Hybrids with shorter vegetation period (earlier FAO groups) are planted in higher plant density variants, and hybrids with longer vegetation period (later FAO groups) are planted in lower plant density variants. Number of various factors affects optimal plant density in the field, such as plant habitus, vegetation period, soil fertility, availability of water and nutrients in the soil. In 2013 microtrial has been set with the goal of hybrid yield testing in various plant density variants and various planting time variants. Total of 10 later hybrids (FAO 600-700) were planted in Altınova (western Turkish region Balıkesir) with randomized complete block design in four replications and in two planting time variants (May 9 and July 10), as well as in four various plant density variants (55000, 65000, 75000 and 85000 plants/hectare). Trial was under two irrigation systems during vegetation period (total of 400 mm). Hybrids planted in the highest plant density variants showed best results (15.20 t/ha), while hybrids planted in lowest plant density variants showed lowest yield (10.95 t/ha). Some hybrids showed tolerance to high plant density, and some hybrids yielded better in low plant density. It is estimated that hybrids planted in second planting time will produce 20 to 30 % lower yield. Trial results indicate some final conclusions – higher plant density could increase grain yield, and planting time affects genetic yield potential of maize hybrids. With further research in selection (inbred and hybrid development) it is expected that number of hybrids tolerant to higher plant density will increase in hybrid maize production.

Key words: maize, hybrids, plant density, yield, genetic potential

Nakupljanje toplinskih jedinica i oplemenjivanje kukuruza

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Sažetak

Rast i razvoj kukuruza značajno ovise o temperaturi. U posljednje tri dekade 1981.-1990., 1991.-2000. i 2001.-2010. srednja dekadna temperatura zraka pojedinog mjeseca za razdoblje od travnja do kolovoza na postaji Zagreb-Maksimir bila je viša za 1oC, a u lipnju za više od 2oC. Zahvaljujući toplijem i manje vlažnom travnju početak sjetve kukuruza se u Rugvici (Zagreb) od 2007. godine (osim 2013.) pomaknuo s kraja na sredinu mjeseca travnja. Cilj ovog rada bio je: 1) ispitati nakupljanje toplinskih jedinica u razdoblju sjetva – svilanje kod 15 inbred linija kukuruza od 2006. – 2009. godine, i 2) ispitati je li došlo do promjene ukupne sume toplinskih jedinica za vegetacijsko razdoblje (od sjetve do 30. rujna) od 2007. – 2009. godine u odnosu na 2006. godinu. Suma toplinskih jedinica za razdoblje sjetva – svilanje u inbred linije kukuruza B73 kretala se od 884 u 2009. godini do 948 u 2006. godini. Ukupna suma toplinskih jedinica za vegetacijsko razdoblje od 2007. – 2009. godine bila je veća u sve tri godine u odnosu na 2006. godinu i kretala se od 1556 u 2008. godini do 1670 u 2009. godini, dok se u 2006. godini nakupilo 1469 toplinskih jedinica.

Ključne riječi: kukuruz, samooplodne linije, toplinske jedinice

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Accumulation of heat units and maize breeding

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Summary

Maize growth and development are strongly dependent on temperature. In the last three decades, 1981-1990, 1991-2000 and 2001-2010 average temperature for each month of the respective decade on the station Zagreb-Maksimir rose by more than 1o C in the period from April to August, and in June by more than 2o C. Owing to warmer and less humid April, from 2007 (except 2013) maize planting in Rugvica (Zagreb) was shifted from the end to mid-April. The aim of this study was to: 1. investigate accumulation of heat units for the period planting-silking in 15 maize inbred lines from 2006 to 2009 and 2. examine whether a change in the total amount of heat units took place for the vegetation period (from planting to September 30th) over the period from 2007 to 2009 compared to 2006. The sum of heat units in maize inbred line B73 for the period planting-silking ranged from 884 in 2009 to 948 in 2006. The total amount of heat units for the vegetation period from 2007 to 2009 was higher in all three years compared to 2006, and ranged from 1556 in 2008 to 1670 in 2009, while 1469 heat units were accumulated in 2006.

Key words: maize, inbred lines, heat units

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Assessment of efficient method for fast breeding by cloning specific plants for ımproved Alfalfa

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Summary

This research has been conducted in greenhouse of the Faculty of Agriculture, University of Ankara, Department of Agronomy in 2009. Materials used in this research were Alfalfa clones acquired from seven cities (Kayseri, Sivas, Kırşehir, Yozgat, Aksaray, Konya and Ankara). It is tried to determine the most efficient media for Alfalfa by rooting 13 Alfalfa clones in different media. The Alfalfa clones were tested in two media (pearlite and sand). Rooting and root length were measured on 15th and 25th day. Significant statistical difference in media interaction has been observed in terms of rooting rates at 15th day, between clones and media. In pearlite media at 15th day rate the clone No.159 rooted the most with rate of 90.00%, while clone No.181 rooted the least (53.75%). Clones rooted in 15th and 25th day in sandy media had longer root size than in pearlite media. The clone No.122 had the longest root of 3.12 cm but shortest in pearlite media, while clone No.169 had the shortest root length in sandy media which was 1.90 cm. In 25th day clones No.166, 170 and 171 rooted the longest with regard to other clones, while clone No.169 was recorded as the slowest in growing. In 40th day, after transfer in soil mixture long rooted clones were detected to have no positive effect on survival rate. Clones rooted in pearlite media have been detected to have the highest survival rate.

Key words: Alfalfa (*Medicago sativa* L.), clone, media, sand, pearlite

Najvažnija komponenta uroda kod sorata pšenice

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Sažetak

Broj zrna i prosječna masa jednoga zrna računske su komponente uroda zrna i određuju urod zrna po klasu, biljci i jedinici površine. Urod zrna je kvantitativno svojstvo određeno poligenima na čiju izražajnost u velikoj mjeri djeluju vanjski činitelji (vremenske prilike, tip tla, agrotehničke mjere, nadmorska visina, napad bolesti, mjere njege i zaštite, datum sjetve i žetve). U pokusima sa sedam sorata ozime pšenice u proteklih pet godina analizirali smo broj zrna/m^2 s obzirom na godinu, a u 2013. godini i s obzirom na lokaciju, normu sjetve (330 i 600 zrna/m^2), te zaštitu od bolesti i umjetnu zarazu sa *F.culmorum*. Najveći broj zrna/m2 ostvaren je 2011. godine, a najmanji 2009. godine (-5,35%). U prosjeku pet godina u Osijeku ostvaren je sljedeći broj zrna/m^2: Katarina (24,923), Alka (23,560), Lucija (23,370), Srpanjka (23,363), Sana (20,991), Renata (20,950) i Žitarka (19,212). U 2013. godini tretman fungicidom dao je 11,28% više zrna od kontrole i 25,24% više zrna od varijante s umjetnom zarazom. S obzirom na lokacije, najveći broj zrna ostvaren je u Osijeku (21.659), što je 2,13%, 54,7% i 69,53% više nego u Tovarniku, Požegi i Sl. Brodu. Pri manjoj sjetvenoj normi ostvareno je, u prosjeku +2,43% više zrna nego s većom sjetvenom normom. U Osijeku i Požegi ostvaren je veći broj zrna s manjom, a na lokacijama Tovarnik i Sl.Brod s većom sjetvenom normom. Zbog utjecaja na potencijal rodnosti i varijabilnosti ovoga svojstva istraživanja treba nastaviti.

Ključne riječi: pšenica, broj zrna/m^2, okolišni uvjeti

The most important yield component of wheat varieties

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Summary

Number of kernels and average weight of single kernel are computational components of grain yield and they determines grain yield per spike, plant and area unit. Grain yield is quantitative trait determined by polygenes which expression is under great influence of external factors (meteorological conditions, soil type, agro technical measures, altitude above sea level, diseases attack, care and protection measures, sowing and harvest date). In trials with seven varieties of winter wheat in last five years we analyzed number of kernels/m2 regarding year, whereas in 2013 year and regarding location, sowing rate (330 and 600 kernels/m2), protection from diseases and artificial infection with F. culmorum. The biggest number of kernels/m2 was realised in the year 2011 and the least in the year 2009 (-5.35%). In five years average in Osijek following number of kernels/m2 was reached: Katarina (24.923), Alka (23.560), Lucija (23.370), Srpanjka (23.363), Sana (20.991), Renata (20.950) and Žitarka (19.212). In the year 2013 fungicide treatment gave 11.28% more kernels than control and 25.24% more kernels than variant with artificial infection. According to locations, biggest number of kernels was realised in Osijek (21.659), what is 2.13%, 54.7% and 69.53% more than in Tovarnik, Požega and Sl.Brod. In lower sowing rate was realised in average +2.43% more kernels in relation to bigger sowing rate. In Osijek and Požega bigger number of kernels with lower sowing rate was achieved, while at the locations Tovarnik and Sl. Brod with bigger sowing rate. Due to influence on yield potential and variability of this trait research should be continued.

Key words: wheat, number of kernels/m^2, environmental conditions

Divergentnost lokalnih populacija crvene djeteline u odnosu na ekogeografske karakteristike staništa

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Sažetak

Lokalne populacije crvene djeteline predstavljaju vrijedan genetski izvor u oplemenjivačkim programima u svrhu kreiranja kultivara prilagođenih domaćim agro-ekološkim uvjetima uzgoja. Ciljevi istraživanja bili su (1) pronaći i odabrati lokacije koje ispunjavaju uvjete - prisutnost lokalnih populacija, tradicionalni način korištenja, te prostorna izolacija, (2) grupirati lokacije na temelju ekogeografskih podataka, (3) procijeniti raznolikost između ispitivanih lokalnih populacija crvene djeteline i grupirati populacije na bazi morfoloških i molekularnih (AFLP) markera, (4) usporediti raznolikost populacija na morfološkoj i molekularnoj razini s ekogeografskim karakteristikama staništa. Područje istraživanja je podijeljeno s obzirom na nadmorsku visinu u tri grupe unutar kojih je odabrano 18 lokacija. Za svaku lokaciju prikupljene su ekogeografske karakteristike staništa (geografske, pedološke i klimatološke). Za svaku odabranu populaciju po lokaciji, na 20 slučajno odabranih individua crvene djeteline napravljena su mjerenja i ocjene 18 morfoloških svojstava. Na istim individuama provedena je AFLP-molekularna analiza. Utvrđeno je postojanje varijabilnosti između lokalnih populacija crvene djeteline na morfološkoj i molekularnoj razini. Mantel-ovim testom komparacije ekogeografskih, morfoloških i molekularnih podataka nisu utvrđene značajne korelacije između svih istraživanih grupa podataka.

Ključne riječi: crvena djetelina (*Trifoilum pratense* L.), lokalne populacije, ekogeografske karakteristike staništa, morfološka svojstva, AFLP

Zahvala

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Divergence of local population of red clover in relation to ecogeographical characteristics of habitats

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Summary

Local populations of red clover represent a valuable genetic pool for breeding programmes with the aim of creating cultivars adapted to local agroecological conditions of cultivation. The aims of the research were: (1) to find and select locations that fulfils following conditions - the presence of local populations, the traditional way of use, and space isolation; (2) to establish groups of locations based on ecogeographical data; (3) to estimate the diversity among the examined local populations of red clover and establish groups of populations on the basis of morphological and molecular (AFLP) markers; and (4) to compare the diversity of populations in the morphological and molecular level with ecogeographical characteristics of habitat. Considering the geographic altitude, the area of research is divided into three groups with 18 locations designated. Ecogeographical characteristics of habitat (geographical, pedological and climatological) were collected for all locations. Measurements and assessments of 18 morphological traits were carried out on 20 randomly selected individual plants per each selected population of red clover. The same individuals were analysed by AFLP molecular analysis. The variability among local populations of red clover was found on the morphological and molecular level. Mantel test of comparisons of ecogeographical, morphological and molecular data did not show any significant correlation among investigated groups.

Key words: red clover (*Trifoilum pratense* L.), local population, ecogeographical characteristics of habitat, morphological attribute, AFLP

S-genotyping of Turkish apricot (*Prunus armeniaca* L.) germplasm

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Summary

This study was carried out to determine the S-genotypes of a set of Turkish apricot cultivars and wild apricots by PCR amplifying their S-RNase intron regions. In addition, the S-genotyping method was extended to the SFB gene in order to detect the non-functional SC-haplotype and hence reliable identify self-compatible apricot cultivars. We determined complete S-genotype of 51 cultivars and partial S-genotype of 4 cultivars. Altogether, a total of 32 different S-genotypes were assigned to the 51 Turkish apricot cultivars. Many of them (28) were classified into newly established cross-incompatibility groups III-XIV. Another 12 cultivars have been identified as unique incompatible genotypes. Only 7 self-compatible cultivars have been determined. The S-genotypes of 63 wild-growing Turkish apricots (*Prunus armeniaca* L.) were determined by PCR amplification of the S-RNase intron regions and SFB gene in order to characterize their sexual (in) compatibility phenotype as well. We determined the complete S-genotype of 63 wild-grown apricot accessions that originated in the Erzincan region. Ten previously described and 2 new S-alleles (provisionally labelled SX and SY) were identified in the genotypes. S2 was the most frequent S-allele in the tested germplasm (occurred in 19 accessions), followed by S8 (17), S19 (16), S3 (13), S12 (11), S6 (10), and S7 (10); while S9-, S11-, and S13-alleles were found in 8 accessions. A total of 36 different S-genotypes were assigned to the tested accessions. The SC-allele responsible for self-compatibility in apricot was not present, indicating that all accessions are self-incompatible. The analysis of S-allele frequencies allowed us to conclude the close relationship of wild-grown and cultivated apricots in Turkey and helped to raise hypotheses to explain high occurrences of S2- and S8-alleles.

Key words: apricot, S-genotyping, SFB gene, allele identification

Tretman sjemena za povećanje klijavosti i ranog rasta u uvjetima abiotskog stresa

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Sažetak

Globalna promjena klime koja se i u našoj zemlji već gotovo redovito osjeća kroz čestu pojavu ekstremnih vrijednosti nekog od klimatskih parametara. Veelik udio ograničeno dobrih i privremeno nepogodnih obradivih površina za intenzivnu i stabilnu proizvodnju u RH nameće potrebu nalaženja održivih rješenja u tehnologiji proizvodnje bilja s ciljem ublažavanja ili neutraliziranja štetnih abiotskih utjecaja na rast, razvoj i prinose najsijanijih poljoprivrednih kultura. Jedno od mogućih, jednostavno primjenjivih, jeftinih i okolišno prihvatljivih rješenja je predsjetveni tretman sjemena (seed priming), tj. namakanje sjemena za indukciju određenog fiziološkog stanja/procesa u sjemenu koji buduću biljku već od najranije dobi razvoja priprema za bržu i snažniju obranu od abiotskog stresa. U ovom radu dan je pregled dosadašnjih spoznaja o učinku predsjetvenog tretmana sjemena na povećanje tolerantnosti na abiotski stres različitih poljoprivrednih kultura, kao i najčešće primjenjivanim metodama. Poseban osvrt dan je preliminarnoj procjeni učinka predsjetvenih tretmana sjemena na klijavost te rani rast i razvoj najsijanijih kultivara pšenice, ječma, kukuruza i soje Poljoprivrednog instituta Osijek.

Ključne riječi: sjeme, predsjetveni tretman, abiotski stres, klijavost, klijanac

Seed treatment for improved germination and early growth under abiotic stress conditions

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Summary

Global climate change, which signs are also visible in our country through frequent occurrence of extreme values of some of the climatic parameters, as well as a great portion of soils with limited productivity and temporarily damaged soils for intensive and stable agricultural production in Croatia, urge the need to find sustainable solutions in technology of plant production in order to mitigate or neutralize damaging influence of abiotic stresses on growth, development and yields of most frequently sown crops. One of few possible, profoundly applicable, cheap and environmentally friendly solution is presowing seed treatment (seed priming), e.g. seed soaking to induce certain physiological state/process in seed by which future plant should be better prepared from the earliest time of development to defend itself more quickly and more powerful against abiotic stresses. This paper gives a short review of existing knowledge relevant to the impact of presowing seed treatments on abiotic stress tolerance enhancement in different agricultural crops and a review of most frequently methods used. A special attention is given to the preliminary estimates of the presowing seed treatment effects on germination and early growth and development of most frequently sown wheat, barley, maize and soybean cultivars created at Agricultural Institute Osijek.

Key words: seed, presowing treatment, abiotic stress, germination, seedling

Molecular characterization by morphological traits and adaptation of Button medic (*Medicago orbicularis*) collected from Southeastern Turkey

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Summary

The aim of this study was to investigate morphological traits of button medic genotypes and determine their molecular characterization by the using of ISSR methods. Button medic is a cool-season annual legume that originated in the Mediterranean region and has become naturalized throughout most of Turkey. Annual *Medicago* spp., have not been recommended as a pasture and forage varieties for our country. Vegetative traits will be assessment at 50% anthesis period; however generative trait was measured at physiologically period. Molecular diversity was studied by using 14 of ISSR primers. To assess the genetic diversity and the genetic structure of wild button medic (*Medicago orbicularis*) of Southeastern Anatolian Region, some genotypes collected from fifteen ecologically and geographically different locations was analyzed by means of ISSR (Inter Simple Sequence Repeats) at Cukurova University, Agricultural Faculty, in Biotechnology Laboratory. According to the Jaccard's similarity index, similarity between genotypes ranged from a minimum of 0.63 to a maximum of 1, the average being 0.70. In the dendrogram obtained from similarity index data plants of 17 genotypes formed two main groups, as A and B. Group A was divided two (A1 and A2) sub-groups. Kulp, Diyarbakır, Eğil-1, Eğil-2, idil ve Ovabağ fell in to sub-group of A1. At dividing A2 group, one groups was Silvan, Hilvan, Adıyaman, Derik, Malabadi ve Erdurağı, in other group Gaziantep, Çermik, Ergani and Palanlı fell in to sub-group A2.

Key Words: Button medic, *Medicago orbicularis*, DNA, ISSR, morphological traits

Najnoviji rezultati oplemenjivanja ozime pšenice u Bc Institutu

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Sažetak

Rad na oplemenjivanju ozime pšenice u Bc Institutu d.d. započeo je 1947. godine i kontinuirano se provodi sve do danas. U tom razdoblju priznate su 94 sorte ozime pšenice. Većina sorata zauzimala je velik udio u strukturi sjetve na području Republike Hrvatske kao i u susjednim zemljama. Uspješnost oplemenjivačkog rada i stalni genetski napredak potvrđuje se novopriznatim sortama. Bc Institutu d.d. 2013. godine u Republici Hrvatskoj priznate su tri nove sorte ozime pšenice. Bc Majda i Bc Blanka visokorodne su krušne sorte, dok je Bc Lada namijenjena konditorskoj industriji. Bc Majda moderna je bijela golica za intenzivnu proizvodnju. Prema dvogodišnjim rezultatima Komisije za priznavanje sorata Republike Hrvatske ostvarila je prosječan prinos od 8438 kg/ha, što je za 28% veći prinos od prosjeka standardnih sorata. Posjeduje dobru kvalitetu i odličnu stabilnost, što ju čini vrlo konkurentnom za proizvodnju. Bc Blanka je brkulja, nešto kasnije vegetacije, odlične otpornosti na bolesti te vrlo dobre kvalitete. Ostvaren prosječni prinos od 7599 kg/ha bio je za 15% bolji od prosjeka standarda. Sorta Bc Lada po svim parametrima kvalitete u potpunosti zadovoljava potrebe konditorske industrije. Uz namjensku kvalitetu ostvarila je za 16% veći prinos od prosjeka standardnih sorata. Sve tri novopriznate Bc sorte pokazale su visok potencijal prinosa, dobru kvalitetu za traženu namjenu, adaptabilnost i stabilnost te se nameću kao izvrstan izbor za široku proizvodnju pšenice.

Ključne riječi: kvaliteta, oplemenjivanje, ozima pšenica, prinos, stabilnost

The latest results of the Bc Institute winter wheat breeding program

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Summary

The winter wheat breeding at the Bc Institute started in 1947 and is continuously performed till today. In that period 94 winter wheat varieties were released. The majority of released varieties took a large share in winter wheat production of Croatia and neighbouring countries. The success of breeding and constant genetic improvement was confirmed by newly released varieties. In 2013 Bc Institute released three new winter wheat varieties. Bc Majda and Bc Blanka are high yielding bread varieties, while Bc Lada is intended for confectionary industry. Bc Majda is a modern white awnless variety for intensive production. In two-year trials of the Croatian Committee for Registration of Agricultural Crop Varieties it achieved average yield of 8438 kg/ha, 28% higher than the average of control varieties. Bc Majda is, due to good quality and excellent stability, very competitive for commercial production. Bc Blanka has white awns, is a bit later in vegetation, has excellent disease resistance and a very good quality. Its average yield of 7599 kg/ha was 15% higher than the average of the control varieties. Bc Lada with all quality parameters meets the needs of confectionery industry. Besides its specific quality, it also achieved a 16% higher yield than the control varieties. The three newest Bc winter wheat varieties showed high yield potential, good quality for their intended purpose, adaptability, stability and impose themselves as excellent choice for commercial production.

Key words: breeding, quality, stability, winter wheat, yield

Procjena stabilnosti prinosa i sadržaja proteina u zrnu ozime pšenice kod dvije razine gnojidbe dušikom

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Sažetak

Prinos zrna (GY) i sadržaj proteina u zrnu (GPC) ozime pšenice (*Triticum aestivum* L.) određuju genotipski i okolinski čimbenici, a za potpuno razumijevanje genetskog potencijala odabranog genotipa, potrebno je znati kako pojedini genotip reagira na pojedine uvjete okoline. Istraživanje je provedeno na 19 kultivara ozime pšenice, posijanih u osam okolina (kombinacija lokacija - godina) kod reducirane (N80) i optimalne (N180) razine dušika tijekom tri vegetacijske godine. Stabilnost ispitivanih svojstava procijenjena je pomoću koeficijenta linearne regresije (b), varijance srednjeg kvadratnog odstupanja od regresije (MS-DEV) i AMMI modela za svaku razinu dušika posebno. Rezultati pokazuju široki raspon vrijednosti regresijskog koeficijenta za GY (N80 0,79 do 1,22; N180 0,55 do 1,53) i GPC (N80 0,74 do 1,37; N180 0,62 do 1,28), što upućuje na različitu stabilnost ispitivanih genotipova. Kod obje razine gnojidbe, Liberta se pokazala kao najstabilniji genotip za GY zbog vrijednosti b oko 1 i ispodprosječne vrijednosti MS-DEV, dok se Aura pokazala kao najstabilniji genotip za GPC. Biplot prikaz prve dvije PCA osi, pokazao je različit utjecaj okolina na ispitivana svojstva pojedinih genotipova kod obje razine gnojidbe. Korelacija između koeficijenata b kod optimalne i reducirane gnojidbe za GY i GPC je iznosila r=0,57* odnosno r=0,49*, što upućuje na značajan utjecaj gnojidbe dušikom na procjenu stabilnosti genotipa.

Ključne riječi: ozima pšenica, gnojidba, prinos, proteini, stabilnost

Assessment of stability of grain yield and grain protein content of winter wheat at two nitrogen fertilization levels

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Summary

Grain yield (GY) and grain protein content (GPC) of winter wheat (*Triticum aestivum* L.) were determined by genotypic and environmental factors. To completely understand the genetic potential of selected genotypes, it necessary to know how individual genotype responds to environmental conditions. The study included 19 winter wheat genotypes. Field experiments were set over three growing seasons at eight environments (eight combinations of location-years) at reduced (N80) and optimal (N180) nitrogen fertilization levels. The stability of the traits was estimated by the coefficient of linear regression (b), variance of the mean square deviations from regression (MS-DEV) and the AMMI model for each level of nitrogen fertilization. The results show a wide range of value of b for GY (N80 0.79 to 1.22; N180 0.55 to 1.53) and for GPC (N80 0.74 to 1.37; N180 0.62 to 1.28), indicating different stability of the studied genotypes. Genotype Liberta proved as the most stable genotype for GY because of the value for b about 1 and because of the below average MS-DEV value. Genotype Aura proved as the most stable genotype for GPC. The biplot of the first two PCA axes showed different influence of the environment on the studied traits of individual genotypes at both levels of fertilization. Correlation for b between optimal and reduced fertilization levels for GY and GPC was r=0.57* and r=0.49*, indicating a significant impact of nitrogen fertilization on estimates of the genotypes stability.

Key words: winter wheat, fertilization, grain yield, proteins, stability

Testiranje Bc linija i hibrida kukuruza na otpornost prema truleži klipa

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Sažetak

Fuzarijska trulež klipa jedna je od najznačajnijih bolesti kukuruza, naročito zbog stvaranja brojnih mikotoksina koji mogu dovesti u pitanje sigurnost hrane. Razlikujemo trulež klipa koju uzrokuje *Fusarium graminearum* s proizvodnjom dva mikotoksina deoksinivalenol (DON) i zearalenon (ZEA) te *Fusarium verticillioides* s mikotoksinima fumonizinima (FB1, FB2). Oplemenjivanje na otpornost i sjetva otpornih hibrida je najučinkovitiji način zaštite kukuruza od truleži klipa i kontaminacije mikotoksinima. Cilj ovih istraživanja je bio usporediti otpornost komercijalnih i eksperimentalnih linija i hibrida kukuruza prema ova dva uzročnika truleži klipa. Tijekom 2013. godine ispitana je otpornost 25 linija i 25 hibrida u uvjetima umjetne infekcije klipa s *F. graminearum* i *F. verticillioides*. U uvjetima umjetne inokulacije klipa sa *F. graminearum* dobiven je raspon od 1,5 (L23 i L24) do 3,8 (L19) kod linija odnosno od 1,1 (H1 i H19) do 2,4 (H8 i H9) kod hibrida, dok se u slučaju *F. verticillioides* taj raspon kretao od 1,3 (L23) do 4,4 (L20) kod linija odnosno od 1,3 (H16, H18 i H19) do 3,6 (H8) kod hibrida. Korelacija između otpornosti linija i hibrida iznosila je 0,72 (*F. graminearum*) odnosno 0,53 (*F. verticillioides*), dok je povezanost između otpornosti prema ova dva uzročnika iznosila 0,66 za linije i 0,58 za hibride. Pojedine linije i hibridi pokazali su visok stupanj otpornosti prema ispitivanim bolestima.

Ključne riječi: kukuruz, trulež klipa, *Fusarium graminearum*, *Fusarium verticillioides*

Testing of maize lines and hybrids for resistance to ear rot

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Summary

Fusarium ear rot is the most important cause of maize ear rot, particularly because of a large number of mycotoxins produced which can affect food safety. Two ear rot pathogens are distinguished, *Fusarium graminearum*, which produces two main mycotoxins – deoxinivalenol (DON) and zearalenone (ZEA) and *Fusarium verticillioides* with mycotoxins fumonisins (FB1, FB2). Breeding for resistance and planting resistant hybrids are the most effective means of ear rot control and prevention of contamination with mycotoxins. The aim of this study was to compare the elite and experimental maize lines and hybrids for resistance to these two pathogens. Resistance of 25 lines and 25 hybrids was tested in 2013 under conditions of artificial ear inoculation with *F. graminearum* and *F. verticillioides*. Under conditions of artificial ear inoculation with *F. graminearum* a range between 1.5 (L23, L24) and 3.8 (L19) was obtained for lines and 1.1 (H1, H19) to 2.4 (H8, H9) for hybrids, while in the case of *F. verticillioides* a range between 1.3 (L23) and 4.4 (L20) was obtained for lines and 1.3 (H16, H18, H19) to 3.6 (H8) for hybrids. Correlation between line and hybrid resistance was 0.72 (*F. graminearum*) and 0.53 (*F. verticillioides*). When comparing resistance of lines and hybrids to *F. graminearum* and *F. verticillioides* respective correlation coefficients, r = 0.66 and r = 0.58, were obtained. Certain lines and hybrids expressed high degree of resistance to these two pathogens.

Key words: maize, ear rot, *Fusarium graminearum*, *Fusarium verticillioides*

Detection of resistance to diseases in a trial with diallel crosses of tobacco

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Summary

Investigations were made with ten varieties of tobacco types: Prilep (P- 23 , P- 76 , P- 66 , NS-72), Yaka (YK 10-7/1), Djebel (Xanthe, HDj-M), Basmak (MB- 3), Samsun (SM- 1), Sirdili (SM-LL) and Virginia (MV-1) and their 45 diallel crosses for resistance to diseases, with an emphasis on black shank - *Phytophthora parasitica* var. *nicotianae.* The trial with parental genotypes and their hybrids was set up in 2011 and 2012 at the Experimental field of the Scientific Tobacco Institute - Prilep in randomized block design with three replications. Traditional agricultural practices were applied during the growing season. The resistance/susceptibility degree was estimated according to a scale recommended by FAO. The aim of this paper is the detection of resistance to black shank and creation of resistant lines, using diallel analysis to obtain knowledge on the genetics of this disease. The highest resistance to the disease was recorded in YK 10-7/1 and SM-LL, while the varieties MV-1 and P-76 showed to be the most susceptible. The highest resistance in the diallel was recorded in the crosses where one of the parents was YK 10-7/1, which indicates a possession of dominant gene of resistance. In the process of breeding, the method of Back-cross hybridization was used in order to increase the varieties resistance to the black shank disease.

Key words: tobacco (*Nicotiana tabacum* L.), diallel crosses, back-cross hybridization, resistance, black shank (*Phytophthora parasitica* var. *nicotianae*)

Urod zrna i parametri kvalitete OS-genotipova golozrnog ječma

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Sažetak

Na Poljoprivrednom institutu Osijek (PIO) kreirane su linije (9) ozimog golozrnog ječma koje se nalaze u mikropokusima, proizvodnim pokusima kod poljoprivrednih proizvođača, a u postupku priznavanja i zaštite novih biljnih sorti u Republici Hrvatskoj je linija Osk.4.1/189GZ-10 (Matko). U pokusima na pokušalištu Instituta u razdoblju od 2010. do 2013. godine ispitivane su linije ozimog golozrnog ječma i sorte pljevičaste forme zrna. Istraživanja ukazuju da linije Osk.4.1/189GZ-10, Osk.4.1/184GZ-10, Osk.4.1/186GZ-10 golozrnog ječma ostvaruju urod zrna na razini standardnih sorti pljevičaste forme zrna uz višu hektolitarsku masu zrna (68,60-80,60 kg) u odnosu na sorte pljevičaste forme zrna (59,30-70,20 kg). Linija Matko ističe se višim udjelom zrna I klase (56,19-89,91%), masom 1000 zrna (46,30-51,22 g), sadržajem proteina (13,20-15,10%). Na uzorcima golozrnog ječma provedeno je mikroslađenje, a rezultati analize slada ukazuju na visoki sadržaj ekstrakta te slabije citolitičke i proteolitičke parametre slada u odnosu na kvalitetne pivarske sorte ječma. Naročito visok sadržaj ekstrakta (86,3%) imala je linija Osk.4.1/179GZ-10 uz nižu viskoznost slada u odnosu na ostale ispitivane linije golozrnog ječma. Analiza sadržaja β-glukana u zrnu ječma ukazuje da linije Matko (5,42 g/100 g.s.t.) i Osk.4.1/186GZ-10 (5,27 g/100 g.s.t.) imaju viši sadržaj β-glukana u zrnu u odnosu na sortu Bingo (4,24 g/100 g.s.t.) najvišeg ostvarenog sadržaja β-glukana kod sorti pljevičaste forme zrna.

Ključne riječi: golozrni ječam, genotip, urod, kvaliteta

Grain yield and quality parameters of hulless OS-genotypes

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Summary

Lines (9) of hulless barley varieties were created at Agricultural Institute Osijek and put to field micro-trials as well as production trials organized with certain agricultural producers and partners. It is important to emphasize the line Osk.4.1/189GZ-10 (Matko) which is included in recognition process in the Republic of Croatia. Research at Institute field trials lasted from 2010 till 2013 with hulless winter barley lines together with several hulled varieties. Research shows three lines of hulless barley (Osk.4.1/189GZ-10 (Matko), Osk.4.1/184GZ-10, Osk.4.1/186GZ-10) with grain yields at the levels of standard hulled barley varieties and also with greater value of hectolitre weight (68.60-80.60 kg vs. 59.30-70.20 kg). Matko excelled with 1st class grain proportion (56.19- 89.91%), 1000 grain weight (46.30-51.22 g) and protein content (13.20-15.10%). Micromalting was also done and the malt results point to high extract value and a bit lower values of cytolitic and proteolitic parameters in comparison to quality brewing barley varieties. Especially high extract value (86.3%) was achieved by the line Osk.4.1/179GZ-10 together with lower viscosity in comparison to all other plant material used. β-glucan analysis shows that the lines Matko (5.42 g/100 g.s.t.) and Osk.4.1/186GZ-10 (5.27 g/100 g.s.t.) possess higher levels of grain β-glucan comparing them to the variety Bingo (4.24 g/100 g.s.t.) which is known for its high levels of β-glucan among hulled varieties.

Key words: hulless barley, genotype, yield, quality

AUDDC metoda u oplemenjivanju kukuruza šećerca

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Sažetak

AUDDC (Area Under the Dry Down Curve) je metoda kojom se kod kukuruza standardnog tipa zrna procjenjuje dinamika otpuštanja vode iz zrna. Metoda se koristi za selekciju genotipova koji u fazi fiziološke zriobe brzo gube vodu iz zrna. Cilj ovoga istraživanja bio je procijeniti primjenjivost AUDDC metode u oplemenjivanju kukuruza šećerca, kako bi se izdvojili genotipovi koji sporije otpuštaju vodu iz zrna u fazi mliječne zriobe. Tijekom tri godine u pokusima sa kontroliranom oplodnjom ispitivano je 10 sugary i 5 shrunken hibrida kukuruza šećerca. Sadržaj vode u zrnu analiziran je pet puta tijekom dozrijevanja (svaki drugi dan od 17. do 25. dana nakon oplodnje). Iz vrijednosti ponovljenih mjerenja sadržaja vode izračunat je indeks, čija veća vrijednost ukazuje na sporije otpuštanje vode iz zrna. Hibridi shrunken skupine imali su značajno veći AUDDC u odnosu na sugary hibride što potvrđuje činjenicu da shrunken hibridi sporije otpuštaju vodu iz zrna i stoga imaju duži optimalni rok berbe. Hibrid Os 255su imao je značajno veći AUDDC u odnosu na ostale sugary hibride, što pokazuje da je i unutar ove skupine moguće izdvojiti genotipove koji sporije otpuštaju vodu iz zrna. Utvrđeni su visokoopravdani učinci hibrida, godine i roka sjetve na AUDDC, dok su interakcije hibrida i godine te hibrida i roka sjetve neopravdane. Dobivena je vrlo jaka pozitivna korelacija za AUDDC između godina, te između rokova sjetve (r=0,90 i r=0,95). Rezultati pokazuju da je AUDDC odgovarajuća metoda za selekciju genotipova kukuruza šećerca koji u fazi mliječne zriobe sporije gube vodu iz zrna.

Ključne riječi: kukuruz šećerac, otpuštanje vode iz zrna, AUDDC

AUDDC method in sweet corn breeding

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Summary

AUDDC (Area Under the Dry Down Curve) is a method for evaluating grain moisture reduction after physiological maturity in field corn. This method is used for screening and identifying corn genotypes that are faster driers. The aim of this study was to evaluate the applicability of AUDDC methods in sweet corn breeding, for selection of genotypes with slow dry down in the milk stage of maturity. Through three years of trials with controlled pollination 10 sugary and 5 shrunken sweet corn hybrids were investigated. The grain water content was analyzed five times during maturation (every other day from the 17th to the 25th day after pollination). From the values of repeated measurements for water content the index was calculated, where the higher value of index indicates a slower dry down. Shrunken hybrids had significantly higher ADDC compared to the sugary hybrids, which confirmed the fact that shrunken hybrids slowly released water from the kernel and therefore have longer optimal harvest period. Hybrid Os 255su had significantly higher AUDDC compared to the other sugary hybrids, which show that even within those group genotypes with slow dry down could be selected. Statistical analysis for AUDDC showed highly significant effects of hybrids, years and planting dates, while the interactions hybrid*year and hybrid*planting date were not significant. A very strong positive correlations for AADDC between years and between two planting dates (r = 0.90 and r = 0.95) were obtained. These results indicate that AUDDC is an efficient and repeatable method for identifying sweet corn genotypes with slow dry down at the milk stage of maturity.

Key words: sweet corn, dry down, AUDDC

Varijabilnost F6 potomstva pšenice za prinos i kvalitetu kod dvije razine dušične gnojidbe

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Sažetak

Stvaranje genotipova pšenice koji efikasno koriste dušik važno je iz ekoloških kao i ekonomskih razloga. Cilj ovoga rada je bio procijeniti varijabilnost prinosa zrna (GY), sadržaja proteina u zrnu (GPC) i prinos dušika u zrnu (GNY) kod F6 potomstava razvijenih iz pojedinačnih F3 biljaka kod dvaju biparentalnih križanaca pšenice pri optimalnoj i reduciranoj gnojidbi s dušikom. Križanje je izvedeno u dvije kombinacije, Golubica x Emesse (GxE) i Verbunkos x Soissons (VxS). Četiristo F6 potomstva razvijenih iz 100 pojedinačnih F3 biljaka (50 F3 biljaka po križanju) uzgajano je u poljskom pokusu kod optimalne (N1, 180kg Nha-1) i reducirane (N0, 80 kg Nha-1) gnojidbe dušikom. Prosječna vrijednost za GY kod F6 potomstava bila je signifikantno niža kod reducirane nego kod optimalne gnojidbe s dušikom uz smanjenje od 12% za GxE i 11% za VxS. Prosječna vrijednost za GPC nije se signifikantno razlikovala između dviju razina dušika, dok se prosječna vrijednost za GNY signifikantno smanjila kod N0 (15% za GxE i 14% za VxS) u usporedbi s N1. Signifikantna korelacija između dviju razina dušika opažena je za GY (0.40** za GxE i 0.33* za VxS) i GPC (0.83** za GxE i 0.74** za VxS). Korelacija između GY i GPC kod N1 je bila 0.18 i 0.13 za GxE odnosno VxS, a kod N0 0.06 i 0.09 za GxE odnosno VxS. Potomstva s izraženim pozitivnim transgresijama za GY i GPC kako kod N0 tako i kod N1 su pronađena u oba križanja.

Ključne riječi: pšenica, prinos, kvaliteta, dušik, gnojidba

Variability of F6 progenies of winter wheat for grain yield and quality at two nitrogen fertilization levels

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Summary

Creating wheat genotypes that efficiently use nitrogen is important for environmental and economic reasons. The aim of this study was to evaluate the variability of grain yield (GY), grain protein content (GPC) and grain nitrogen yield (GNY) among F6 progenies developed from individual F3 plants in two biparental crosses of wheat at optimal and a reduced nitrogen fertilization. Crossing was done in two combinations, Golubica x Emesse (GxE) and Verbunkos x Soissons (VxS). Four hundred F6 progenies developed from 100 individual F3 plants (50 F3 plants per cross) were grown in a field experiment at the optimal (N1, 180 kg Nha^{-1}) and reduced (N0, 80 kg Nha^{-1}) nitrogen fertilization. Mean GY of the F6 progenies was significantly lower under reduced than under optimal nitrogen fertilization with the reduction being 12% and 11% for GxE and VxS, respectively. Mean GPC was not significantly different between the two N levels, whereas mean GNY significantly decreased under N0 (15% for GxE and 14% for VxS) as compared with N1. A significant correlation between the two nitrogen levels was observed for GY (0.40** and 0.33* for GxE and VxS, respectively) and GPC (0.83** and 0.74** for GxE and VxS, respectively). Correlation between GY and GPC under N1 was 0.18 and 0.13 for GxE and VxS, respectively and under N0 it was 0.06 and 0.09 for GxE and VxS, respectively. Progenies expressing positive transgressions for GY and GPC under N0 as well as N1were identified in both crosses.

Key words: wheat, yield, quality, nitrogen, fertilization

Ispitivanje otpornosti oplemenjivačkih linija ozime pšenice na fuzarijsku palež klasa

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Sažetak

U programu oplemenjivanja ozime pšenice u Bc Institutu d.d. uz povećanje prinosa i kvalitete posebna pažnja pridaje se otpornosti na najvažnije bolesti pšenice, poglavito na fuzarijsku palež klasa (FHB) uzrokovanu gljivom *Fusarium graminearum* Schw. Ispitivanje otpornosti na FHB prolaze sve linije potencijalni sortni kandidati. U tom smislu je 2012. godine na lokaciji Botinec pomoću dvije metode umjetne infekcije (spray metode i metode infekcije pomoću zaraženih stabljika kukuruza) te u uvjetima prirodne infekcije ispitana otpornost 25 genotipova ozime pšenice. Oboljenje je ocijenjeno vizualno (% zaraženosti klasa) i kao % broja zrna sa simptomima FHB. Pokus je postavljen kao RCBD u četiri repeticije. Najveći intenzitet oboljenja ocijenjen je % broja zrna sa simptomima FHB nakon spray metode umjetne infekcije (16,85%), a najmanji istom ocjenom u uvjetima prirodne infekcije (0,44%). Između ocjena otpornosti najsnažnija korelacija zapažena je između vizualne ocjene oboljenja nakon spray metode umjetne infekcije i iste ocjene nakon infekcije zaraženim stabljikama kukuruza (r= 0,70**). Najslabija korelacija (r= 0,21*) uočena je između vizualne ocjene postotka oboljenja klasa i % broja zrna sa simptomima FHB u uvjetima prirodne infekcije. Između testiranih genotipova su kod sve tri metode infekcije pomoću obje ocjene uočene visokosignifikantne razlike u otpornosti na FHB. Linije Bc 7976/09 i Bc 7945/09 odabrane su kao kandidati za sortno priznavanje, dok je linija Bc 6119/09 prepoznata kao donor otpornosti na FHB.

Ključne riječi: fuzarijska palež klasa, ozima pšenica, umjetna infekcija

Screening winter wheat breeding lines for head scab resistance

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Summary

Within the winter wheat breeding program at the Bc Institute, besides yield and quality, great emphasis is given to improvement of resistance to important wheat diseases, primarily head scab (FHB) caused by *Fusarium graminearum* Schw. Test for resistance to FHB is mandatory for all new breeding lines, potential candidates for release. In 2012, at location Botinec, 25 winter wheat genotypes were tested for resistance to FHB under conditions of natural and, two methods of artificial infection (spray method and infection using the infected corn stalks). The severity of disease was rated visually as % of infected wheat head and as % of FHB damaged kernels. The highest average disease intensity was rated as % of FHB damaged kernels after spray method of infection (16.85%), while the lowest disease intensity was rated using the same rate under conditions of natural infection (0.44%). The highest correlation among the disease ratings was observed between the visual rate after spray method of infection and the same rate after infection using the corn stalk (r=0.70**). The lowest correlation was observed between the visual rate and % of FHB damaged kernels under conditions of natural infection. Among the studied genotypes significant differences in resistance to FHB were observed under all conditions of infection using both disease ratings. Lines 7976/09 and Bc 7945/09 were selected for release and Bc 6119/09 as the resistance donor for future breeding purposes.

Key words: artificial infection, head scab, winter wheat

Investigations of some quantitative traits in autochthonous tobacco varieties in Republic of Macedonia

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Summary

Investigations were carried out with five autochthonous tobacco (*Nicotiana tabacum* L.) varieties of the types Prilep (P 10-3/2 and P 12-2/1), Djebel (Dj No1) and Yaka (YK 7-4/2 and KY), to study their quantitative traits: height of the stalk with inflorescence, number of leaves and dry mass yield per stalk. The trial was set up in the Experimental field of Tobacco Institute-Prilep in 2011 and 2012, in randomized block design with four replications. Traditional cultural practices were applied for realization of the experiment. The aim of investigations was to evaluate the variability of the above quantitative traits typical for the autochthonous varieties by the use of biometric analysis and to give directions for their maintenance in future. The significant differences observed among the traits of investigated varieties indicate that they are different cultivars. No significant differences were observed between the two years of investigation, which is an indication of highly heritable traits. Statistical parameters of variability are low, which is an indication of stable and homozygous genotypes, adapted to agro-ecological conditions of the region. Results on the standard deviation and variability coefficient were lower in 2012, because the seed sawn in this crop was obtained from one stalk for each variant isolated in 2011. The lowest statistical data on variability of stalk height and leaf number in both years were recorded in the varieties of Prilep tobacco, and for dry mass yield in the Yaka variety KY.

Key words: tobacco (*Nicotiana tabacum* L.), autochthonous varieties, quantitative traits, standard deviation, variability coefficient

Adaptabilnost pšenice na klimatske promjene

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Sažetak

Klimatske promjene imaju značajan utjecaj na prirodne i umjetne agroekosustave. Stoga je potrebno postaviti nove zahtjeve i pristupe u području oplemenjivanje bilja te strategiji razvoja i očuvanja bioraznolikosti. Približno 20% cjelokupne proizvodnje hrane za ljudsku ishranu oslanja se na pšenicu, koja se uzgaja na oko 216 miliona hektara u svijetu. Tijekom 30 godina vidljiv je vrlo velik napredak u oplemenjivanje pšenice, posebice u pogledu uroda i kvalitete te učinkovitog iskorištenja njene genetske različitosti. Imajući u vidu plastičnost i veliku važnost pšenice u ljudskoj ishrani i industriji hrane sa sigurnošću se može reći da pšenica zadržati svoju dominantnu ulogu kako u hrvatskoj tako i u europskoj poljoprivrednoj proizvodnji. Danas su oplemenjivači suočeni sa problemom sve češćih klimatskih promjena. Kako bi bili uspješni u predviđanju svojstava u pšenice koja bi mogla biti vrlo važna u sljedećih 15 do 25 godina, informacije o klimatskim promjenama u bliskoj budućnosti su od velike važnosti. Istraživanja o klimatskim promjenama upućuju na korelaciju između fenotipa i genotipa, a jedna od najvažnijih svojstava koja su najviše pogođena takvim promjenama, posebice sušom, su urod i kvaliteta. Vrlo velik broj svojstava pšenice (visina, datum klasanja, osjetljivost na fotoperiodizam, tip rasta, masa zrna, itd.) imaju različitu razinu otpornosti na sušu. Aktualni istraživački trendovi su usmjereni ka razvoju funkcionalnih markera za željena svojstva koja su povezana s adaptabilnosti pšenice na nove klimatske izazove.

Ključne riječi: pšenica, adaptabilnost, klimatske promjene, funkcionalni markeri

Wheat adaptability to climate change

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Summary

Climate variability has a fundamental influence on natural and artificial agro-ecosystems. That demands new approaches both in the plant breeding and in the strategy and policies of biodiversity conservation. Around 20% of human food productions relays on wheat. This staple crop grows on 216 million hectares of arable area worldwide. During the last 30 years huge progress has been made in winter wheat breeding. The improvement is mainly due to the efficient use of wheat genetic diversity. Regarding the wheat plasticity and importance in human food consumption and industry there is a great certainty that wheat will keep its dominant role in Croatian and European agriculture because its adaptability and consumers acceptance. Breeders are now faced with rapidly changing climate. Information regarding climate conditions in near future might as well in the next decade is essential for predicting targeted traits in wheat that might be important in 15-25 years. Climate change studies dealing with wheat adaptability are pointing towards correlations between phenotype and genotype. The most important traits that are affected with climate changes such as drought are yield and quality. Considerable number of wheat traits (plant height, heading date, response to photoperiod, grow habit, grain weight etc.) have different level of influence on drought tolerance. Current global research trend is directed toward development of functional markers for the traits connected with wheat adaptability to new climate challenges.

Key words: wheat, adaptability, climate change, functional markers

Utjecaj okoline na prinos zrna novih OS hibrida kukuruza

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Sažetak

Jedan od ključnih čimbenika u prihvaćanju novih hibrida kukuruza visokog genetskog potencijala rodnosti čijom sjetvom bi poljoprivredna gospodarstva mogla ostvariti veće prihode je poznavanje reakcije novih hibrida na različite okolinske uvjete tijekom rasta i razvoja. Cilj ovog istraživanja bio je ispitati reakciju šest novih hibrida kukuruza kreiranih na Poljoprivrednom institutu Osijek na okolinske uvjete deset lokacija sjeverozapadne, središnje i istočne Hrvatske tijekom dvije uzastopne godine istraživanja (2012./2013.) sa svrhom procjene visine i postojanosti njihova prinosa zrna u različitim okolinskim uvjetima. Efekti godine, hibrida i lokacije, kao i interakcija godina x hibrid, godina x lokacija na prinos zrna bili su značajni ($p=0,01$). Prosječan prinos zrna istraživanih hibrida bio je za 2,1 tha^{-1} viši u 2013. godini. Najviše prosječne prinose zrna ostvarila su dva hibrida FAO grupa 350 i 390 (9,2 i 9,4 tha^{-1}). Prosječni prinosi zrna istraživanih hibrida bili su najviši na lokacijama sjeverozapadne i srednje Hrvatske (10,9 tha^{-1} u prosjeku). Rezultati su ukazali na postojanost prinosa zrna novih hibrida kukuruza Poljoprivrednog instituta Osijek u različitim okolinskim uvjetima.

Ključne riječi: kukuruz, hibrid, lokacija, godina, prinos zrna

The influence of environment on the grain yield of new OS maize hybrids

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Summary

One of the key factors in the acceptance of new maize hybrids of high genetic yield potential which planting might increase farmers' incomes is knowledge about new hybrids response to different environmental conditions during growth and development. The aim of this study was to investigate the response of six new maize hybrids created at Agricultural Institute Osijek to environmental conditions of ten sites located in north-west, middle and east Croatia during two consecutive years of investigation (2012/2013) in order to evaluate the height and stability of their grain yields under different environmental conditions. Effects of year, hybrid and location, as well as interactions year x hybrid, year x location on grain yield were significant (p=0.01). The average grain yield of investigated hybrids was for the 2.1 tha^{-1} higher in year 2013. The highest average grain yields had two hybrids of FAO groups 350 and 390 (9.2 and 9.4 tha^{-1}, respectively). Average grain yields of investigated hybrids were highest at three sites located in north-west and middle Croatia (10.9 tha^{-1} on average). The results indicated that the grain yield performance of new maize hybrids created at Agricultural Institute Osijek was stable under different environmental conditions.

Key words: maize, hybrid, location, year, grain yield

Varijabilnost albuminskih lokusa pšenice

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Sažetak

Albumini i globulini se svrstavaju u neprolaminske bjelančevine endosperma zrna pšenice čine ukupno 15-20% ukupnih bjelančevina. Albumini su topivi u vodi, dok su globulini topivi u otopinama soli. Smatra se da imaju bolju nutritivnu vrijednost aminokiselina, posebice veći sadržaj lizina i metionina, u usporedbi s ostalim bjelančevina zrna pšenice. Značajno utječu na reološka svojstva pšeničnog brašna, tako neki albumini velike molekularne mase (HMW Alb) i određeni globulini imaju funkciju skladišnih bjelančevina formirajući disulfidnim vezama dio glutenskog kompleksa. Istraživanja varijabilnosti albuminskih lokusa provedena su na 50 sorti heksaploidne ozime pšenice (*Triticum aestivum* ssp. *vulgare* L.) priznatih u Republici Hrvatskoj. Utvrđivanje i albuminskih kompozicija na lokusima Alb-1 i Alb-2 provedena je prema BSA vodiču za elektroforezu pšenice koristeći PAGE pH 8,9 metodu, dok je identifikacija podjedinicana navedenim albumiskim lokusima napravljena usporedbom sa standardnim sortama primjerima prema UPOV TG/3/11. Statistička obrada podataka obavljena je uporabom programa NTSYS ver.2.2. Najzastupljenija kombinacija podjedinica na lokusima Alb-1 i Alb-2 bila je 87+90+92+94 s frekvencijom od 36% dok su u frekvenciji od 2 % bile zastupljene podjedinice 88+90, 87+95+97, 90+95+97 i 85+92+94+95+97. Prosječna genetska različitost (He) i PIC vrijednost je bila veća na lokusu Alb-1.

Ključne riječi: varijabilnost, ozima pšenica, UPOV, albumini

Variability of albumin loci in wheat

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Summary

The non-prolamin proteins; albumins and globulins of wheat, comprises 15-20% of total wheat flour proteins. Albumins are soluble in water and globulins are soluble in salts; and are considered to have nutritionally better amino acid compositions (higher lysine and methionine contents) as compared to the rest of the proteins in the wheat grain. Some of the higher molecular mass albumins (HMW Alb) and certain globulins have significant influence rheological quality of wheat flour as storage protein function of glutenin complex by forming disulphide bonds. Total of 50 hexaploid winter wheat varieties (*Triticum aestivum* ssp. *vulgare* L.) registered in Croatia was used in this study. Determination of albumin composition on Alb-1 i Alb-2 loci was conducted according to BSA guidelines for wheat electrophoresis using PAGE pH 8.9 method. Identification of albumin subunits was performed in comparison with standard example varieties by UPOV TG/3/11. Statistical analysis was performed using NTSYS ver.2.2. Most abounded albumin subunit on Alb-1 and Alb-2 loci was 87+90+92+94 with frequency of 36% while subunits 88+90, 87+95+97, 90+95+97 and 85+92+94+95+97 were present in only 2% of wheat germplasm. Highest average genetic diversity (He) and Pic values was estimated for Alb-1 loci.

Key words: variability, winter wheat, UPOV, albumins

Antimicrobial Activity of Walnut and Effect of Health

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Summary

The walnut tree (*Juglans regia* L.) is quite widespread in Turkey. Walnuts are grown naturally in almost all over Turkey suitable climate and geographic conditions for growth. Green husks and leaves are important part of walnut, because of their high antioxidative and antimicrobial activity. Phenolic compounds such as vanillic acid, catechin, caffeic acid, chlorogenic acid, juglan are demonstrated to contribute the overall antioxidant activity of the green husks and leaves of walnut. Also phenolic compounds possess antimicrobial activity, especially juglan. Methanol extracts of walnuts green husks and leaves are demonstrated high antimicrobial activity against bacteria, fungi etc. Furthermore, walnuts have been used widely and contain nutritive compounds with beneficial effects on human health. Walnut is very rich especially in protein, carbohydrate and oil contents. It is considered a good source of dietary minerals especially potassium, magnesium, calcium. The walnuts health benefits include cholesterol lowering, reducing inflammation and improving arterial function.

Key words: walnut, antimicrobial activity, health

Ukupni polifenoli i ukupni flavonoidi u OS linijama soje

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Sažetak

Zrno soje (*Glycine max* (L.) Merr.) ima važnu ulogu u ljudskoj i životinjskoj prehrani zbog svog sadržaja ulja, bjelančevina, oligosaharida i sekundarnih metabolita – između ostalih, fenolnih spojeva i flavonoida. Fenolni spojevi su poznati aktivni antioksidansi sposobni neutralizirati slobodne radikale. Izoflavoni su glavne komponente flavonoidne grupe povezani s brojnim dobrobitima za ljudsko zdravlje kao što su prevencija raka, kardiovaskularnih bolesti, osteoporoze i simptoma menopauze. Cilj ovog istraživanja je odrediti sadržaj ukupnih polifenola i ukupnih flavonoida 33 genotipa soje (elitne linije i kultivari) koji su uzgojeni 2010. i 2011. godine. Istraživani genotipovi su razvijeni u sklopu oplemenjivačkog programa Poljoprivrednog instituta Osijek (Osijek, Hrvatska). Količine ukupnih polifenola i ukupnih flavonoida su određene spektrofotometrijski pomoću Folin-Ciocalteu, odnosno AlCl3 reagensa. Značajna razlika između kultivara soje nađena je za oba istraživana svojstva. Sadržaj ukupnih polifenola u 2010. godini je bio od 2,338 do 3,227 dok je u 2011. godini bio od 2,155 do 3,164 mg/g u suhoj tvari izraženo kao ekvivalent galne kiseline. Sadržaj ukupnih flavonoida u 2010. godini se kretao od 0,433 do 0,638 a u 2011. godini od 0,428 do 0,578 mg/g u suhoj tvari izraženo kao ekvivalent katehina. Nije postojala značajna razlika u sadržaju ukupnih polifenola i ukupnih flavonoida između godina. Dobiveni rezultati mogu biti korisni za budući oplemenjivački rad na kultivarima soje za poboljšanje nutritivnih i funkcionalnih svojstava zrna soje.

Ključne riječi: soja, zrno, ukupni polifenoli, ukupni flavonoidi

Total phenolics and total flavonoids in OS soybean lines

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Summary

The soybean (*Glycine max* (L.) Merr.) seed has had important role in human and animal nutrition due to its levels of oil, proteins, oligosaccharides and secondary metabolites– phenolic compounds and flavonoids among others. The phenolic compounds are known as active antioxidants able to scavenge free radicals. The isoflavones are the principal compounds of the flavonoid group associated with numerous benefits to the human health like prevention of cancer, cardiovascular diseases, osteoporosis and menopause symptoms. The aim of this study was to evaluate total phenolic content and total flavonoid content of 33 soybean genotypes (elite lines and cultivars) grown in 2010 and 2011 year. Tested genotypes were developed within the soybean breeding program at the Agricultural Institute Osijek (Osijek, Croatia). Total phenolic and total flavonoid quantities of the samples were determined by spectrophotometer using Folin-Ciocalteu and AlCl3 reagents respectively. Significant difference between soybean cultivars for both investigated traits was found. The total phenolic content in 2010 ranged from 2.338 to 3.227 and in 2011 from 2.155 to 3.164 mg/g of dry weight, expressed as gallic acid equivalents. The total flavonoid content in 2010 varied from 0.433 to 0.638 and in 2011 from 0.428 to 0.578 mg/g of dry weight, expressed as catehin equivalents. There was no significant difference in total phenolics and total flavonoids content between grown years. The obtained results may be useful in further breeding work for soybean cultivars for improving nutritional and functional properties of grain.

Key words: soybean, seed, total phenolics, total flavonoids

Testiranje kombinatornih sposobnosti inbred linija i sorti krušne pšenice i kvantitativna analiza heterozisa

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Sažetak

Uz učinkovit sustav muškog steriliteta, jedan od uvjeta za uspješnu eksploataciju heterozisa kod krušnih pšenica (*Triticum aestivum* L.) je germplazma koja može ostvariti nivo heterozisa koji mogu imati hibridne sorte. U toj germplazmi najveći nivo heterozisa može biti ostvaren testirajući kombinatorne sposobnosti. Istraživanje predstavlja statističku analizu kombinatorne sposobnosti i kvantitativne analize heterozisa dvije germplazme krušne pšenice, koje su najzastupljenije u Republici Sloveniji. Testiranje kombinatorne sposobnosti temeljilo se na modelu Linija × Tester, gdje je kvantitativna analiza bazirana na izračunu prosječne vrijednosti obje roditeljske komponente, a u usporedbi s boljim roditeljem i standardnim kultivarom. Statistička analiza kombinatorne sposobnosti i efekta heterozisa uključivala je 42 F1 hibrida, čije je sjeme dobiveno ručnom emaskulacijom šest inbred sorti podrijetlom iz Francuske (6 linija × 2 testera) i 20 F1 hibrida, čije je sjeme proizvedeno kemijskom indukcijom muškog steriliteta na deset inbred linija Poljoprivrednog instituta Osijek (10 linija × 2 testera). Ukupno 42 F1 hibrida testirano je u 2010./11. i 2011./12. godini na Selekcijskom Centru Ptuj, a 20 F1 hibrida u 2011./12. na lokaciji Osijek i Jablje kod Trzina. Rezultati statističke analize ukazuju na potencijal inbred sorti iz Francuske i Poljoprivrednoga instituta Osijek za razvoj komercijalno zanimljivih hibridnih sorti kod krušne pšenice.

Ključne riječi: kombinatorna sposobnost, krušna pšenica, F1 hibrid, germplazma, heterozis

Combining ability testing of inbred varieties and inbred lines of common wheat and quantitative analysis of heterosis

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Summary

In addition to the effective male sterility induction system, one of the conditions for successful exploitation of heterosis in common wheat (*Triticum aestivum* L.) is germplasm, which »conserves« the level of heterosis that can be achieved by hybrid varieties. In the given germplasm the highest level of heterosis can be achieved by testing the combining ability. The study represents the statistical analysis of combining ability and quantitative analysis of heterosis in two germplasms of common wheat that are most commonly found in the Republic of Slovenia. The testing of combining ability was based on the Line × Tester model, whereas the quantitative analysis was based on the calculation of the average value of both parental components, on the comparison with a better parental component and on the comparison with a standard cultivar. The statistical analysis of combining ability and the effect of heterosis includes 42 F1 hybrids, whose seed was obtained by hand emasculation of six inbred varieties of French breeders (6 lines × 7 testers) and 20 F1 hybrids the seed of which was produced with chemical induction of male sterility in ten inbred lines of the Agricultural Institute Osijek (10 lines × 2 tester). The testing of 42 F1 hybrids took place in seasons 2010/11 and 2011/12 at the Selection Centre Ptuj, while the testing of other twenty F1 hybrids took place in the 2011/12 season on locations in Osijek and Jablje near Trzin. The results of the statistical analysis have shown that inbred varieties of French breeders and inbred lines of the Agricultural Institute Osijek show the potential for the development of commercially interesting hybrid varieties of common wheat.

Key words: combining ability, common wheat, F1 hybrid, germplasm, heterosis

Fatty acid composition of promising walnuts (*Juglans regia* L.) genotypes selected from Cankiri

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Summary

In this selection survey we selected walnut types with superior properties of fatty acid composition among the population of seedling walnut trees in Cankırı location. Fruit samples were collected individually from 64 trees. Results of the study are selection of 8 promising walnut types. The total oil content of selected types varied from 43.16 to 58.68%. The range of fatty acid contents in the fruits were also determined and ranged between 50.83% -60.77% for linoleic acid, 16.14% and 26.44% for oleic acid, 5.42% and 7.29% for palmitic acid, between 11.08% -14.25% for linoleic acid and for stearic acid between 1.70% - 2.55%, respectively.

Key words: walnuts, Turkey, oil content, fatty acid

Usporedba četiri tehnike inokulacije klipa kukuruza sa *Fusarium verticillioides*

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Sažetak

Trulež klipa uzrokovana patogenom *Fusarium verticillioides* jedna je od najznačajnijih bolesti klipa kukuruza danas, a veća pažnja posvećena joj je nakon otkrića mikotoksina fumonizina koje proizvodi. Oplemenjivanje na otpornost je najučinkovitiji način zaštite od ove bolesti. Cilj istraživanja bio je provjera pouzdanosti vlastite tehnike inokulacije zrna sa F. verticillioides te usporedba sa tri standardne tehnike inokulacije. Vlastita tehnika simulira ozljede klipa od kukuruznog moljca koji je najznačajniji vektor ove bolesti. Kroz dvije godine ispitano je šest komercijalnih hibrida kukuruza i četiri tehnike inokulacije. Dobivene su značajne razlike u stupnju otpornosti u rasponu od 1,1 do 2,9 (2012.) te od 1,0 do 3,2 (2013.). Najbolji raspon ocjena dala je tehnika inokulacije veterinarskom brizgaljkom od 1,5 do 2,9 (2012.) te od 2,1 do 3,2 (2013.), a najslabiji raspon imala je spray tehnika od 1,1 do 1,3 (2012.) od 1,0 do 1,4 (2013.). S obzirom da je pokus izveden na hibridima ocjene nisu prelazile ocjenu 3,2, što je i očekivano.

Ključne riječi: kukuruz, *Fusarium verticillioides*, umjetna infekcija, trulež klipa

Comparison of four techniques of artificial inoculation of maize ear with *Fusarium verticillioides*

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Summary

Ear rot caused by *Fusarium verticillioides* is one of the most significant diseases of maize now days and great attention was given to after discovery of fumonisins that this pathogen produces. Maize breeding represents the most efficient way of protection against this disease. Objective of this research was testing of reliability of our own inoculation technique with *F. verticillioides* and to compare own technique with three standard techniques of inoculation. Our own technique simulates damage caused by European corn borer which is the most important vector of this disease. During two years six commercial hybrids and four inoculation techniques were tested. Significant differences in degree of resistance were found and they ranged from 1.1 to 2.9 (2012) and from 1.0 to 3.2 (2013). The largest range was obtained in inoculation with veterinary syringe from 1.5 to 2.9 (2012) and from 2.1 to 3.2 (2013). The smallest range was obtained from spray technique from 1.1 to 1.3 (2012) and from 1.0 to 1.4 (2013). Regarding that this experiment was conducted on hybrids grades were not greater than 3.2 as it was expected.

Key words: maize, *Fusarium verticillioides*, artificial inoculation, Fusarium ear rot

Book of Abstracts

Vegetable Growing, Ornamental, Aromatic and Medicinal Plants

04

Povrćarstvo, ukrasno, aromatično i ljekovito bilje

Zbornik sažetaka

The effect of grafting method on the dry matter partitioning and stand establishment rate of grafted cucumber seedlings under saline conditions

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Summary

The objective of investigation was to better understand the influence of grafting method on the dry matter and stand establishment rate to cucumber (*Cucumis sativum*) seedlings under saline conditions. Cucumber variety (Ekron F1) was grafted onto a commercial rootstocks (*Cucurbita maxima* x *C. moschata*). Splice grafting (SG) and root pruning splice grafting (RPSG) were simultaneously applied. Additionally, non-grafted (NG) seedlings were grown as control. Two weeks after grafting, an equal number of each experimental unit was transplanted in to 200 cm^3 plastic pots filled with vermiculite. The plants of each group were split in three equal subgroups and irrigated several times with equal amounts of the same nutrient solution (N 100 mgL^{-1}, P mgL^{-1}, K mgL^{-1}), with addition of different concentration of NaCl (0, 50 and 100 mM) for each subgroup. Root, stem and leaf dry matter were recorded, and leaf area of plants was measured successively from randomly selected plants of each experimental plot. The grafting method showed a significant effect on the dry matter partitioning of grafted seedlings. Compared to splice grafted (SG), the root pruned splice grafted (RPSG) seedlings had a much higher value of root, stem and leaf dry matter. RPSG seedlings showed a significantly higher leaf area ratio versus SG seedlings. The dry matter of transplanted seedlings was drastically reduced due to the increase of nutrient solution salinity, but still relatively higher value of dry matter were recorded in case of RPSG and SG compare to NG. RPSG seedlings showed a significantly higher dry matter partitioning, which was in favor of a quick stand establishment of seedling after transplanting.

Key words: salinity, stand establishment rate, leaf area, dry matter, grafting method

Raising production performances and active principles with hypoglycemic effect for *Momordica charantia* L. species by using ecological biostimulation

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Summary

Bitter cucumber (*Momordica charantia* L.) it's a tropical origin species with lots of therapeutic use, being an important source of active principles with anti-diabetes activity. The acclimatization of this species in the west side of Romania was beginning in 2002 in agro-ecological area of Arad. The obtained extract from this species fruits or/and from the whole plant, has proved a remarkable, distinguished hypoglycemic action in diabetic treatment, the active substance with such a properties, peculiarities being "charantine" (a stereo-glycozyd). For the stimulation of the morphological-productive characters of bitter cucumber, in the past two years, we also have studied the influence of accepted bio-stimulation from ecological agriculture. The ecological studied products with a role in inducing and favored fruits raising and development as well as their qualities by content adjustment in dry matter, sugars, proteins, minerals and vitamins are: Revital, Raykat, Razormin, Flovone and Nemagold.

Key words: active principles, hypoglycemic action, bio-stimulation, ecological agriculture

Prinos i kvaliteta paprike na inertnim supstratima

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Sažetak

Cilj istraživanja bio je utvrditi utjecaj supstrata na komponente prinosa kultivara parike zvonolikog ploda. Testirano je pet kultivara (Istra, Madonna, Nikita, Silba i Vedrana) u hidroponskom uzgoju na kamenoj vuni i kokosovim vlaknima te u uzgoju na tlu. Tijekom plodonošenja od 21. lipnja i do 16. listopada provedeno je 13 berbi. Pri svakoj berbi utvrđen je broj plodova, mjereni su masa i prinos tržnih plodova te udio netržnih plodova. U reprezentativnim uzorcima tehnološki zrelih plodova izmjereni su dužina i promjer ploda te debljina perikarpa, a određen je i udio suhe tvari. U hidroponskom uzgoju utvrđen je veći broj (28 do 47) zametnutih plodova paprike po biljci u odnosu na uzgoj na tlu (23 do 30). Testirani kultivari razlikovali su se u masi tržnih plodova koja je varirala od 103 do 109 g. U hidroponskom je uzgoju ostvarena veća masa u odnosu na uzgoj na tlu, osim kod kultivara Vedrana. Navedeno je rezultiralo značajnim razlikama u ostvarenom tržnom prinosu po biljci između testiranih kultivara, supstrata i kombinacija. Najveći tržni prinos je ostvaren uzgojem na kamenoj vuni i bio je 13 % veći od prinosa na kokosovim vlaknima te 30 % veći od prinosa na tlu. Kultivar Istra ističe se udjelom netržnih plodova (> 20 %), dok je kultivar Silba imao najmanji udio netržnih plodova (< 10 %). Najmanji udio netržnih plodova utvrđen je pri uzgoju na tlu. Kod svih testiranih kultivara debljina perikarpa bila je veća od 5 mm, dok je udio suhe tvari bio veći od 7 %.

Ključne riječi: *Capsicum annuum* L., kultivar, kamena vuna, kokosova vlakna, tlo

Yield and quality of bell pepper grown on inert substrates

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Summary

The aim of this study was to determine the effect of the substrate on the yield components of bell pepper cultivars. Five cultivars were tested (Istra, Madonna, Nikita, Silba and Vedrana) grown hydroponically in rockwool and coconut fibers and in soil. During the harvest period from June 21 till October 16, 13 harvests were done. At each harvest the fruits number, weight and yield of marketable fruits, and share of unmarketable fruits were determined. Fruit length and diameter, pericarp thickness and dry matter content were measured in the representative samples of technologically ripped fruits. Hydroponically grown plants produced a higher number (28-47) of fruits per plant compared to the plants grown in soil (23-30). Tested cultivars differed in marketable fruits weight, which varied from 103 to 109 g. Marketable fruit weight was higher in hydroponic than in soil cultivation, except for cultivar Vedrana. As a result, significant differences in marketable yield per plant between the tested cultivars, substrates and their combinations were determined. The highest marketable yield was achieved on rockwool and it was 13% higher than the yield on coconut fibers and 30% higher than the yield on soil. Cultivar Istra had the highest unmarketable fruits share (> 20%), while the cultivar Silba had the lowest one (< 10%). The lowest share of unmarketable fruits was found on soil grown plants. In all the tested cultivars pericarp thickness was higher than 5 mm, while the dry matter content was higher than 7%.

Key words: *Capsicum annuum* L., cultivar, rockwool, cocnut fibers, soil

Effect of crop rotation on yield and weed density for organic red pepper cultivation in Kahramanmaras

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Summary

This study was carried out in order to determine effect of crop rotation on yield and weed density for organic red pepper production in Kahramanmaraş conditions between period of 2004–2008. Continuous pepper, Pepper-Cotton, Pepper-Bean-Cotton and Pepper-Maize-Cucumber-Bean crop rotations were cultivated with organic farming principle for five years and compared with conventional red pepper cultivation on account of yield and yield components. The experiment consisted of 5 applications. Pepper-Bean-Cotton crop rotation was found considerably close to conventional treatment on account of fresh and dried red pepper yield. At the end of experiment yield of dried red pepper obtained from conventional cultivation was 396 kg da^{-1} while from applied organic cultivation in Pepper-Bean-Cotton crop rotation was 382 kg da^{-1}. *Cyperus rotundus* L., *Sorghum halepense* L., *Portulaca oleracea* L. and *Xanthium strumarium* L. were determined as dominant weeds for organic red pepper cultivation in the region. The population of these weeds was 20.50, 3.90, 6.65 and 0.90 in a meter square respectively at the end of the experiment.

Key words: Organic agriculture, crop rotation, red pepper, weed

Effect of soil and foliar boron application on plant growth and yield of broccoli (*Brassica oleracea* L. var. *italica*).

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Summary

This study was conducted to determine the effects of boron (B) on yield and plant growth of broccoli (*Brassica oleracea* L. var. *italica*). A two-year field experiment was carried out in the Department of Horticulture at Ataturk University in Erzurum, Turkey. Two different boron (Boren ($Na_2B_4O_7 \times 10H_2O$) and Trade Boren ($Na_2B_8O_{13} \times 4H_2O$)) fertilizer, two applications (soil and foliar) and five doses (0, 1, 3, 6 and 9 $kg.ha^{-1}$ B) were used in the study. According to the results of two years both of boron application significantly affected the yield, weight of primary and secondary head, head diameter and dry matter when compared to control. As a result, based on the results of the experiment reported here in, the use of boron (soil and foliar treatments) were increased yield and plant growth of broccoli.

Key Words: broccoli, boron, yield, plant growth.

Effects of boron fertilization on red cabbage (*Brassica oleracae* L. var. *rubra*) yield and yield componenets

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Summary

In many parts of the world, boron (B) levels are insufficient for potential production. B deficiency is also widespread in the Anatolia region of Turkey. B deficiency could impact production and quality of red cabbage. A 2-year field experiment was conducted to study yield and quality response of red cabbage to B addition (0, 1, 3, 6 and 9 kg B ha^{-1}). The study result show that the optimum economic B rate (OEBR) for marketable yield, head weight, head diameter, head length, and stem diameter were 5.98 kg ha^{-1}, 5.99 kg ha-1, 5.52 kg ha^{-1}, 6.31 kg ha^{-1}, 5.08 kg ha^{-1} of Boren type fertilizer ($Na_2B_4O_7 \times 10H_2O$) and 5.69 kg ha^{-1}, 5.78 kg ha^{-1}, 5.82 kg ha^{-1}, 5.53 kg ha^{-1}, 8.45 kg ha^{-1} of Trade Boren type fertilizer ($Na_2B_8O_{13} \times 4H_2O$). We conclude that a B addition of 5.5-6.0 kg ha^{-1} is sufficient for quality growth of red cabbage.

Key Words: boron, red cabbage, yield, plant growth.

The characterization of the Hairy (Burr) medic

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Summary

The aim of this study was to determine the morphological characteristics of the annual species Hairy (Burr) Medic (*Medicago polymorpha*) grown in native flora of South-eastern Anatolian region. The annual Medics, including genus Medicago (*Medicago* L.), complete their life cycle in a year. Generally, the annuals naturally grow in the width range of temperatures and growth seasons in Mediterranean countries. The vegetation observations were obtained during flowering period (50%) and the generative observation were during physiological period. The hairy Medic (*Medicago polymorpha*) collected in 25 different ecological and geographical part of South-eastern Anatolia Region was analysed by comparing the morphological structure and diversity. The observations were made using sixteen morphological and botanical characters. The highest plant height was determined 103 cm (Kurtalan Erdurağı-Magrip/Siirt). Number of main branches per plant ranged from 1.00 to 4.67 per plant. The weight of green herbage varied between 5.07 g (Siverek-Şanlıurfa) and 18.33 g (Siirt Kezer) per plant. The leaf weight per plant varied from 0.2 g for Eğil/Diyarbakır to 1.8 g (Nemrut's Fountain/Adıyaman). The stem weight per plant ranged from 0.2 g (Silvan/Diyarbakır and Karacadağ/Alatosun village) to 1.8 g (Diyarbakır Dicle dam). The weight of highest fruit (0.058 g) was obtained from Diyarbakır Dicle dam. Coleoptile length ranged from 10.71 to 18.60 mm and the lowest value was determined from Diyarbakır Eğil.

Key words: *Medicago polymorpha*, morphological characteristics

Changes in major physiocochemical components of cantaloupe melones during post-harvest storage

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Summary

Cantaloupe melons (*Cucumis melo* L. subsp. *melo* var. *cantalupensins* Naudin) cv. 'Chianti' were evaluated for quality traits during 14 days of storage at three different temperatures i.e., 2, 10 and 18ºC with 85-95% relative humidity. The weight loss of fruits slightly increased during the stored period studied, as well as insignificant differences between the temperatures. Whereas significant texture was lost more rapidly in the samples stored at 18ºC and 10ºC than those stored at 2ºC. TSS were also affected by storage time and temperature. The TSS (total soluble solids) content of fruit at 2ºC increased and then remained constant over storage. At higher temperatures and at every stage of storage time TSS increased as storage time increased. The predominant carotenoid in all samples was β-carotene. The carotenoids components were increased and then decreased with the time; however, the decrease processes were delayed by low temperature. The alpha form was the predominant tocopherol fraction. The level of tocopherol isomers significantly (α-tocopherol) and gradualy (γ- and δ- tocopherol) increased during the 7 days, but after 1st week of storing for all isomers a significant decrease was measured. High temperature storage at 18ºC in comparison to 10ºC and 2ºC promoted γ- and δ- tocopherol level.

Keywords: Cantaloupe melons, storage, weight loss, texture, soluble solids, carotenoids, tocopherols

Prešanje i superkritična ekstrakcija ulja iz sjemenki *Camelina sativa*

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Sažetak

U ovom istraživanju ispitano je sljedeće: (i) utjecaj procesnih parametara hladnog prešanja sjemenki *Camelina sativa* na iskorištenje i kvalitetu ulja; (ii) utjecaj dodataka šest prirodnih antioksidanasa na oksidacijsku stabilnost *Camelina Sativa* ulja te (iii) mogućnost potpunog iskorištenja ulja koje zaostaje u pogači nakon prešanja pomoću superkritičnog CO_2 u novo projektiranom i izrađenom uređaju za ekstrakciju superkritičnim fluidima. Metoda odzivnih površina korištena je kako bi se odredio utjecaj temperature, frekvencije i veličine otvora za pogaču u procesu prešanja na iskorištenje i kvalitetu ulja. Optimalni uvjeti prešanja u ispitanom rasponu eksperimentalnih varijabli dobiveni su pri temperaturi 52 °C, frekvenciji 20 Hz i upotrebom veličine otvora za pogaču od 9 mm. Eksperimentalno dobivene vrijednosti slažu se sa modelom predviđenim vrijednostima, što upućuje na činjenicu da je metoda odzivnih površina uspješno primjenjena u procesu hladnog prešanja ulja. Dobiveno ulje odlikuje se visokom kvalitetom na što upućuju mali postotak vlage, netopljivih nečistoća, slobodnih masnih kiselina, nizak peroksidni i anisidinski broj. Ekstrakt ružmarina Oxy´Less CS u koncentraciji 0.3% pokazao je najbolje antioksidacijsko djelovanje u zaštiti ulja od oksidacijskog kvarenja. U ovom radu je pokazano da je moguće konstruirati uređaj za ekstrakciju superkritičnim fluidima cjenovno puno jeftinije od komercijalnih sustava prisutnih na tržištu. Također je moguće gotovo potpuno ekstrahirati ulje koje zaostaje u pogači pomoću CO_2 u novo izrađenom uređaju.

Ključne riječi: *Camelina sativa* ulje, hladno prešanje, oksidacijska stabilnost, ekstrakcija superkritičnim CO_2, metoda odzivnih površina

Pressing and supercritical CO_2 extraction of oil from *Camelina sativa* seeds

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Summary

The objectives of this work were threefold: (i) to investigate the effects of process parameters during the screw pressing of *Camelina sativa* seeds on the oil recovery and oil quality; (ii) to investigate the influence of six different natural antioxidants on the oxidative stability of *Camelina sativa* oil and (iii) to recover the residual oil from press cake using supercritical CO_2 in the new designed and built homemade supercritical fluid extraction system. In pressing experiments, the response surface methodology was conducted in order to study the effects of temperature, frequency and nozzle size on oil recovery and quality parameters. The optimal condition to obtain the highest oil recovery and the best oil quality within the experimental range was at temperature of 52 °C, frequency of 20 Hz and using nozzle of ID 9 mm. The experimental values agreed with those predicted, thus indicating suitability of the used models and the success of response surface methodology in optimizing the pressing conditions. Obtained camelina oil indicated desirable quality as it had very small percentages of moisture, insoluble impurities, free fatty acids, low peroxide and p-anisidine value. The rosemary extract Oxy.Less CS in concentration of 0.3% was the most effective in protecting the oil from oxidative deterioration. This study also showed that was possible to design and build a supercritical fluid extraction system low cost compared to similar commercial systems and the residual oil in press cake was almost totally extracted with CO_2 in this homemade system.

Key words: *Camelina sativa* oil, screw pressing, oxidative stability, supercritical CO_2 extraction homemade system, response surface methodology

Morfološka pokazatelji razvoja lukovice ozimog slavonskog češnjaka u različitim uvjetima uzgoja

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Sažetak

Češnjak (*Allium sativum* L.) postaje sve značajnija povrćarska kultura jer posjeduje značajna antioksidativna svojstva te sadrži niz aktivnih tvari i vitamina koji blagotvorno djeluju na ljudski organizam poboljšavajući imunološki sustav. Nadalje, češnjak je sastavni dio važnih autohtonih tradicionalnih hrvatskih proizvoda koji će postati ili jesu brend na domaćem i stranom tržištu. Kontinentalna Hrvatska je pogodna za proizvodnju češnjaka, a pogotovo lokalnih domaćih ozimih ekotipova koji se dobro i dugo skladište te imaju visoke prinose lukovice. Cilj istraživanja bio je utvrditi morfološke pokazatelje ozimog slavonskog češnjaka u različitim uvjetima uzgoja. Istraživanje je provedeno na tri ekotipa slavonskog ozimog češnjaka uzgajanih na konvencionalan način sadnjom češnjeva te uzgojem iz presadnica dobivenih in vitro. Na uzorcima pojedinog ekotipa i načina uzgoja utvrđeni su ukupna masa češnjeva, masa glavice češnjaka te broj češnjeva po glavici. Prema LSD testu utvrđena je statistički značajna razlika ($P \geq 0,05$) u ukupnoj masi češnjaka i masi glavice koja je bila i pod značajnim utjecajem varijante uzgoja. Broj češnjeva je također bio pod značajnim utjecajem varijante te je utvrđena statistički značajna razlika ($P \geq 0,05$) između svih pojedinih ekotipova. Možemo zaključiti da komponente prinosa istog ekotipa nisu značajno razlikovale ovisno o uvjetima uzgoja te da se uzgojem češnjaka iz *in vitro* presadnica dobiva jednako kvalitetan proizvod.

Ključne riječi: ekotip, *Allium sativum* L., *in vitro* presadnica

Morphological indicators of bulb development of winter slavonian garlic under different growing conditions

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Summary

Garlic (*Allium sativum* L.) is becoming increasingly important vegetable crop because it contains significant antioxidant properties as well as a great number of active ingredients and vitamins that are beneficial to the human body by enhancing the immune system. Furthermore, garlic is an integral part of important indigenous traditional Croatian products that are or will become a brand in the domestic and foreign markets. Continental Croatia is suitable for garlic production and especially for local domestic winter ecotypes that are characterized by long term storage and high yield bulbs. The aim of the study was to determine the morphological characteristics of winter slavonian garlic under different growing conditions. The study was conducted on three ecotypes of slavonian winter garlic conventionally grown by planting cloves and by planting in vitro garlic seedlings. Total weight of cloves, weight of garlic bulbs and number of cloves per bulb were determined on samples of each ecotype and cultivation method. The LSD test showed statistically significant difference ($P \geq 0.05$) between ecotypes in the total weight and the weight of garlic bulbs that was also under significant influence of cultivation method. Number of cloves has also been influenced by ecotypes ($P \geq 0.05$). We can conclude that the yield components of the same ecotype didn't differed significantly depending on growing conditions and that by the cultivation of garlic *in vitro* seedling we can get the same quality product.

Key words: ecotype, *Allium sativum* L., in vitro seedling

Uspostava katastra zelenila – primjer zadarskog poluotoka

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Sažetak

Katastar zelenila predstavlja suvremeni način prikupljanja, pohrane i vizualizacije podataka gradskog zelenila u GIS okružju. Takav pristup podrazumijeva uspostavu prostorne baze podataka, s lokacijskim i atributnim elementima. Na taj način svako stablo, grm ili druga zelena površina postaju geoobjekt na digitalnoj interaktivnoj karti s pratećim opisnim podatcima kao što su: vrsta, visina, širina krošnje, starost, oštećenja, potreba za intervencijom i sl. Cilj uspostave katastra zelenila na dijelu gradskih zelenih površina u gradu Zadru je evidentiranje postojećeg stanja vegetacije te stvaranje inicijalne baze podataka koja će se, po potrebi, proširivati novim geoobjektima ili njihovim atributima. Konačan rezultat uspostave baze podataka bit će njihova vizualizacija u WebGIS okružju. Ovakav način upravljanja gradskim zelenilom je efikasniji, ekonomičniji te omogućava trenutačan uvid u informacije o zelenilu, bez obzira radi li se o upravitelju ili nekom drugom korisniku gradskog zelenila.

Ključne riječi: katastar zelenila, upravljanje zelenilom, GIS, Zadar, Hrvatska

Establishing the cadaster of green space – the example of Zadar peninsula

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Summary

The cadaster of green space represents a contemporary way of gathering, saving and visualizing data on city's green space in a GIS environment. Such approach requires the establishment of spatial database, with referential locational and attribution elements. This way, every tree, bush or any other green space becomes a geo-object in a digital interactive map, together with corresponding description data such as: flora, height, treetop width, age, damage, intervention requirements etc. The aim of establishing the cadaster of green space in the city of Zadar is to create a record of the current state of vegetation, and to create an initial database that could be upgraded by new geo-objects or attributes as needed. The final result of establishing such a database will be the visualization of its features in the WebGIS environment. Such way of managing the city's green space is more effective, economically more practical and it enables an immediate insight into information regarding green surfaces, whether the person using the data is a manager or another user of the city's green space.

Key words: cadaster of green space, green spaces management, GIS, Zadar, Croatia

Utjecaj inertnog supstrata i gustoće sjetve na prinos koprive u plutajućem hidroponu

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Sažetak

Kopriva je samonikla, višegodišnja biljka, koja je posljednjih godina prepoznata kao vrlo perspektivna i višenamjenska biljna vrsta. Sakupljanjem iz prirodnih staništa ubire se materijal promjenjive i neprovjerene kvalitete, zbog čega je koprivu potrebno uzgajati u kontroliranim uvjetima. Primjenom suvremenih hidroponskih tehnologija uzgoja može se postići ujednačena kvaliteta biljnog materijala. U istraživanju provedenom 2012. godine kopriva je uzgajana u plutajućem hidroponu u negrijanom zaštićenom prostoru. Sjetva u polistirenske ploče ispunjene inertnim supstratima (perlit, vermikulit) provedena je 6. rujna. Testirane su tri gustoće sjetve: 0,2, 0,5 i 0,9 g m^{-2}. Pokus je postavljen po metodi slučajnog bloknog rasporeda u 3 ponavljanja. Ostvarene su dvije košnje zelene nadzemne mase, pri čemu je proizvodni ciklus od sjetve do prve košnje trajao 47 dana, dok je druga košnja bila 38 dana nakon prve. U prvoj košnji signifikantno veći prinos postignut je uzgojem koprive u vermikulitu (0,9 kg m^{-2}), u odnosu na perlit (0,3 kg m^{-2}). U drugoj košnji nisu utvrđene značajne razlike između supstrata, kao ni između gustoći sjetve, dok je njihova interakcija statistički opravdana. Najveći prinos (0,4 kg m^{-2}) ostvaren je kombinacijom vermikulit × 0,2 g m^{-2}, a najmanji (0,3 kg m^{-2}) u kombinaciji perlit × 0,5 g m^{-2}. Prva od njih može se preporučiti za uzgoj koprive u plutajućem hidroponu.

Ključne riječi: *Urtica dioica* L., hidroponski uzgoj, perlit, vermikulit, košnja koprive

The influence of inert substratum and sowing density on nettle yield in floating hydropon

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Summary

Stinging nettle is a wild, perennial plant which has been recognized as a promising and multifunctional plants species. Because of variable and unverified quality of plant material collected from natural habitats it is necessary to grown nettle in controlled conditions. Consistent quality of plant material can be achieved by modern hydroponic technology. In a study conducted in the year 2012 the nettle was grown in floating hydroponic system in unheated greenhouse. Sowing in polystyrene trays, filled with inert substrata (perlite, vermiculite), was conducted on September 6. Three sowing densities: 0.2, 0.5 and 0.9 g m^{-2} of seed were tested. The trial was laid out according to the randomized block scheme with three replications. Two harvests of green mass were realized. The production cycle from sowing to the first harvest lasted 47 days, and the second harvest was conducted after next 38 days. Significantly higher yield in the first harvest was achieved with nettles grown in vermiculite (0.9 kg m^{-2}) compared to perlite (0.3 kg m^{-2}). In the second harvest there were no significant differences between substrata, as well as between sowing densities, while their interaction was considerable. The highest yield (0.4 kg m^{-2}) was achieved by combination of vermiculite × 0.2 g m^{-2} of seed, and the lowest (0.3 kg m^{-2}) in combination perlite × 0.5 g m^{-2}. The first of them can be proposed for nettle growing in floating hydroponic.

Key words: *Urtica dioica* L., hydroponic technology, perlite, vermiculite, harvest

Revitalizacija biljaka tipičnih za renesansu u Arboretumu Hrvatske akademije znanosti i umjetnosti u Trstenom

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Sažetak

Arboretum Hrvatske akademije znanosti i umjetnosti sa svojim povijesnim perivojima spada u jedno od najvrednijih djela krajobrazne arhitekture na području Republike Hrvatske. Afiniteti pojedinih biljnih vrsta za hranivima značajno se razlikuju, a za njihovo usvajanje presudnu ulogu ima reakcija tla. Cilj istraživanja bio je utvrditi biljke koje pripadaju renesansnom razdoblju te koliki je intenzitet fizioloških poremećaja-kloroza prvenstveno koristeći model reakcije tla (A-E) i vizualne ocjene (0-5). Za ovo istraživanje odabrano je pet biljnih vrsta: slatka naranča (*Citrus sinensis*), vinova loza (*Vitis vinifera*), maslina (*Olea europaea*), šimšir (*Buxus sempervirens*) i lovor (*Laurus nobilis*). Na odabranim mikrolokacijama uzeti su prosječni uzorci tla na dvije dubine (0-30 i 30-60 cm) u širini krošnji triju biljaka svake biljne vrste. Rezultati istraživanja ukazuju na loše stanje ishranjenosti odnosno loš izgled biljaka koje je u najvećoj mjeri posljedica visoke reakcije tla. Provedeno istraživanje i rezultati ukazuju na nužnost multidisciplinarnog pristupa u obnovi povijesnih perivoja, te da pri odabiru biljaka treba voditi računa o afinitetima pojedinih biljnih vrsta prema reakciji tla.

Ključne riječi: Arboretum Trsteno, biljke renesansa, reakcija tla, obnova povijesnih perivoja

Revitalisation of the typical plants for the Renaissance period in Arboretum of the Croatian Academy of Sciences and Arts in Trsteno

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Summary

Arboretum of the Croatian Academy of Sciences and Arts with its historic gardens is considered to be one of the most valuable works of landscape architecture in Croatia. Individual plants have different requirements for nutrients, whilst the interaction with soil reaction plays an important role in their development. It is therefore imperative to determine the plants whose origin is from the Renaissance period, and how severe is the intensity of physiological damage –chlorosis, which will be determined by mainly using soil reaction model (A-E) and visual evaluation (0-5). Five plant species were chosen for this experiment: sweet orange (*Citrus sinensis*), grape vine (*Vitis vinifera*), olive tree (*Olea europaea*), common box (*Buxus sempervirens*) and bay tree (*Laurus nobilis*). Average soil samples were taken at two depths (0-30 and 30-60 cm) on chosen microlocations under the area of the tree crown of three specimens of every plant species. The study results point to the poor status of nutrients and poor appearance of plants largely due to high soil reaction. Conducted research and the results indicate the necessity of the multidisciplinary approach in the restoration of historical gardens, and that in choosing plants the preferences of individual plant species to soil reaction should be taken into account.

Key words: Arboretum Trsteno, plants Renaissance, soil reaction, restoration of historical gardens

Projekt Baltazar Grad, Adica u Vukovaru – perivoj budućnosti

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Sažetak

Adica u Vukovaru šuma je na južnoj strani grada smještena uz meandar rijeke Vuke na povišenom položaju s kojeg se vidi grad. Ovaj projekt zamišljen je kao multikulturni centar sa slijedećim sadržajima: Arboretum i botanički vrt profesora Baltazara, podmornica profesora Baltazara, kuhinja profesora Baltazara, Istraživački centar profesora baltazara, planetarij profesora Baltazara, kazalište profesora Baltazara, kino profesora Baltazara, profesor Baltazar i prijatelji, te zabavni park profesora baltazara. Unutar mnoštva događanja u perivoju, gdje posjetitelji pronalaze zabavu ali i uče, te aktivno sudjeluju u organizaciji i odvijanju svih aktivnosti, kao osnova projekta promiče se lik iz poznatog crtića, ali i niz tradicijskih vrijednosti Hrvatske koje posjetitelji nose sa sobom u vidu stečenih znanja. Nositelj projekta je Grad Vukovar, a financiranje za realizaciju će se ostvariti iz EU fondova. Unutar perivoja prikazano je niz izuma obnovljivih izvora energija, baziranih na biljkama i drugim prirodnim obnovljivim izvorima (sunce, podzemne i površinske vode, vjetar). Također je prikazan i Trilet projekt.

Ključne riječi: crtani film, profesor Baltazar, tradicijske vrijednosti, botanički vrt, arboretum

Balthazar City Project, Adica Vukovar - the park of the future

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Summary

Adica, in Vukovar, is the forest in the southern part of the City located along the meander of the river Vuka on the elevated position from which the city can be seen. This project was imagined as a multi-cultural centre with the facilities as follows: Professor Balthazar Arboretum and Botanical Garden, Submarine, Kitchen, Research Centre, Planetarium, a Theatre, Professor Balthazar and friends as well as Professor Balthazar Entertainment Park. Within numerous events occurring in the park where visitors have not only fun, but also learn and actively participate in the organization and conducting all activities there is the famous cartoon character being promoted. Regardless the above mentioned a variety of Croatian traditional values that visitors bring with them in terms of the acquired knowledge are also promoted. The city of Vukovar is the project leader, and funding for implementation will be realized from EU funds. A series of inventions of renewable energy, based on herbs and other natural renewable sources (solar, ground and surface water, wind) were shown within the park. The Trilet project was also shown.

Key words: cartoon, professor Balthazar, traditional values, botanical garden, arboretum

Utjecaj srebrnih nanočestica na antioksidativnu aktivnost u listovima paprike

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Sažetak

Cilj ovog istraživanja je bio utvrditi utjecaj srebrnih nanočestica (AgNP) na antioksidativnu aktivnost u listovima paprike. Istraživanje je provedeno tijekom 2012. godine na Poljoprivrednom fakultetu u Osijeku, Odjelu za biologiju u Osijeku i Institutu za medicinska istraživanja i medicinu rada u Zagrebu. Sjeme paprike Vedrana F1 posijano je tijekom travnja u polistirenske kontejnere u komercijalni supstrat. Tretiranje s dvije različite koncentracije AgNP (0.1 i 1 mg/L) obavljeno je nakon pojave prvog pravog lista zalijevanjem u zonu korijena. Tretman s 0.1 i 1 mg/L srebrnog nitrata ($AgNO_3$) obavljen je radi usporedbe. Listovi paprike su uzorkovani 55 dana nakon sjetve te su pripremljeni za analizu ukupne antioksidativne aktivnosti (UAA), sadržaja vodikovog peroksida, ukupnih fenola i razine lipidne peroksidacije. Statističkom obradom podataka je utvrđeno da je tretman s 1 mg/L AgNP značajno povećao UAA u usporedbi s ostalim tretmanima i kontrolom. Sadržaj vodikovog peroksida bio je najveći u biljkama tretiranih s 1 mg/L AgNP. Najveća razina lipidne peroksidacije zabilježena je kod tretmana s 0.1 mg/L AgNP. Nadalje, najveći sadržaj fenola utvrđen je kod tretmana s 1 mg/L $AgNO_3$. Dobiveni rezultati pokazali su da nanočestićni i ionski oblik srebra značajno utječu na UAA te na pojedine pokazatelje oksidativnog stresa u listu paprike.

Ključne riječi: nanočestice, antioksidativna aktivnost, fenoli, lipidna peroksidacija, paprika

Effects of silver nanoparticles on antioxidative activity in pepper leafs

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Summary

The aim of this investigation was to determine the influence of silver nanoparticles (AgNP) on antioxidative activity of pepper leaf. Research was conducted during 2012th at the Faculty of Agriculture in Osijek, Department of Biology in Osijek and Institute of Medical Research and Occupational Health in Zagreb. Seeds of pepper Vedrana F1 were sown during April in polystyrene containers filled with commercial substrate. Treatment was performed after emergence at the stage of first leaf by watering in root zone with AgNP at concentrations of 0.1 and 1 mg/L. Treatment with the same concentrations of silver nitrate ($AgNO_3$) was done for comparison. Pepper leaves were sampled 55 days after sowing and prepared for determination of total antioxidative activity (TAA), hydrogen peroxide content, total phenolics content and lipid peroxidation rate. Results showed significant increase of TAA in leaves treated with 1 mg/L AgNP. Content of hydrogen peroxide was highest in pepper leaves treated with 1 mg/L AgNP. The highest lipid peroxidation rate was determined in pepper leaves treated with 0.1 mg/L AgNP. The highest content of phenolics was observed in plants treated with 1 mg/L $AgNO_3$. Obtained results showed that AgNP and $AgNO_3$ had significant effects on TAA as well as on some oxidative stress indicators in pepper leaves.

Key words: nanoparticles, total antioxidative activity, phenolics, lipid peroxidation, pepper

Phytochemicals from white mulberry fruits

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Summary

In this study, some selected physico-chemical properties (antioxidant activity, ascorbic acid, fatty acids, fruit color, fruit juice yield, fruit weight, organic acids, pH, total phenolic and total soluble solid contents) of ten mulberry (*Morus nigra* L.) genotypes grown in the Northeast Anatolia region of Turkey was investigated. The total phenolic and antioxidant activity of methanol extract of white mulberry fruits were determined according to Folin-Ciocalteu and β-carotene bleaching method assays, respectively. Fatty acids of mulberry fruits were determined by using gas chromatography. Antioxidant activity of black mulberry genotypes was found between 60% and 71%, which lower than standard BHA and BHT. Regarding organic acid content, malic acid was the most predominant followed by citric acid. The results of the study are helpful for attempting crop improvement in white mulberry for bringing to cultivation.

Key words: *Morus nigra* L., antioxidant activity, ascorbic acid, genotypes

Utjecaj cijepljenja, koncentracije dušika i omjera NO^{3-}:NH^{4+} na prinos i populaciju štetnika rajčice u hidroponu

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Sažetak

Utjecaj cijepljenja i dušika (koncentracije: 75, 140 i 205 mg/l N; omjeri NO^{3-}:NH^{4+}: 92:8, 85:15 i 70:30), na prinos i populaciju nadzemnih štetnika, istraživan je u hidroponskoj rajčici u 2012. i 2013. godini. U pokusima nije zabilježen učinak cijepljenja na ukupni prinos, ali je utvrđen utjecaj metode na gustoću populacije *Bemisia tabaci* i *Tuta absoluta*. Manji broj nimfa *B. tabaci* zabilježen na cijepljenim (podloge Arnold i He-Man) nego na necijepljenim biljkama rajčice ili cijepljenim na vlastiti korijen. Broj mina od *T. absoluta* bio je najmanji na biljkama cijepljenim na podlogu Arnold. U 2012., najmanja masa ploda je utvrđena na biljkama prihranjivanim sa 75 mg/l N. U 2013., broj plodova i ukupni prinos su bili viši na biljkama prihranjivanim otopinom s 8% NH^{4+} u odnosu na biljke prihranjivane otopinom s udjelom NH^{4+} od 30%. Najviša brojnost nimfi *B. tabaci* bila je na biljkama uzgajanim na tretmanu 205 mg/l N, u 2012. godini. Najmanja gustoća nimfalne populacije je zabilježena na biljkama prihranjivanim otopinom s 30% NH^{4+} u 2013. godini. Infestacija minerom *T. absoluta* bila je viša na biljkama uzgajanim na 140 i 205 mg/l N u 2012., kao i na biljkama prihranjivanim otopinom sadržaja 15% NH^{4+} u 2013. godini. Dobiveni rezultati se mogu primijeniti u održivom sustavu zaštite rajčice od navedenih štetnika.

Ključne riječi: Arnold, He-Man, *Lycopersicon esculentum, Bemisia tabaci, Tuta absoluta*.

Effect of grafting, nitrogen rate and ratio of NO^{3-}:NH^{4+} on yield and aerial pests populations in hidroponic tomato

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Summary

Grafting and nitrogen (rates: 75, 140, and 205 mg/l N; and ratios: 92:8, 85:15 and 70:30 of NO^{3-}:NH^{4+}) effect on yield and pests populations was studied in hydroponics tomato during 2012 and 2013. Grafting did not affect total yield but affected populations of *Bemisia tabaci* and *Tuta absoluta*, in both experiments. The lower number of *B. tabaci* nymphs was recorded on grafted (rootstocks cv. Arnold or He-Man) than on self or non-grafted plants. The number of *T. absoluta* mines was the lowest on plants grafted on cv. Arnold. The lowest fruit mass was recorded on plants fertigated with 75 mg/l N in 2012. In 2013, number of fruits and total yield was higher on plants supplied with 8% NH^{4+} than on plants supplied with 30% NH^{4+} in nutrient solution. *B. tabaci* nymphs were the most numerous on plants grown at 205 mg/l N in 2012. The lowest nymphs population inhabited plants supplied with 30% NH^{4+} in 2013. *T. absoluta* infestation was higher on plants grown at 140 and 205 mg/l N in 2012 as on plants supplied with 15% NH^{4+} in 2013. Results could be applied in sustainable tomato pests management.

Key words: Arnold, He-Man, *Lycopersicon esculentum*, *Bemisia tabaci*, *Tuta absoluta*.

Book of Abstracts

Field
Crop
Production

05

Ratarstvo

Zbornik sažetaka

Study some of potato cultivars, regarding to the leafy surface, root and stem (*Solanum tuberosum* L.)

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Summary

Eleven potato cultivars (Sinora, Faluka, Ambition, Arnova, Zafira, Exelent, Mantiou, Rudolph, Marlen, Ambassador and Condor) were studied during the vegetation in 2012. Research were conducted in Peja (Researching Farm / Kosovo Institute of Agriculture) in Dukagjini Plain. Potato cultivars who are involved in research are dedication for fresh consumption and industrial processing.For planting we used a quality seed, Class A, imported from Netherland (AGRICO). Fields are planted in four repetition according to the system plan completely random (PPRB) on the block, with four rows for each cultivar and repeated use. We tested the properties as follows: determination of the vegetation period; measurement of leaf area; weight of the roots and weight of the stalks after drying; total weight of each plant; bulb (tuber) weight and the participation (in %) of roots, stem and leaves. For each variant and every replication we select 10 plants on which we do the biometric measurements and relevant estimate for indicators provided by scientific methodology. To determination the surface of eaf, we used the leaf weighting methods, where the leaves is cut in circles. Researched cultivars belong to the different vegetation periods ranging from elarly cultivars as Sinora that reaches maturity at 20 to July's and up to Ambition and Exelent as late cultivar, which reaches maturity at 10 September. The difference for the duration of the vegetative period was 53 days. By weight of root system has significant changes, especially Ambassador cultivar has very large changes. Measure surface represented by different stalks and two cultivars have the largest share, namely Rudolf and Ambition.

Key words: potato, root, stalk and cultivation technology.

Testing potato cultivars regarding the content of minerals substance

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Summary

This paper present testing of eleven potato cultivars (Sinora, Faluka, Ambition, Arnova, Zafira, Exelent, Mantiou, Rudolph, Marlen, Ambasadordhe and Kondor) during the vegetation in 2012. Research were conducted in Peja (in Researching Farm / Kosovo Institute of Agriculture) in Dukagjini Plain, testing of the potato samples were conducted in laboratory of Kosovo Institute of Agriculture. For planting we used a quality seed, Class A, imported from Netherland (AGRICO) and after harvest, samples were taken for each treatment. The samples are analyzed in the parameters as follows: ash and mineral nutrient contents (Zn, Cu, Ca, K, Na, Mg and P). Ash content was determined by using infrascan-NIR. Phosphorus content was determined spectrophotometricaly, while remaining tested element were determined by atomic absorption (AAS). Depending on the cultivars, ash contents in potato were in range from 0.790 (cultivar Faluka) to 1.048% (cultivar Kondori). Zinc concentrations were in range from 2.5 Zn mg/kg (cultivar Zafira) to 4.7 Zn mg/kg (cultivar Kondor). Iron concentrations were in range from 10.3 Fe mg/kg (cultivar Ambition) to 16.2 Zn mg/kg (cultivar Mantiou)

Key words: potato, ash, minerals, methods

Kontrola rasta zaperaka duhana kontaktnim sredstvima

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Sažetak

Nakon otkidanja cvata duhana početkom cvatnje, prestaje vršna dominantnost i počinju intenzivnije rasti zaperci iz pazušca vršnih listova. U proizvodnji porast ovih zaperaka spriječava se sredstvima (fiziotropima) kontaktnog i sistemičnog djelovanja. Kontaktni fiziotropi su na bazi alkohola i dehidriraju mlade pupove, a sistemično sredstvo je hidrazid maleinske kiseline (MH_{30}) koji nakon ulaska u biljku spriječava diobu stanica. Pokazalo se da MH_{30} ima štetno djelovanje na zdravlje pušača, pa se neće moći koristiti u proizvodnji duhana. Alternativa je spriječiti rast zaperaka kontaktnim fiziotropima na bazi masnih alkohola. Dozvolu za uporabu ima n-dekanol (F. T.). Svrha ovih istraživanja bila je sljedeća: 1) proučiti porast zaperaka nakon primjene nekoliko kombinacija koncentracije i datuma primjene kontakntog fiziotropa F.K. i 2) ustanoviti koja od proučavanih kombinacija daje najbolje proizvodne rezultate. U pokusu izvedenom na dvije lokacije primjenjeni su tretmani:.1) 2% F.T., 4% F.T., 4% F.T.; 2) 3% F.T., 5% F.T.; 3) 2%F.T., 3% F.T., 16 l/ha MH30. Zaperci su tretirani kad su bili veličine do 2,5 cm.Pri svakom tretiranju korišteno je 500 l/ha vodene otopine određene koncentracije fiziotropa. Tretman br.2 je obzirom na spriječavanje rasta zaperaka imao slično djelovanje kao tretman br.3 kod kojeg je primijenjen i MH_{30}. Sa tretmanom br.2 ostvaren je i najveći prosječni prinos. Ovo upućuje da je sa kontaktnim fiziotropom moguće postići slične proizvodne rezultati kao pri korištenju kombinacije kontaktnog i sistemičnog fiziotropa.

Ključne riječi: duhan, zaperci, kontaktni i sistemični fiziotropi

The control of growth laterals a contact tobacco means

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After topping tobacco, hormonal terminal dominance ceases and, suckers start growing mostly from axils of the top leaves. For stopping the sucker growth contact and systemic sucker control chemical agents have been used, i. e. fatty alcohols and MH30. The latter agent might be dangerous for smokers health. Consequently, only the contact sucker control agents could be used. Permission to be used in tobacco production has the fatty alcohol n-decanol FAIR TAC (F.T.). The purpose of this research was: 1) to study growth of the lateral tobacco suckers after applying several combinations of concentration and date of application of the F.T. contact agent and 2) to determine which of the studied combination gives the best production results. In tests carried out at two locations the sucker control treatments were: 1) 2 % F.T., 4% F.T., 4% F.T.; 2) 3 % F.T., 5% F.T.; 3) 2% F.T., 3% F.T., 16 l/ha MH30 . Tobacco plants were treated when the young suckers were up to 2.5 cm long. At each treatment 500 l/ha of the sucker control agent water solution was applied. Treatment No.2 affected the suckers similarly as the treatment No.3 where MH30 was applied. The yields achieved with these two treatments did not differ significantly either. These results indicate that the ROYAL TAC sucker control contact agent could be used alone in the commercial tobacco production.

Keywords: tobacco, suckers, sucker control agent

Quality of hops (*Humulus lupulus* L.) with regard to weather conditions

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The aim of the study was to detect the impact of weather conditions (year) on quality (alpha-acids and nitrates content) of hops cv. Aurora, which is planted on about 60% of hop fields in Slovenia. In three different field experiments implemented from 2010 to 2012 and from 2009 to 2010 respectively the weather conditions did not have a significant impact on the alpha-acids content of hop cones, whereas they had a significant impact on their nitrate content. But, high deficit of rainfall accompanied by very high temperatures in summer of 2013 (almost up to 40ºC) caused very low alpha-acid content of hop cones in that year. The secondary aim of this research was to find a simple mathematical model due to sum of effective temperatures and rainfalls from second germination after spring pruning till the technological maturity of hop cones. Considering achieved results it is possible to suggest following empiric mathematical model for alpha-acids accumulation in hop cones of cv. Aurora: $y = [(k_1\ w) - k_2 - (k_3\ w^2)]/x \div (-10) \leftrightarrow ET_{0\ (July)} \leq 4.5$. Where *y* is alpha-acids content in dry matter (%), *x* = sum of effective temperatures and *w* = sum of rainfalls, both from second germination after spring pruning till technological maturity of hop cones. Coefficients k_1, k_2 and k_3 are determined for cv. Aurora (53.8, 453 and 1.33, respectively).

Key wors: hop, *Humulus lupulus* L., alpha-acids content, nitrates content, empiric mathematical model

Utjecaj roka košnje i gnojidbe na prinos suhe tvari ozimog graška

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Sažetak

Ozimi stočni grašak zbog velike zelene mase i visokog udjela bjelančevina u cijeloj biljci ima veliku potrebu za dušikom. Dušik jednim većim dijelom nadoknađuju simbiotskom fiksacijom, a drugi dio crpi iz tla. U praksi postoji hipoteza da će ozimi grašak za proizvodnju zelene mase ostvariti znatno veći prinos s dušičnog gnojidbom. Stoga je cilj ovoga rada bio utvrditi svrhovitost i učinak gnojidbe dušikom na prinos zelene mase i suhe tvari ozimog graška. Istraživanja su obavljena tijekom tri godine na lokaciji Osijek. Pokus je bio postavljen po split blok rasporedu gdje je rok košnje (početak cvjetanja i puna cavatnja) bio glavni faktor, a sedam razina gnojidbe dušikom (od 0 do 186 kg N/ha) podfaktor. Analizirana su svojstva visine, prinosa zelene mase i suhe tvari. Utvrđeno je da prinos zelene mase najviše varirao po otkosima (22,7%) dok je prinos suhe tvari najviše varirao po razinama gnojidbe (22,7%). Nasuprot tome najmanje je variralo svojstvo udio suhe tvari po otkosima (11,3%) i različitim razinama gnojidbe dušikom (7,1%). Prosječni prinosi zelene mase u prvoj godini su bili najmanji (17,8 t/ha) dok je najveći prinos u prosjeku ostvaren (41,3 t/ha) u drugoj godini istraživanja. Statistički opravdane razlike na nivou značajnosti $p<0,01$ utvrđene su između otkosa za sva istraživana svojstva i interakcija između godina i roka košnje za svojstva visine i udjela suhe tvar. Razina gnojidbe i njezine interakcije nisu imale opravdanog utjecaja na visinu biljke, udio suhe tvari, prinos zelene mase i suhe tvari. Rezultati istraživanja su potvrdili hipoteze o opravdanom utjecaju roka košnje i neopravdanosti dušićne prihrane tijekom vegetacije.

Ključne riječi: ozimi grašak,suha tvar, dušik , prihrana, rok košnje

The influence of harvest and fertilization deadlines on the dry matter yield of winter peas

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Summary

The winter animal feed pea has a high need for nitrogen because of its large green mass and high protein content in the whole plant. The nitrogen is largely provided by symbiotic fixation and the rest is absorbed from the soil. In practice, there is a hypothesis that says that the winter green pea used for green mass production will achieve a significantly higher yield through nitrogen fertilization. Therefore, the goal of this paper was to determine the purpose and effect of nitrogen fertilization on the green mass and dry matter yield of the winter pea. The research was conducted during a period of three years on the location Osijek. The experiment was set up in a split block layout in which the harvesting deadline (start of blooming and full bloom) was the main factor and the seven levels of nitrogen fertilization (from 0 to 186 kg N/ha) the subfactor. Height, green mass and dry matter yield were analyzed. It was determined that the green mass yield varied the most according to harvest (22.7%) and the dry matter yield according to fertilization level (22.7%). On the other hand, the dry matter content according to harvest (11.3%) and nitrogen fertilization level (7.1%) varied the least. Average green mass yields in the first year were the lowest (17.8 t/ha) while the the highest average yield (41.3 t/ha) was achieved in the second harvesting year. Statistically significant differences with a signifacancy level $p<0.01$ were determined between harvesting cycles and interactions between years and harvesting deadlines for height and dry matter content. Fertilization level and its interactions had no significant influence on plant height, dry matter content, green mass yield and dry matter. The results of the research have confirmed the hypothesis about the significant influence of harvesting deadlines and nonsignificance of nitrogen fertilization during vegetation.

Key words: winter pea, dry matter, nitrogen, fertilization, harvesting deadline

Advanced vibration pneumatic separator of cleaning of seeds

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Summary

Research objective-increase of overall performance vibration pneumatic separator. Problems of work: to carry out the analysis of process of conveyance of seeds on yeast heads, a blown inclined air flow; to develop mathematical models for calculation of speed of conveyance of seeds on Deke a vibration pneumatic separator; experimentally to determine speeds of movement of seeds on yeast heads a vibration pneumatic separator and to give an assessment of division of a grain material in a fluidized layer at the raised specific loadings on a vibration pneumatic separator from the advanced wild. For the purpose of identification of a mode of influence of an air flow on the layer of the seeds moving on the punched surface, vibration pneumatic separator with delivery system of air supply with an inclined air flow was made. The car consists of a frame, flow, having zones of preliminary stratification and separate transportation, a housing of racks, the gear of the drive gear consisting of a shaft and a connecting rod, the fan. The housing is executed in the form of an air vent located under wild along a connecting rod, and its water part is connected to the delivery port of the fan, and output with the heel flow. The equations for calculation of average speed of relative conveyance of seeds for the punched fluctuating surface blown by the directed air flow are received. Application of an improved version of a vibration pneumatic separator for cleaning of elite seeds of grain crops allows, in comparison with used, to rise specific loading more than twice, to reduce specific power consumption by 30-50%.

Key words: vibration pneumatic separator, yeast heads, average speed, inclined air flow.

Prinos sjemena Bc linija kukuruza u različitim gustoćama sklopa

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Sažetak

Gustoća sklopa (GS) jedan je od glavnih čimbenika formiranja prinosa kukuruza jer o njoj ovisi veličina ostvarene lisne površine odnosno fotosintetski potencijal usjeva. Optimalne GS dobro su poznate za hibride kukuruza. Međutim, linije kukuruza imaju manju lisnu površinu po biljci pa se stoga optimalna GS za linije razlikuje od one za hibride iste duljine vegetacije. Nadalje, značajan utjecaj na prinos sjemena linija mogu imati lokacija i vegetacijska sezona. Poljska istraživanja provedena su tijekom dvije godine na dvije lokacije (Maksimir i Rugvica). Utjecaj različitih GS (60.000, 75.000 i 90.000 biljaka ha^{-1}) na prinos sjemena istraživan je na tri Bc linije kukuruza u uvjetima intenzivne agrotehnike. Prosječni prinos sjemena u GS od 60.000 biljaka ha^{-1} iznosio je 4923 kg ha^{-1}. Unatoč značajnom smanjenju mase 1000 sjemenki i broja sjemenki po biljci, te većem broju jalovih biljaka u povećanim gustoćama sklopa, povećanje GS dovelo je do značajnog rasta prinosa za prosječno 9,8% u GS od 75.000 i 16,4% u GS od 90.000 biljaka ha^{-1}. Vegetacijska sezona i lokacija su značajno utjecali na prinose sjemena. Nadalje, istraživane linije su se međusobno razlikovale u prinosu sjemena, a signifikantnost interakcije GS × linija ukazala je na specifičnu reakciju linija na povećane gustoće sklopa. Rezultati istraživanja ukazuju na povećanje prinosa linija kukuruza sve do GS od 90.000 biljaka ha^{-1}, ali i da je povećanje prinosa bilo različito za istraživane Bc linije kukuruza.

Ključne riječi: kukuruz, linija, prinos sjemena, gustoća sklopa.

Seed yield of Bc maize inbred lines as affected by plant population densities

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Summary

Plant population density (PPD) is one of most important factor determining the yield of maize crop because of its effect on leaf area and photosynthetic activity. Optimal PPD for maize hybrids is well documented. However, maize inbred lines are characterised by smaller leaf area per plant, and consequently, optimal PPD for inbred lines may differ than those for hybrids of similar maturity. Growing conditions may also significantly affect seed yields of maize inbred lines. A field study was conducted over two growing seasons on two sites (Maksimir and Rugvica). The effect of various PPDs (60.000, 75.000 i 90.000 plants ha^{-1}) on seed yield were determined on three Bc inbred lines grown under intensive management. Seed yields at PPD of 60.000 plants ha^{-1} averaged 4923 kg ha^{-1}. Higher PPDs produced larger seed yields despite of significant decreases in 1000-kernel weight and kernel number per plant, as well as increased number of barren plants ha^{-1}. Compared to the smallest PPD, seed yields increased by an average of 9,8% at 75.000 and 16,4% at 90.000 plants ha^{-1}. Growing season and site significantly influenced seed yields. Tested maize inbred lines differed for seed yields, whereas a significant PPD × inbred interaction was also found. Our findings indicated that seed yields of Bc inbred lines might be increased when grown under higher PPDs (up to 90.000 plants ha^{-1}), but these yield increments were inbred specific.

Key words: maize, inbred line, seed yield, plant population density.

Svojstva ekstrudata na bazi kukuruzne krupice s dodatkom raži

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Sažetak

Raž je žitarica koja se iza pšenice najviše koristi u proizvodnji kruha, dok se u proizvodnji ekstrudiranih proizvoda ne koristi tako često. Cilj ovoga rada bio je ispitati utjecaj dodatka brašna raži u kukuruznu krupicu (omjer krupica:raž = 80:20) na svojstva ekstrudata. Uzorci sa 15% vlage ekstrudirani su u laboratorijskom jednopužnom ekstruderu pri temperaturnom profilu 135/170/170 °C, uz upotrebu puža kompresijskog omjera 4:1 i sapnice promjera 4 mm. Dobiveni ekstrudati osušeni su na zraku, a potom su im ispitana fizikalna i reološka svojstva. Istraživanjem je utvrđeno da dodatkom raži dolazi do smanjenja ekspanzijskog omjera i povećanja nasipne mase, kao i povećanja tvrdoće i smanjenja lomljivosti ekstrudata. Ekstruzijom se povećao indeks apsorpcije i indeks topljivosti u vodi, kao i značajno oštećenje škroba kod svih uzoraka, s tim što je dodatkom raži smanjena oštećenost škroba. Postupkom ekstruzije i dodatkom raži došlo je do smanjenja viskoznosti vrha, viskoznosti pri 92 °C te viskoznosti pri 50 °C te su ekstrudirani uzorci bili manje skloni retrogradaciji.

Ključne riječi: ekstruzija, kukuruzna krupica, raž

Properties of extrudates based on corn grits with addition of rye

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Summary

Rye is second to wheat, the most commonly used grain in the production of bread, although not widely used as an ingredient for extruded products. The aim of this study was to determine the effect of rye flour addition to corn grits (ratio grits:flour = 80:20) on extrudates properties. Prepared samples with 15% of moisture content were extruded in the laboratory single screw extruder at temperature profile 135/170/170 °C, using a screw with compression ratio 4:1 and die with 4 mm diameter. Obtained extrudates were air-dried, and physical and rheological properties of extrudates were determined. Addition of rye resulted in decrease of the expansion ratio (ER) and fracturability of extrudates and increase of bulk density (BD) and hardness. Extrusion resulted in the increase of water absorption indeks (WAI) and water solubility indeks (WSI), as well as the significant damage of starch in all samples, but addition of rye resulted in reduced starch damage. Rye flour addition and extrusion process decreased peak viscosity and viscosities at 92 °C and at 50 °C, and the extruded samples were less prone to retrogradation.

Key words: extrusion, corn grits, rye

Bc hibridi kukuruza u proizvodnim pokusima u 2013. godini

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Sažetak

Pokusi Bc hibrida kukuruza u 2013. godini postavljeni su na raznim lokacijama u različitim agroekološkim uvjetima na području cijele Hrvatske. Sjetva kukuruza je bila nešto kasnija nego prethodnih sezona zbog previsoke vlage tla i duljeg hladnog razdoblja. Priprema tla i sjetva obavljene su u kratkom razdoblju u solidnim uvjetima. U nicanju i za vrijeme ranog porasta kukuruza uvjeti su bili povoljni, pa su ostvareni preporučeni sklopovi. Pred cvatnju i u cvatnji, klimatski uvjeti su bili izuzetno povoljni na svim područjima uzgoja kukuruza. Usjevi kukuruza su imali optimalne količine vode u tlu a i temperature nisu bile previsoke. U kolovozu nastupa razdoblje od tri tjedna bez oborina, što je rezultiralo ubrzanim dozrijevanjem kukuruza, posebice u istočnom dijelu Hrvatske. Ovakvi uvjeti u vrijeme vegetacije kukuruza imali su za posljedicu veće prinose u zapadnom dijelu Hrvatske. Kao primjer navodimo lokacije Lovas i Farkaševac. Prosječni prinos pokusa u Lovasu je bio 12.14 t/ha a u Farkaševcu 13.14 t/ha. Najveće prinose na obje lokacije imali su hibridi Bc 424 (15.34, 15.33 t/ha), Bc 306 (13.45, 14.08 t/ha), i Bc 344 (13.28, 13.74 t/ha). U 2013. godini najbolje rezultate su dali hibridi vegetacijske skupine FAO 300 i 400.

Ključne riječi: kukuruz, prinos, hibridi, lokacije

Bc maize hybrids in performance trials in 2013

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Summary

Field trials with Bc maize hybrids were conducted at various locations and agroecological conditions throughout Croatia in 2013. Because of excessive soil moisture and prolonged period of cold weather planting was somewhat delayed in comparison with the previous season. Soil preparation and planting were carried out during a short period of time at relatively good conditions. During emergence and early growth conditions were favourable and recommended stands were achieved. Before and during flowering, climatic conditions were exceptionally good in all maize growing areas. Maize crops received optimal soil moisture and the temperatures were not too high. A three-week period without rain in August resulted in rapid maturation of maize especially in Eastern Croatia. The result of such conditions during maize growth were higher yields in the Western part of Croatia, such as locations Lovas and Farkaševac, where average yields were 12.14 t/ha and 13.14 t/ha respectively. The highest yields at both locations were achieved by Bc 424 (15.34, 15.33 t/ha), by Bc 306 (13.45, 14.08 t/ha) and by Bc 344 (13.28, 13.74 t/ha). In 2013, the best results were produced by the hybrids from FAO groups 300 and 400.

Key words: maize, yield, hybrids, locations

Precizna gnojidba kao osnova racionalizacije poljoprivredne proizvodnje

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Sažetak

U strukturi troškova konvencionalne biljne prizvodnje, agroethnička mjera gnojidbe čini više od 30 % ukupnih troškova proizvodnje. Stoga je racionalana i pravovremena gnojdba temeljni čimbenik ostavarivanja ekonomski učinkovite proizvodnje, te je cilj rada bio provesti izračun preporuka za preciznu gnojidbu kukuruza pojedinačnim gnojivima, te istu usporediti s konvencionalnom gnojidbom primjenom kompleksnih gnojiva. Pokus je postavljen u Banovcima 2013. godine na površinama u vlasništvu tvrtke Banovci d.d. i agrokemijskom analizom tla utvrđen je prosječni sadržaj AL-fosfora od 10,05 mg 100 g^{-1}, AL-kalija 10,28 mg 100 g^{-1} što ubrajamo u kategoriju jako siromašnih tala fosforom i kalijem, pH_{H2O} 7,51, pH_{KCl} 6,43, sadržaj humusa 3,2 % te sadržaj karbonata 3,1 %. Gnojidbeni pokus proveden je s tri tretmana: kontrola-bez gnojidbe, konvencionalna gnojidba kompleksnim NPK gnojivom 10:20:30 i precizna gnojidba pojedinačnim gnojivima MAP i KCl. I u jednom i u drugom slučaju kao dušično gnojivo korištena je Urea i KAN, a potrebe za fosforom iznosile su 150 kg ha^{-1}, te kalija 300 kg ha^{-1}. Po završetku vegetacije kukuruza i nakon provedene gnojidbe rezultati su bili sljedeći: AL-fosfor u prosjeku je iznosio 18,35 mg 100 g^{-1}, AL-kalij 20,9 mg 100 g^{-1}, pH_{H2O} 7,51, pH_{KCl} 6,43, sadržaj humusa 3,2 % te sadržaj karbonata 3,1 %. Dakle, nakon samo jedne vegetacijske sezone očito je povećanje sadržaja AL-fosfora za 8,3 mg 100 g^{-1} i kalija za 10,62 mg 100 g^{-1} (na parcelama gdje je provedena precizna gnojidba pojedinačnim gnojivima MAP i KCl). Ostvareni prinosi prema postavljenoj shemi pokusa bili su: 7,9 t ha^{-1} na kontroli, te 9,5 t ha^{-1} (konvencionalna gnojidba kompleksnim gnojivima), odnosno 10,05 t ha^{-1} (precizna gnojidba pojedinačnim gnojivima). Promatrano s financijskog aspekta povećanje prinosa od 1,6 t ha^{-1} do 2,15 t ha^{-1} jest povećanje dobiti za 1.600 kn ha^{-1} tj 2.150 kn ha^{-1} (na bazi trenutne cijene kilograma kukuruza standardne kakvoće).

Ključne riječi: kukuruz, konvencionalna gnojidba, precizna gnojidba, fosfor, kalij

Precision fertilization as a basis for the rationalization of agricultural production

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Summary

In the cost structure of conventional plant production, fertilization accounts for more than 30 % of total production costs. Therefore, the rational and timely fertilization is the major factor of cost-effective production realization. So, the aim of paper was to compare, precise fertilization (single fertilizers) with conventional fertilizer application (complex fertilizers) for maize. The trial was set in Banovci 2013 in areas owned by Banovci Inc. and by agrochemical soil analysis the average content was determined for AL–P_2O_5 10,05 mg 100 g^{-1}, AL–K_2O 10,28 mg 100 g^{-1} which indicates the category of very low phosphorus and potassium supplied soil, pH_{H2O} 7,51, pH_{KCl} 6,43, humus content 3,2% and carbonate content 3,1%. Fertilization experiment was conducted with three treatments: control - without fertilization, conventional fertilizers with NPK complex fertilizers 10:20:30 and precise fertilization by single fertilizers MAP and KCl. In both cases, as a nitrogenous fertilizers were used Urea and KAN. Phosphorus requirement was 150 kg ha^{-1} and potassium requirement was 300 kg ha^{-1}. After maize growing season, results were as follows: average AL–P_2O_5 18.35 mg 100 g^{-1}, AL–K_2O 20.9 mg 100 g^{-1}, pH_{H2O} 7.51, 6.43 pH_{KCl}, organic content 3, 2 % and 3.1% carbonate content. So, only one vegetation season obviously increased the content of AL–P_2O_5 for 8.3 mg 100 g^{-1} and K_2O for 10.62 mg 100 g^{-1} (in the plots with precise fertilization by MAP and KCl). According to a scheme of the trial, yields were: 7.9 t ha^{-1} on the control treatment and 9.5 t ha^{-1} (conventional fertilization by complex fertilizers) and 10.05 t ha^{-1} (precise fertilization by single fertilizers). From a financial point of view, yield increase from 1.6 t ha^{-1} till 2.15 t ha^{-1} means an increased profit for 1.600 kn ha^{-1} up to 2.150 kn ha^{-1} (based on the current price per kilogram of standard quality maize).

Key words: corn, conventional fertilization, precise fertilization, phosphorus, potassium

Izbor hibrida kao čimbenik povećanja prinosa sjemena i ulja uljane repice

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Sažetak

U cilju evaluacije novih hibrida i sorata uljane repice provedeno je istraživanje na pokusnom polju Agronomskog fakulteta Sveučilišta u Zagrebu tijekom 2010.-2012. godine. U istraživanje je bilo uključeno 16 kultivara uljane repice (5 sorata i 11 hibrida) 5 sjemenarskih kuća koje plasiraju sjeme u Hrvatskoj. Pokus je postavljen po shemi slučajnog bloknog rasporeda u pet ponavljanja. Istraživani hibridi i sorte uljane repice međusobno su se značajno razlikovali po ostvarenom prinosu sjemena i ulja, sadržaju ulja i komponentama prinosa. Međutim, veliki broj hibrida ostvario je istovjetne rezultate jer su razlike između njih u istraživanim svojstvima bile unutar statistički dopuštenog odstupanja. 2010. godine najveći prinos sjemena utvrđen je kod hibrida Traviata (3,71 t ha^{-1}). Hibrid CWH 119 u istoj godini imao je najveći udio ulja (46,91 % na suhu tvar), a ujedno i najveći prinos ulja (1,49 t ha^{-1}). U 2011. godini hibrid CWH 119 ostvario je najveći prinos sjemena (4,25 t ha^{-1}) kao i najveći prinos ulja (1,91 t ha^{-1}). Najveći udio ulja u toj godini ostvarila je sorta Ricco (50,80 % na suhu tvar). Hibrid CWH 119 i u 2012. godini postigao je najveći prinos sjemena (5,10 t ha^{-1}) i najveći prinos ulja (2,19 t ha^{-1}), dok je najveći udio ulja u sjemenu imao hibrid PR46W15 (49,89 % na suhu tvar).Na temelju ovih istraživanja prema ostvarenim prinosima sjemena i ulja mogu se izdvojiti hibridi Traviata i CWH 119, a prema visokom udjelu ulja u sjemenu sorta Ricco i hibridi CWH 119 i PR46W15.

Ključne riječi: uljana repica, hibrid, prinos sjemena, prinos ulja

Hybrid selection as a factor of increasing seed and oil yields of rapeseed

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To evaluate new rapeseed hybrids and varieties, investigations were conducted at the experimental field of the Faculty of Agriculture, University of Zagreb, in the period 2010-2012. The trial involved 16 rapeseed cultivars (5 varieties and 11 hybrids) of 5 seed producers selling seed in Croatia. The trial was laid out according to the randomized block design with five replications. Studied rapeseed hybrids and varieties differed significantly in seed and oil yields, oil content and yield components. However, a number of hybrids rendered identical results, since the differences in the investigated properties were within statistically allowable deviation. In 2010, the highest seed yield was recorded for the hybrid Traviata (3.71 t ha^{-1}). Hybrid CWH 119 had the highest oil content in the same year (46.91 % on dry matter basis) as well as the highest oil yield (1.49 t ha^{-1}). In 2011, hybrid CWH 119 produced the highest seed yield (4.25 t ha^{-1}) as well as the highest oil yield (1.91 t ha^{-1}). The highest oil content in that year was recorded for the Ricco variety (50.80 % on dry matter basis). Hybrid CWH 119 gave the highest seed yield also in 2012 (5.10 t ha^{-1}) as well as the highest oil yield (2.19 t ha^{-1}), while the hybrid PR46W15 had the highest oil content in seed (49.89 % on dry matter basis). Hybrids Traviata and CWH 119 can be singled out based on the achieved seed and oil yields, and the variety Ricco and hybrids CWH 119 and PR46W15 for their high oil content in seed.

Keywords: rapeseed, hybrid, seed yield, oil yield

Analysis of Fusarium ear rot on different maize genotypes in Kosovo and Albania

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Maize is an important crop in Kosovo and Albania and a major component of animal feed. Fusarium ear rot (FER) occurs in both countries and decreases food and feed quality due to mycotoxin contamination. So far, in both countries FER resistance of locally grown maize genotypes was not investigated. To test FER resistance, a set of 18 important maize genotypes was selected (8 from Kosovo and Albania, supplemented with two from Austria). The maize nursery was grown in well replicated experiments in the three countries with three replications in a randomized complete block design. In each replication 90 plants were assessed after natural FER infection and 10 plants were inoculated with *F. graminearum* incrustrated tooth picks. Disease incidence and disease severity (percentage of diseased ear area) was visually assessed on dehusked ears after ripening. ANOVA analyses with the data for the percentage of diseased ear area from the experiments in the 3 countries showed highly significant differences in resistance between the genotypes after artificial inoculation. Moreover, a large variability in FER resistance was detected ranging from 3.1% to 27.6% ($LSD_{0.05}$ = 8.0). Highly significant differences in the mean disease level were also present between the countries: in Kosovo the highest disease level was measured (31.9%), followed by Albania and Austria (9.7% and 7.1% diseased ear area, respectively). The genotype by country interaction was also highly significant. Resistance ranking in Austria was significantly different from the ranking in both other countries. It is concluded that in order to obtain reliable data for FER resistance investigations in different environments (locations and/or years) are required. Identifying the most sensitive maize genotypes gives the possibility to eliminate such genotypes for practical use. In this way the FER resistance could be immediately increased and the risk for toxin contamination effectively reduced. This is the first report on resistance testing of different maize genotypes against Fusarium ear rot in Kosovo and Albania. Yield results as well as the *Fusarium* species identified on natural infected maize plants from Kosovo and Albania are currently investigated and results will be integrated in the oral presentation.

Key words: *Fusarium* ear rot, resistance, *Zea mays*, Kosovo, Albania

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Moguća uloga metabolizma glutationa u odgovoru listova pšenice na dva različita izvora cinka

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Sažetak

Nedostatak cinka predstavlja moguć poremećaj u ishrani pšenice na karbonatnim tlima, utjecajući također na prehranu ljudi jer je pšenice jedan od najkritičnijih izvora hrane za čovjeka i životinje. Dakle, gnojidba cinkom je korisna agrotehnička mjera neutralizacije manjka cinka i istovremene fortifikacije zrna pšenice povećanjem koncentracije Zn. Iako gnojidba cinkom ima pozitivan utjecaj na prinos i povećanje koncentracije cinka u zrnu, suvišak cinka može izazvati stresno stanje biljke. Biljke su razvile različite mehanizme za neutralizaciju stresa, pri čemu metabolizam glutationa ima vrlo važnu ulogu. Tri sorte pšenice različite po odnosu visine i kvalitete prinosa (Divana, Srpanjka i Simonida) uzgajane su kako bi se istražila uloga metabolizma glutationa u održavanju sadržaja cinka u listovima. Dva različita izvora cinka ($ZnSO_4$ i Zn–EDTA) primijenjena su folijarno (1,5 kg/ha) između fenofaze klasanja (Feeks 10.3) i fenofaze početka cvjetanja (Feeks 10.51), te su nakon 14 dana listovi zastavičari uzorkovani za daljne analize. Rezultati su pokazali da je cink iz oba izvora uzrokovao povećanje aktivnosti glutation-reduktaze u listovima sorte Divana, dok je u listovima sorte Srpanjka porast aktivnosti uzrokovao samo $ZnSO_4$. Aktivnost glutation-transferaze bila je povećana samo u listovima sorti Divana i Simonida tretiranih s Zn–EDTA. Tretman cinkom nije imao značajan utjecaj na ukupni sadržaj glutationa u listovima sve tri ispitivane sorte. Na temelju dobivenih rezultata može se zaključiti da mehanizmi uključeni u održavanje sadržaja cinka u listovima pšenice, koji uključuju glutation, ovise o sorti i vrsti primijenjenog izvora cinka.

Ključne riječi: cink, pšenica, list zastavičar, glutation, glutation reduktaza, glutation transferaza

Possible role of glutathione metabolism in response of wheat leaves on foliar zinc application

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Summary

Zinc deficiency represents a possible nutrient disorder for wheat grown on calcareous soils, but also effecting human nutrition as wheat is one of the most critical nutrient sources for human and animals. Therefore, Zn fertilisation is useful agronomic practice to correct Zn deficiency, and simultaneously fortifying grain by increasing Zn content. Although, treatment with zinc has a positive impact on plant yield and increase of zinc grain concentration, it can also have stress effects on plants when present in excess. Plants evolved different mechanisms to combat stress, wherein the glutathione metabolism has very important role. In order to investigate the role of glutathione and its metabolism in maintaining of leaf zinc homeostasis, three wheat cultivars different in grain yield/quality ratio have been grown (cv. Divana, Srpanjka, Simonida). Two different sources of zinc ($ZnSO_4$ and Zn–EDTA) were applied foliar (1.5 kg/ha) between stage of heading (Feekes 10.3) and beginig of flowering (Feekes 10.51), and flag leaves were collected for further analyses 14 days after. Results showed that in general both zinc foliar fertilizers caused increasing effects on glutathione reductase activity in cv. Divana, but only $ZnSO_4$ caused increase in leaves of cv. Srpanjka. Glutathione transferase activity was induced only in leaves of cvs. Divana and Simonida treated with Zn–EDTA. The zinc treatment did not have significant effect on total glutathione content in all three cultivars. It can be concluded that mechanisms of zinc homeostasis maintain in wheat leaves that involve glutathione are depending on the cultivar and the type of applied zinc fertilizer.

Key words: zinc, wheat, flag leaf, glutathione, glutathione reductase, glutathione transferase

Book of Abstracts

Fisheries, Game Management and Beekeeping

06

Ribarstvo, lovstvo i pčelarstvo

Zbornik sažetaka

Intenzitet šteta od divljih svinja u lovištu IV/22 "Petrova Gora"

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Sažetak

Tijekom proteklih dvadesetak godina prisutan je trend porasta brojnosti populacije divlje svinje (*Sus scrofa*) u lovištima Republike Hrvatske. Usporedno s porastom brojnosti povećan je i njihov odstrjel. Tako je odstrjel iznosio 3.607 grla u 1993. godini, dok je deset godina kasnije, 2003. iznosio 8.452 grla, što je porast za 134 %. Prema dostupnim podacima, u 2011. godini odstrijeljeno je 21.871 grlo, odnosno 159 % više u odnosu na 1993. godinu. Stanišni uvjeti, kapaciteti lovišta i praksa lovnoga gospodarenja na području Hrvatske omogućuju gospodarenje matičnim fondom divlje svinje od 19.000 grla u otvorenim lovištima i godišnji odstrjel od 17.500 grla. Istraživanje utjecaja brojnosti divlje svinje na pojavu šteta na poljoprivrednim kulturama provedeno je u državnom lovištu IV/22 "Petrova Gora". Lovište je smješteno na području Karlovačke i Sisačko-moslavačke županije, brdskog je tipa i ukupne površine 14.010 ha. Utvrđeno je da su evidentirane štete od divljih svinja u stalnom porastu u razdoblju od 2010. godine do danas. Godišnje je isplaćen iznos od oko 50.000 kn za nastale štete. Najveći intenzitet šteta i proporcionalno tomu najviši novčani iznos od 71.772 kn za nastalu štetu evidentirani su 2012., dok je u 2013. godini isplaćeno znatno manje, odnosno 28.876 kn. Među čimbenicima koji su utjecali na pad brojnosti populacije divlje svinje u lovištu valja istaknuti klimatske prilike, koje su tijekom zime 2012./2013. bile vrlo nepovoljne po divljač u lovištu. Zima je bila hladna i dugotrajna, s visokim snježnim pokrivačem, što je uzrokovalo povećani mortalitet mladunčadi i narušilo dobnu strukturu populacije. Pad brojnosti divlje svinje bio je naročito izražen pri aktivnostima komercijalnog lova provedenog tijekom studenoga 2013. Zabilježen je prosječni odstrjel od 8 grla po lovnom danu, dok višegodišnji prosječni odstrjel iznosi 12 grla svinje divlje po lovnom danu.

Ključne riječi: divlja svinja, populacija, šteta, lovište

Intensity of damages caused by wild boar in the hunting ground IV/22 "Petrova Gora"

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Summary

During the last twenty years, a trend of increasing growth in the population of wild boar (*Sus scrofa*) is present in the hunting grounds of the Republic of Croatia. This trend also leads to increase culling rate of wild boar. Total cull of wild boar was 3,607 individuals in 1993, while ten years later; it was 8,452 individuals in 2003, which is growth by 134%. Based on available data, number of 21,871 individuals has been culled in 2011, which is growth of 159% in comparison to 1993. Habitat conditions, hunting ground capacities and practice in hunting management enables in Croatia management with domicile stock of 19,000 wild boar individuals in the open hunting grounds, and annual culling rate of 17,500 individuals. Research on the relationship between wild boar population size and occurrence of damage on agricultural crops has been carried out in the state-owned hunting ground IV/22 "Petrova Gora". This hunting ground is located in the areas of Karlovačka and Sisak-Moslavina Counties; it comprise total surface of 14,010 ha, and it belongs into hilly type of the hunting ground. It was determined that registered damages caused by wild boar are in the continual growth in the period 2010-2013 year. Annual payment for the damage amounted to 50,000 Croatian kunas (HRK). The highest damage intensity and proportional highest payment of 71,772 HRK was registered in 2012, while the payment was considerably lower (28,876 HRK) in 2013. Climatic conditions are among the factors that caused decline in population size of wild boar in the hunting ground. During the winter period 2012/2013, the climate conditions were very harsh for the game animals. Winter was cold and lasting, with high snow cover, that caused increased mortality of young animals and disturbed population age structure. Decline in the population size of wild boar was pronounced during the commercial hunting activities carried out in November 2013. An average cull of 8 individuals per hunting day was registered, while the multi-annual average cull amounted to 12 individuals per hunting day.

Key words: wild boar, population, damage, hunting ground

Preliminarno istraživanje šteta od divlje svinje na odabranim hibridima kukuruza u lovištima Karlovačke županije

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Sažetak

Cilj istraživanja bio je utvrditi oblike, dinamiku i intenzitet pojave štete koju divlja svinja (*Sus scrofa*) čini na poljoprivrednim površinama u lovištu, zasijanim odabranim hibridnim sortama kukuruza. Eksperimentalni terenski rad proveden je u dva različita lovišta u Karlovačkoj županiji: u lovištu brdskog tipa IV/22 „Petrova Gora“ i lovištu nizinskog tipa IV/9 „Pokupski Bazen“. U dijelovima ovih lovišta gdje se divljač svakodnevno prihranjuje postavljene su pokusne plohe: četiri plohe ukupne površine 5 ha u brdskom i jedna ploha, površine 1,5 ha u nizinskom lovištu. Pokusne plohe su nakon prethodne pripreme tla zasijane sa po pet različitih KWS hibrida kukuruza: Simao, Amandha, KWS 3381, KWS 2376, Decco, u razdoblju 15.-29. svibnja 2013. Utvrđeno je da nema razlika u šteti koju divlja svinja učini na sjemenu zasijanih hibrida kukuruza, već da tek zasijano sjeme vade redom na cijeloj pokusnoj plohi. Značajne razlike u pojavi štete utvrđene su polovinom kolovoza, kada je kukuruz u fenofazi mliječne zriobe a divlje svinje svakodnevno ulaze u usjev. U zadnjoj dekadi kolovoza utvrđena je najveća razlika u intenzitetu štete od divlje svinje na hibridima kukuruza. Na trećoj parceli u brdskom lovištu šteta je iznosila 95 % na hibridu Simao, dok je na hibridu KWS 2376 na istoj parceli iznosila < 10 %. Na ostalim pokusnim plohama, koje su nakon sjetve bile zaštićene električnim čuvarom utvrđeno je da divlje svinje najprije unište usjev jednog hibrida kukuruza i zatim prelaze na drugi hibrid na istoj pokusnoj plohi. Početkom rujna utvrđeno je da su divlje svinje uništile preostale usjeve tako da je prije fenofaze sazrijevanja kukuruza udjel šteta iznosio 100 % na svim pokusnim plohama. Rezultati istraživanja pokazuju na izraženu sklonost divljih svinja za učestalijim dolaženjem na poljoprivredne površine zasijane određenim hibridom kukuruza. Kao moguću mjeru smanjenja šteta od divljih svinja na poljoprivrednim površinama predloženo je zasijavanje kukuruza hibrida Simao u funkciji remize. Poljoprivrednicima je preporučeno da zasiju kukuruz hibrida KWS 2376, koji divlje svinje ne diraju sve dok u okolišu lovišta imaju dostupne usjeve drugih hibrida kukuruza.

Ključne riječi: kukuruz, hibrid, divlja svinja, šteta, lovište

Preliminary study of damages caused by wild boar on selected maize hybrids in the hunting grounds of Karlovacka County

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Summary

Aim of the research was to find out forms, dynamics and intensity of occurrence of damages caused by wild boar (*Sus scrofa*) on agricultural land in the hunting ground that are sown with selected maize hybrid cultivars. Experimental fieldwork was carried out in two different hunting grounds in the Karlovac County: IV/22 „Petrova Gora“as hilly type, and IV/9 „Pokupski Bazen“as lowland type. In parts of the hunting grounds where feeding of game animals is done on daily basis, experimental plots has been set up: four plots of total 5 ha surface in hilly type and one plot of 1.5 ha surface in the lowland hunting ground type. After the soil pre-treatments, each experimental plot has been sown with five KWS maize hybrids: Simao, Amandha, KWS 3381, KWS 2376, Decco, in the period from 15 to 29 May, 2013. Differences in damage of wild boar on seeds of sown maize hybrids were not found because boar raise seeds in serial way on the whole experimental plot. Considerable difference in damage occurrence was determined in the mid-August, when the maize is in wax ripeness phenophase, and wild boars are visiting the crop every day. In the last decade of August, the largest difference in damage intensity on maize hybrids was determined. In hilly hunting ground, on third plot damage amounted to 95% on hybrid Simao, while it was less than < 10 % on hybrid KWS 2376 at the same plot. At other experimental plots, which were protected by electric guardian after the sowing, it was determined that wild boars at first destroy crop of one maize hybrid and after that move on another hybrid at the same plot. Remaining crops were destroyed on the beginning of September before the ripening phenophase, with damage intensity of 100% at all plots. Results of the research indicated pronounced addiction of wild boar for more frequent visit at agricultural land that is sown with specific maize hybrid. As potential measure for reducing damage caused by wild boar at agricultural land it was recommended to sown maize hybrid Simao as annual crop. Farmers can choose to sow maize hybrid KWS 2376, which wild boar do not touch as long as they have reachable crops of other maize hybrids.

Key words: maize, hybrid, wild boar, damage, hunting ground

Utjecaj klimatskih i hidroloških čimbenika na vrijednost rogovlja jelena običnog (*Cervus elaphus*, L.) u baranjskom Podunavlju

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Sažetak

Godišnji ciklus rasta rogovlja u jelena običnog (*Cervus elaphus*) usko je povezan s reprodukcijskim ciklusom, hormonalnim procesima te klimatskim i hidrološkim čimbenicima. Klimatski i hidrološki čimbenici koji na to direktno utječu jesu: temperatura zraka; oborine (kiša, snijeg, led); insolacija (fotoperiodizam); vodostaj, periodičnost, intenzitet i trajanje plavljenja. Navedeni čimbenici indirektno utječu određujući sastav i raspodjelu vegetacije kopnenih i vodenih stanišnih tipova. U baranjskom Podunavlju istraživana je vrijednost rogovlja jelena običnog i povezanost s klimatskim i hidrološkim čimbenicima koji djeluju na očuvanim izvornim staništima. Istraživanje je provedeno tijekom šest lovnih godina, od 2004./2005. do 2009./2010., a korišteni su podaci podrijetlom od srednjedobnih i zrelih mužjaka (dob iznad 5 godina). Mjereni su sljedeći parametri rogovlja s ukupno 382 jelena: masa; ukupna duljina grane, broj parožaka i duljina paroška srednjaka. Vrijednost rogovlja u lovnoj 2007./08. godini bila je signifikantno viša u odnosu na 2004./05., 2005./06. i 2006./07., dok u odnosu na 2008./09. i 2009./10. vrijednosti nisu signifikantne, ali su više što je u biološkom smislu jednako važno. Mjere gospodarenja bile su jednake u istraživanom razdoblju, stoga je analiziran utjecaj klimatskih i hidroloških čimbenika na staništu na razlike u vrijednosti rogovlja. Tijekom 2007. godine izostalo je redovito proljetno plavljenje Dunava, dok je tijekom ostalih godina bilo prisutno. Tijekom zimskih mjeseci, u razdoblju: studeni 2006. – veljača 2007., vrijednosti srednje mjesečne temperature nisu bile uobičajeno ispod 0 ºC, već su iznosile od 2,9 ºC do 8,4 ºC, što su ujedno bile i maksimalne zimske temperature tijekom 10-godišnjeg razdoblja. U istom razdoblju je zabilježen najmanji broj od 35 hladnih dana (t< 0,0 ºC), kao i nedostatak snježnog pokrivača (svega dva dana sa snijegom visine 1 cm). Količina oborine u razdoblju siječanj-ožujak 2007. bila je sa 142 mm nešto iznad prosjeka, a tijekom travnja i svibnja (45 mm) i do tri puta manja od količine u ostalim istraživanim godinama. Insolacija, odnosno broj sunčanih sati bila je znatno viša u razdoblju: siječanj – svibanj 2007., posebice u travnju kada su procesi rasta i razvoja rogovlja najintenzivniji. Vrijednosti izmjerenih parametara rogovlja bile su najviše u lovnoj 2007./08. godini. Povoljne klimatske i hidrološke prilike u proljetnom razdoblju omogućile su rast kvalitete i vrijednosti rogovlja jelena običnog u prirodnim staništima baranjskog Podunavlja.

Ključne riječi: jelen obični, rogovlje, klima, hidrologija, Baranja

Impact of climate and hydrological factors on value of red deer (*Cervus elaphus*, L.) antlers in the Baranja Danube region

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Summary

Annual cycle of antler growth in red deer (*Cervus elaphus,* L.) is closely associated with the reproductive cycle, hormonal processes, as well as climatic and hydrological factors. Climatic and hydrological factors which affect directly are: air temperature; precipitation (rain, snow, ice); insolation (photoperiodism); water level, periodicity, intensity and duration of flooding. Those factors have indirect influence by determining composition and distribution of vegetation in land and aquatic habitats. Value of antlers of red deer, and its relation to climatic and hydrological conditions at preserved native habitats, was researched in the Baranja Danube region. Research was carried out during six hunting year, from 2004/2005 to 2009/2010. Data originated from middle aged and mature stags (aged above 5 year) were used. Following parameters of antlers have been measured from total of 382 stags: weight; total length of the main beams; number of tines and length of the third tine. Value of antlers in year 2007/2008 was significantly higher in relation to 2004/05, 2005/06 and 2006/07 year. In relation to 2008/09 and 2009/10 year, values were not significant, but higher, which is equally important from the biological standpoint. The management measures were identical during the research period. Thus, the impact of climatic and hydrological factors at habitats on differences in values of antlers, have been analysed. During 2007 year, regular flooding of the Danube River failed, but it was pronounced during other research years. During the winter months in the period: November 2006 – February 2007, values of mean annual temperature was not below 0ºC, as it is usual, but ranged from 2.9ºC to 8.4ºC, which also were the maximal winter temperature recorded in 10-year period. In the same period, the least number of 35 cold days (t< 0,0ºC) was recorded. Shortage in snow cover was also recorded, in this period, with only two days with snow cover of 1 cm. Precipitation quantity in the period: January – March 2007 amounted to 142 mm, which is slightly above an average, and during April and May (45 mm) was three times lover than quantity in other researched years. Insolation, described as the number of sunshine hours, was much higher in the period: January – May 2007, especially during the April, when the processes of antlers growth and development are most intensive. Values of the measured antler parameters were highest in hunting year 2007/08. Favourable climatic and hydrological conditions in the spring period made possible an increase in quality and values of antlers of red deer, living in the natural habitats of Baranja Danube region.

Key words: red deer, antlers, climate, hydrology, Baranja

Fatal uterine prolapse in a female European bison (*Bison bonasus* L.) from Slovakia

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Summary

European bison (*Bison bonasus* L.) is an endangered autochthonous mammal species in Europe, which is listed in the Red Book. The last free-ranging animal in Europe was killed in 1927 in the Caucasus. From remained 54 captive animals a breeding and reintroduction program was launched. In 2004, first five wisents were released in Poloniny National Park, Eastern Slovakia. On 7 November, 2007 a free-ranging female European bison was found dead in the Park. Female was found two days after parturition with prolapsed uteri and nearby was barely alive calf. Despite supportive therapy calf died during following day. Necropsy performed on female revealed following diagnoses: uterine prolapse, rupture of urinary bladder, pneumonia, dilated and hypertrophic heart. Uterine prolapse in cattle occurs typically in late gestation and despite the fact that exact causes has not been ascertained they are most likely related to endocrine imbalance, obesity, large calves, heredity in certain breeds, etc. In this particular case, a calf weighed 23 kg, which is within normal values set up for wisent's calves. Most probably the position of developing calf was not ideal which resulted in prolonged and difficult birth followed by constant straining efforts. Reproductive failure represent severe problem in efforts for conservation of endangered European bison, and is partly attributed to inbreeding.

Key words: european bison, poloniny, uterine prolapse, reproductive failure

Usporedba kapitalnih trofeja divljači u zajedničkim lovištima hrvatskog Podunavlja u razdoblju 2007. – 2012.

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Sažetak

Obrađeni su i uspoređeni podaci o trofejima divljači stečenim odstrjelom u 85 zajedničkih lovišta u Osječko-baranjskoj i 53 u Vukovarsko-srijemskoj županiji. Podaci su prikupljeni iz obrazaca evidencije o ocijenjenim trofejima krupne i sitne divljači tijekom pet lovnih godina, od 2007./2008. do 2011./2012. Trofeje su ocijenila službena povjerenstva pri županijskim lovačkim savezima. U Osječko-baranjskoj županiji ocijenjeno je ukupno 2754 trofeja, od čega 486 (18 %) kapitalnih, dok je u Vukovarsko-srijemskoj županiji ocijenjen ukupno 771 trofej, od čega 130 (17 %) kapitalnih. Zabilježen je trend godišnjeg porasta broja trofeja prijavljenih za ocjenjivanje, kao i udjela kapitalnih trofeja kod većine vrsta divljači. Utvrđene su razlike u zastupljenosti pojedine divljači u strukturi kapitalnih trofeja. U Osječko-baranjskoj županiji zastupljeni su: srna obična (46 %), jelen obični (26 %), čagalj (25 %) i svinja divlja (17 %). Trofej čaglja od 27,93 CIC točaka iz lovišta XIV/130 „Laslovo“ bio je nacionalni prvak u lovnoj 2010./2011. godini. U Vukovarsko-srijemskoj županiji zastupljeni su: srna obična (52 %), svinja divlja (38 %) i čagalj (5 %). Zastupljenost trofeja mačke divlje, lisice i jazavca neznatna je (1-3 %) u obje županije. Trofej lubanje jazavca iz lovišta XIV/136 „Dalj“, ocijenjen u lovnoj 2007./2008. godini s 23,51 CIC točaka, aktualni je nacionalni prvak. Prema provedenom službenom ocjenjivanju, među kapitalnim trofejima u Osječko-baranjskoj županiji je 59 trofeja (12 %) u zlatnoj, 147 (30 %) u srebrnoj i 280 (58 %) u brončanoj medalji, dok su u Vukovarsko-srijemskoj županiji 22 trofeja (17 %) u zlatnoj, 36 (28 %) u srebrnoj i 72 trofeja (55 %) u brončanoj medalji. Od ukupnog broja zlatnih medalja, najviše (24 ili 41 %) je dodijeljeno trofeju jelena običnog u Osječko-baranjskoj, dok ih je 10 (45 %) dodijeljeno trofeju svinje divlje u Vukovarsko-srijemskoj županiji. Kvalitetu trofeja divljači moguće je poboljšati prikladnim uzgojno-selekcijskim radom i primjenom mjera za unaprjeđenje stanišnih uvjeta u lovištima.

Ključne riječi: kapitalni, trofej, lov, Hrvatska, Podunavlje

Comparison of capital trophies of game in the joint huntig grounds of the Croatian Danube Region in the period 2007 – 2012

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Summary

Records on game trophies, acquired by the culling in the 85 joint hunting grounds situated in Osijek-Baranja County, and 53 in Vukovar–Srijem County, was analysed and compared. Source of the records were forms for the registry on scored trophies from big and small game animals, during the five hunting years, from 2007/2008 to 2011/2012. Trophies were scored by the official committees established in the hunting federations at county level. In Osijek-Baranja County, total of 2,754 game trophies was scored, of which 486 (18 %) is assigned as capital trophy. In Vukovar-Srijem County, total of 771 game trophies was scored, of which 130 (17 %) is assigned as capital trophy. Annual increasing trend was noticed in number of trophies submitted for scoring, as well as percentage of capital trophies in most of the game animals. Differences in representation of individual game were determined in the structure of capital trophies. In Osijek-Baranja County, roe deer makes 46%, red deer 26%, golden jackal 25% and wild boar makes 17% in the structure of capital trophies. Trophy of golden jackal from the hunting ground XIV/130 „Laslovo“ with scored 27.93 CIC points, was national champion in the hunting year 2010/2011. In Vukovar-Srijem County, roe deer makes 52%, wild boar 38% and golden jackal 5% in the structure of capital trophies. Presence of trophies from wild cat, red fox and European badger was negligible (1-3%) in both counties. Trophy of Eurasian badger from the hunting ground XIV/136 „Dalj“ with scored 23.51 CIC points in the hunting year 2007/2008 is actual national champion. According to realised official scoring, among capital trophies in Osijek-Baranja County, 59 (12%) got gold medal, 147 (30%) silver and 280 (58%) got bronze medal. In Vukovar-Srijem County, 22 trophies (17%) got gold medal, 36 (28%) silver and 72 (55%) got bronze medal. The largest portion of gold medals (24 or 41%) was awarded to trophy of red deer in Osijek–Baranja County, while in Vukovar-Srijem County, 10 gold medals (45%) were awarded to trophy of wild boar. The quality of game trophies can be improved by appropriate implementation of activities of game breeding and selection, as well as measures for the improvement of the habitat conditions in the hunting grounds.

Key words: capital, trophy, hunt, Croatia, Danube region

Klima i tjelesna masa kao limitirajući faktori u reprodukciji divlje svinje (*Sus scrofa* L.)

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Sažetak

Procjena trenutne reproduktivne sposobnosti populacije divljih svinja je potrebna zbog nedavnog povećanja populacije diljem Europe. Istraživanje je provedeno u razdoblju od 7 godina (2006.-2012.) tijekom redovitih prigonskih lovova diljem Hrvatske. Ukupno je pregledano 543 odstrijeljenih slobodno živućih ženskih životinja, a podatci su preuzeti od 468 suprasne ženke te je analizirano sveukupno 2.819 fetusa. Cjelokupni omjer spolova fetusa bio je nešto neuravnotežen u korist mužjaka (1:0,86). Dobna distribucija ukazuje na relativno mladu populaciju: 62 % životinja bilo je mlađe od 24 mjeseci, a gotovo 65 % juvenilnih ženki bilo je suprasno. Prosječan broj fetusa po životinji bio je 6,02 (4,62 za juvenilne; 6,39 za jednogodišnje i 6,77 za odrasle). Friedman Test određuje najznačajniju razliku u broju fetusa između dobnih skupina ($\chi 2=96,448$; d.f.=2, $p<0,001$). Srednja tjelesna težina iznosila je 40,90 kg za juvenilne; 68,76 kg za jednogodišnje i 88,73 kg za odrasle. Broj fetusa u pozitivnoj je korelaciji s tjelesnom masom ($r=0,533$, $P<0,001$); korelacija raste do 85 kg ($r=0,580$, $p<0,001$), a zatim se počinje smanjivati. Isto tako, ovaj slučaj zabilježen je i kod drugih životinjskih vrsta, što se može pripisati dobi i sposobnosti životinja, jer su starije krmače mogući razlog za manju veličinu legla. S obzirom na utjecaj klimatskih čimbenika, najniža plodnost zabilježena je 2010. godine, što je prvenstveno povezano s najvećom količinom padalina (>1.000 mm), brojem snježnih dana (59 dana) i najnižom temperaturom (<12 °C). Ovaj rezultat podupire pretpostavku da klimatski uvjeti neosporno utječu na reprodukciju ženki, ali također mogu i neizravno utjecati kroz dostupnost prirodne hrane u lovištu. Analizirani reproduktivni parametri odražavaju relativno visoku reproduktivnu sposobnost u odnosu na populacije u južnoj i sjevernoj Europi, ali su usporedivi s nekim populacijama u središnjoj Europi. Zaključno, dokumentirani rezultati reproduktivnih karakteristika vrste ukazuju na značaj izrade boljih planova za održivo gospodarenje divljim svinjama.

Ključne riječi: *Sus scrofa*, klimatski uvjeti, fetus, Hrvatska

Climate and body weight as limiting factors in the reproduction of wild boar (*Sus scrofa* L.)

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Summary

Evaluation of the current reproductive performance of wild boar populations is necessary due to recent population increases throughout Europe. This study was conducted over a 7-year period (2006-2012) during regular drive hunts throughout Croatia. A total of 543 harvested free-range female animals were inspected, but comprehensive data for 468 pregnant female was obtained and a total of 2,819 fetuses were analyzed. The overall fetal sex ratio was slightly unbalanced in favor of males (1:0.86). The age distribution indicated a relatively young population: 62% of the examined animals were younger than 24 months, and nearly 65% of juvenile females were pregnant. The mean number of fetuses was 6.02 per animal (4.62 per juvenile, 6.39 per yearling and 6.77 per adult). A Friedman test determined the most significant difference in the number of fetuses between age groups ($\chi 2$=96.448; d.f.=2; P<0.001). The mean live body weight was 40.90 kg for the juvenile class, 68.76 kg for the yearling class and 88.73 kg for the adult class. The number of fetuses correlated positively with live body weight (r=0.533; P<0.001) however, the strength of correlation increased up to 85 kg (r=0.580; p<0.001) and then began to decrease. Also, this case was recorded in other animal species, which can be attributed to the age and fitness of animals, because older sows are the possible reason for smaller litter size. Considering the influence of climate factors, the lowest fertility was recorded in year 2010, and it is primarily related with highest rainfall (>1,000mm), number of snow days (59 days) and the lowest temperature (<12°C). This result supports the hypothesis that climate conditions unquestionably influence reproduction performance of females, but also might indirectly effect throughout the availability of natural food in the hunting ground. The observed reproductive parameters reflect a relatively high reproductive capacity, in comparison to the populations in southern and northern Europe, but are comparable with some populations in central Europe. Inclusively, the results documented the reproductive performance of the species, drew attention to the importance of designing better plans for sustainable wild boar management.

Key words: *Sus scrofa*, climatic conditions, fetuses, Croatia

Krivolov i krijumčarenje ugroženih i zaštićenih životinjskih vrsta u Republici Hrvatskoj

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Sažetak

Konvencija o međunarodnoj trgovini ugroženim vrstama divljih životinja i biljaka (CITES), usvojena u Washingtonu 1975. godine, sa 178 država članica je najšire prihvaćen međunarodni sporazum u području zaštite prirode. Usvojena je s ciljem sprječavanja nekontrolirane međunarodne trgovine i komercijalnog iskorištavanja ugroženih vrsta i njome je zaštićeno preko 30.000 vrsta divlje flore i faune. Republika Hrvatska je punopravna stranka CITES-a od 12. lipnja 2000. godine. Status ugroženosti ili rijetkosti neke vrste i želja kolekcionara da posjeduju žive jedinke ili trofeje tih vrsta potiču krivolov i krijumčarenje te ilegalnu trgovinu. Sakupljanje trofeja divljih životinja, uključujući zaštićene i ugrožene vrste i danas je prisutno u cijelom svijetu, pa i u Hrvatskoj. Ilegalni transport do krajnjeg odredišta u pravilu se odvija preko teritorija jedne ili više država. Načini uzimanja i transporta živih ili mrtvih primjeraka divljih životinja ili njihovih dijelova danas su sve domišljatiji i suptilniji. Pravni okvir za sprječavanje krivolova i krijumčarenja ugroženih i zaštićenih divljih životinjskih vrsta u Republici Hrvatskoj čine: Zakon o zaštiti prirode, Zakon o prekograničnom prometu i trgovini divljim vrstama, Carinski zakon i Kazneni zakon. Nadležna provedbena tijela državne uprave su: inspekcija zaštite prirode, Carinska uprava i Ministarstvo unutarnjih poslova. Usklađenost domaćeg pravnog okvira s CITES-om preduvjet je učinkovitog sprječavanja krivolova i suzbijanja prekograničnog krijumčarenja. Inspekcija zaštite prirode zabilježila je brojne pokušaje prekograničnog krijumčarenja ugroženih životinja, najčešće ptičjih vrsta. Glavna žarišta ovih aktivnosti su granični prijelazi sa Bosnom i Hercegovinom, Crnom Gorom i Srbijom. Intenzitet krijumčarenja pojačan je u jesenskom razdoblju kada ptice selice na svom migracijskom putu do zimovališta prolaze iznad područja navedenih država.

Ključne riječi: CITES, Hrvatska, krivolov, krijumčarenje, ugrožena vrsta

Poaching and smuggling of endangered and protected animal species in the Republic of Croatia

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Summary

The Convention on International Trade in Endangered Species (CITES), adopted in Washington in 1975, with 178 member states is considered as the most widely accepted international agreement in the area of nature protection. It was adopted with an aim to prohibit uncontrolled international trade and commercial exploitation of endangered species; more than 30,000 species of wild flora and fauna are being protected by the CITES. Republic of Croatia is full party of CITES since June 12, 2000. The status of endangered or being rare for some species, and wishes of collectors to possess live individuals or trophies of these species encourage poaching, smuggling and illegal trade. Nowadays, collecting trophies of wild animals, including those protected and endangered is present, as well around the world as in Croatia. Illegal transport up to final destination is usually taken across the territory of one or more countries. Methods of collecting and transporting live or dead individuals of wild animals are being more subtle and inventive. Legal framework for prohibition of poaching and smuggling of endangered and strictly protected wild animal species in Republic of Croatia consists of: the Nature Protection Act; the Act on Transboundary Movement and Trade in Wild Species; the Customs Act and the Criminal Code. Competent state administration bodies for the implementation are: Nature Protection Inspection; Customs Directorate and Ministry of Interior. Alignment of domestic legal framework with CITES is precondition for the effective fighting and prevention of poaching and transboundary smuggling. Nature Protection Inspection recorded numerous attempts for transboundary smuggling of endangered animals, mostly bird species. Hot spots for these activities are border crossings with Bosnia and Hercegovina, Montenegro and Serbia. Smuggling intensity is higher during the autumn season when migratory birds on their migration route toward wintering places passing above territory of mentioned countries.

Key words: CITES, Croatia, poaching, smuggling, endangered species

Koncentracija epinefrina u serumu divlje svinje (*Sus scrofa* L.) u uvjetima stresa

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Sažetak

Istraživanje je provedeno na 42 zdrave divlje svinje (19 mužjaka i 23 ženke), u državnom lovištu br. XIV/23 "Krndija II" nakon lova prigonom. Životinje su bile tjelesne mase od 20 do 95 kilograma, u dobi do 5 godina. Krv je uzeta iz srca, odmah nakon odstrjela, u vakuum epruvete za biokemijske pretrage, centrifugirana je 10 min na 3000 okretaja i odijeljeni serumi pohranjeni su na -80° C. Analiza epinefrina određena je metodom ELISA tjedan dana nakon uzimanja uzoraka i 30 dana nakon ponovnog smrzavanja. Uzorci su kvantificirani u dva testa, s prosječnim koeficijentom varijacije za intra-test < 10 % i koeficijentom varijacije za inter-test < 12%. Mjerenje su urađena pri 450 nm valne duljine na ELISA čitaču (iMark™, Biorad; Engleska). Utvrđena je povišena koncentracija epinefrina u starijih životinja u odnosu na referentne vrijednosti kod domaćih svinja i ljudi. Nakon ponovljenog smrzavanja utvrđene su niže koncentracije u objema dobnim skupinama, ali statističkih razlika nije bilo (P>0,05). Utvrđena je povišena koncentracija glukoze i triglicerida u odnosu na referentne vrijednosti, dok su urea, kreatinin, ukupni proteini i albumin bili unutar referentnih vrijednosti. Nije utvrđena povezanost koncentracije epinefrina i glukoze.

Ključne riječi: lov, stres, epinefrin, ELISA, divlja svinja

Epinephrine concentration in wild pigs (*Sus scrofa* L.) serum under the stress condition

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Summary

The study was conducted on 42 healthy wild boars (19 males and 23 females) in the state hunting ground XIV/23 "Krndija II" during hunting season. The animals' weight was between 20 and 95 kilograms and they were not older than 5 years. Blood was taken from the heart, right after shooting, via vacuum tubes for biochemistry analyses, centrifuged for 10 min at 3000 rpm and the separated sera were stored at -80°C. Epinephrine analysis was determined by ELISA one week after sampling and 30 days after re- freezing. Samples were quantified in two tests, with an average variation coefficient for intra-test<10% and the variation coefficient for inter-test<12%. Measurements were performed at 450 nm wavelength in an ELISA reader (iMark™, Biorad, England). A higher concentration of epinephrine was determined in older animals compared to the reference values in domestic pigs and humans. After repeated freezing, lower concentrations in both age groups were found, but there was no statistical difference ($P > 0.05$). Elevated blood glucose and triglyceride levels were determined compared to reference values, whereas urea, creatinine, total protein and albumin were within the reference range. There was no correlation between the concentration of epinephrine and glucose.

Key words: hunting, stress, epinephrine, ELISA, wild boar

Book of Abstracts

Animal Husbandry

07

Stočarstvo

Zbornik sažetaka

Način mjerenja mikroklimatskih parametara na mliječnim farmama

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Sažetak

Kako bi se postigli bolji proizvodni rezultati u suvremenoj govedarskoj proizvodnji, moraju se osigurati optimalni uvjeti za životinje. Ključnu ulogu u tome ima staja i mikroklimatski uvjeti koji vladaju u njoj. Prilikom procjene mikroklime u staji potrebno je uzeti u obzir različite aspekte, kao što su:pasmina, dob, proizvodnja, način držanja, te samo trajanje i intenzitet djelovanja određenog čimbenika mikroklime u staji. Najvažniji parametri mikroklime u staji su: temperatura zraka u staji i površinska temperatura pojedinih dijelova staje, relativna vlaga zraka u staji, brzina strujanja zraka, osvijetljenost i koncentracija štetnih plinova. Mjerenje mikroklime u staji se obavlja u području u kojem se životinje zadržavaju. Prilikom mjerenja važno je uzeti u obzir godišnju dob, vrijeme mjerenja, vremenske prilike i položaj mjerne točke u staji, jer sve to ima utjecaj na dobivene rezultate. Za mjerenje temperature i vlage zraka koriste se naprava „Data Logger PCE-HT71“, a za štetne plinove (CO_2, NH_3, H_2S) koriste se mjerni uređaji poput: mjerača gasa „IAQ7515“ i „Gasman“. Za mjerenje jačine strujanja zraka i osvjetljenja koristi se mjerač brzine strujanja zraka „PCE-007“ i mjerač jačine svjetlosti „PCE-174“. „Data Logger PCE-HT71“ mjeri temperature zraka i vlažnost, te sprema podatke u svoju memoriju. Mjerni uređaji moraju biti postavljeni u sredini staje gdje krave borave, i to na visini od 2 do 2,5 metra (izvan dosega životinja). Uređaj stoji u staji cijelo vrijeme ispitivanja, te bilježi vrijednosti temperature i vlage zraka u određenim razmacima (svakih 2, 4, 6 ili više sati). Pri svakom posjetu farmi, snimljeni podatci se prenose sa uređaja na prijenosno računalo. Koncentracije štetnih plinova i količina osvjetljenja mjere se u visini glave životinje, i to na 13 mjernih točaka (12 u staji i jedna izvan staje). Razmak između točaka mora biti jednak, a njihova udaljenost od zida mora biti dva metra. Podatci snimljeni na uređajima mogu se prebaciti u računalo za daljnju obradu. U usporedbi s trenutnim mjerenjima, kontinuirana mjerenja nam omogućuju realniji prikaz klime u staji, jer se mjerenje obavlja kroz duži vremenski period. Međutim, nedostatak kontinuiranog mjerenja je u tome, što se uređaji moraju postaviti neposredno iznad zone u kojoj životinje borave, zbog zaštite uređaja od oštećenja. Prilikom određivanja mikroklime u staji u obzir se uzimaju i mikroklimatski uvjeti izvan staje. Zbog toga bi bilo potrebno izvan staje izmjeriti temperaturu zraka, relativnu vlagu zraka, brzina strujanja zraka i smjer kretanja vjetra.

Ključne riječi: mikroklima, mjerenje, mliječne farme

The way of measurements of the microclimate conditions on dairy farms

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Summary

In order to achieve better production results in modern cattle production, we must ensure optimal conditions for the animals. The key role in this has barn and microclimate conditions. When assessing the microclimate in the barn must take into account various aspects, such as: breed, age, productions, housing, and the duration and intensity of the effect of certain factors of microclimate in the barn. The most important parameters of the microclimate in the barn are: air temperature in the barn and temperature of the surface of the certain parts on the barn, the relative humidity in the barn, velocity of wind, light and concentrations of harmful gases. Measurement of microclimate in the barn is taken in an area where animals are kept. When is the measuring it is important to consider yearly age, time of measurement, the weather conditions and the position of the measurement point in the barn, because that all has an effect on the results. For measuring of temperature and humidity of the air is using a data logger PCE-HT71, and for the harmful gases (CO_2, NH_3, H_2S) it is using a measuring devices such as: gas meter IAQ7515 and Gasman. For the measuring of the velocity of wind and illuminations is using a air flow meter PCE-007 and lux meter PCE-174. The PCE-HT71 data logger detects air temperature and humidity and stores readings to its internal memory. They must stand in the middle of the barn where located cattle at a height from 2 to 2,5 m (out of reach of animals). The device remains in the barn the entire study period, with each day of record temperatures and humidity in the selected intervals (every 2, 4, 6 or more hours). At each visit farms recorded data is downloaded and stored on the portable computer. Measurement of harmful gases and illuminations are measured at head height of animals to the 13 measuring points (12 in the barn and one outside the barn). The distance between the points should be the same, and their distance from the wall must be two meters. The data saved in the apparatus can be transferred onto the computer for later evaluation. Compared with the single measurements, continuous measurements allow us a more realistic view of climate in the barn, because the measurement is carried out over a longer period of time. However, continuous measurements have their shortcomings; the devices must often set slightly above the zone in which the animals are to be protected from damage. In determining the microclimate in the barn the must are taken into account and a microclimate conditions outside the barn. Because of that it is necessary to measure: air temperature, relative humidity, wind velocity and direction of the wind from outside of the barn.

Key words: microclimates, measurements, dairy farms

Next generation sequencing (NGS) tehnologija u analizi genoma svinje

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Sažetak

Frederick Sanger razvio je prvu metodu izoliranja DNA provedenu tijekom 1975. godine. Navedena metoda poznata je kao metoda terminacije sinteze lanca (Chain termination method), odnosno dideoxy metoda. Ona se temelji na korištenju 2,3- dideoksi nukleozid trifosfata pri sintezi DNA. Automatizirana Sangerova metoda bila je dominantna metoda izolacije DNA tijekom zadnja dva desetljeća te se smatra tehnologijom prve generacije. Next generation sequencing metoda (NGS) predstavlja novi način analize DNA koji se bazira na shotgun sekvenciranju. Tehnologija sekvenciranja uključuje niz metoda koje su grupirane obzirom na pripremu uzorka, sekvenciranje i analizu dobivenih podataka. Kombinacija specifičnih protokola razlikuje se između pojedinih tehnologija te određuje vrstu dobivenih podataka. Dvije su metode pripreme podataka za NGS analizu, a to su uzorci jednolančane DNA molekule te klonirani i umnoženi uzorci koji potječu od jednolančane DNA. Ovim načinom analiziraju se kratki fragmenti DNA koji se spajaju računalnim algoritmom. Sekvenciranje fragmenata duljih od 1000 baznih parova uobičajenim metodama analize je neprecizno. NGS tehnologijom stvaraju se kratki fragmenti duljine 600 do 700 baznih parova te se u tome očituje uspješnost ove metode. Primjena ovog načina analize genoma uspješnija je i jeftinija od primjene tehnologije prve generacije. Razvoj i primjena NGS tehnologije omogućuje sekvenciranje cijelog genoma pojedinih organizama.

Ključne riječi: Sangerova metoda analize, genom, shotgun sekvenciranje, next generation sequencing (NGS) tehnologija

Next generation sequencing (NGS) technology in the analysis of swine genome

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Summary

During 1975th Frederick Sanger has developed first method of isolating the DNA. This method is known as a method of termination of synthesis chain (chain termination method) or dideoxy method. It is based the use of 2,3- dideoxy nukleoside triphosphate in the synthesis of DNA. Automated Sanger method was the dominant method of DNA isolation during the last two decades and it is considered as a first-generation technology. Next generation sequencing methods (NGS) is a new method of DNA analysis, which is based on shotgun sequencing. Sequencing technologies includes a variety of methods that are grouped due to sample preparation, sequencing and data analysis. The combination of specific protocols is different between specific technologies and determines the type of obtained data. There are two methods used in preparing data, and that is the single-stranded DNA molecules, and cloned amplified samples that originating from single-stranded DNA. With this method analyzes the short fragments of DNA that are connected by computer algorithms. Sequencing fragments longer than 1000 base pairs by usual methods of analysis is imprecise. NGS technology creates fragments of 600 to 700 base pairs and that is one of the advantage in use of this technology. Application of this method of genome analysis is more successful and less expensive than the first generation technology. Development and application of NGS technology allows sequencing of the entire genome in individual organisms.

Key words: Sanger sequencing method, genome, shotgun sequencing, next generation (NGS) sequencing technology

Genetska raznolikost istarskog goveda: analiza rodovnika

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Sažetak

Istarsko govedo je jedna od tri hrvatske izvorne pasmine goveda i prema veličini rasplodne populacije sa 729 grla (39 bikova i 690 krava) najveća je izvornih pasmina goveda, a prema stadiju ugroženosti kategorizira se kao visoko ugrožena pasmina (N_e = 147,65) (HPA, 2013). Vjerodostojna matična evidencija omogućava plansko vođenje uzgoja u cilju povećanja genetske varijabilnosti i izbjegavanje štetnih utjecaja inbridinga (uzgoja u srodstvu). Kako se populacija istarskog goveda uzgaja isključivo u čistoj krvi, postoji veliki rizik od značajnog gubitka genetske varijabilnosti. Za vjerodostojno i uspješno plansko vođenje uzgoja i provedbe uzgojnog programa, nužno je učiniti sistematizaciju uzgoja temeljem rodovničkih podataka, a plansko vođenje uzgoja (planski pripust) organizirati prema linijama bikova i rodovima krava. Iz tog razloga provedena je sistematizacija uzgoja istarskog goveda (izgradnja rodovnika), a rezultat sistematizacije je definiranje 5 linije bikova i 142 roda krava. Osim planskog vođenja uzgoja, sistematizacija omogućava vjerodostojnije utvrđivanje demografskih parametara, procjenu genetske varijabilnosti, ali i efikasnu provedbu molekularnih istraživanja.

Ključne riječi: istarsko govedo, rodovnik, sistematizacija, genetska raznolikost

Genetic diversity of Istrian cattle: pedigree analysis

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Summary

Slavonian Syrmian Podolian cattle is one of three Croatian autochthonous cattle breeds and by the breeding population size of 729 heads (39 bulls and 690 cows) it is the largest Croatian autochthonous breed, and according to the stage of vulnerability categorized as highly endangered breed (N_e = 147,65) (CAA, 2013). Reliable herd book records allow planned conducting of breeding with goal of increasing genetic variability and avoiding harmful influence of inbreeding. As the population of the Istrian cattle is raised exclusively in pure blood, there is a risk of a significant loss of genetic variability. For reliable and successful planned conducting of breeding and implementation of breeding program, it is necessary to make a systematization of breeding based on pedigree records, and planned conducting of breeding (planned mating) organized by bull lines and cow lines. For this reason, systematization of Istrian cattle has been carried out (pedigree construction), and the result of systematization is defining 5 bull lines and 142 cow lines. Besides planned conducting of breeding, systematization allows more reliable determination of demographic parameters, genetic variability estimation, but also an efficient application of molecular researches.

Key words: Istrian cattle, pedigree, systematization, genetic diversity

Utjecaj državne potpore na populacije izvornih i zaštićenih pasmina domaćih životinja u Republici Hrvatskoj

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Sažetak

Tijekom prošlih stoljeća u Republici Hrvatskoj uzgojen je velik broj različitih pasmina domaćih životinja koje odlikuju naše nacionalno, genetsko i kulturno nasljeđe. U sklopu očuvanja ukupne bioraznolikosti, Ministarstvo poljoprivrede već desetak godina provodi program potpore registriranim izvornim i zaštićenim pasminama domaćih životinja. Do danas smo u uzgoju uspjeli sačuvati i registrirati 27 pasmina koje su s obzirom na veličinu svoje populacije razvrstane u više statusnih kategorija ugroženosti od kojih su neke kritično ugrožene. Ovaj rad, analizirajući zadnjih deset godina uzgojne parametre pojedine izvorne i zaštićene pasmine (broj grla/kljunova, broj podmlatka, broj uzgajivača, N_e (efektivna veličina populacije) i procjenu trenda populacije) objašnjava kakav je utjecaj državne potpore na pojedine parametre i populaciju u cjelini. Potpora je do sada bila plod aproksimativne procjene tadašnjih politika i imala je neujednačen utjecaj na populacije izvornih i zaštićenih pasmina, ali u odnosu na konvencionalne pasmine ipak bilježe značajan trend rasta. Rad završava sa usporedbom naše nacionalne potpore s potporama u drugim članicama EU 28 te mogućim implikacijama nakon izrade nove kalkulacije potpore u Republici Hrvatskoj. Očuvanje izvornih i zaštićenih pasmina nije samo praćenje svjetskog trenda zbog biološkog i ekonomskog značenja već je i moralna obveza prema prošlim i budućim generacijama.

Ključne riječi: izvorne i zaštićene pasmine, potpora, status ugroženosti, trend populacije

The impact of state support on autochthonous and protected breeds populations of domestic animals in Croatia

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Summary

Over the past centuries many different breeds of domestic animals have been bred in Croatia that characterize our national, genetic and cultural heritage. As a part of the overall preservation of biodiversity, the Ministry of Agriculture is implementing Program of support for registered autochthonous and protected breeds of domestic animals in Croatia for last ten years. Until today, we have managed to preserve and register 27 breeds that are according to size of its population classified into several categories of risk status, including some of them are critically endangered breeds. This paper explains the impact of state aid on the individual parameters and the population as a whole, by analyzing the last ten years of breeding parameters of each autochthonous and protected breed (number of heads/beaks, the number of offspring, the number of farmers, effective population size and estimation of population growth rate). So far, the support has been the result of an approximate estimate of the previous policy and has had an uneven impact on the autochthonous and protected breeds populations, but in comparison to conventional breeds still showed a significant upward trend. The paper concludes with a comparison of Croatian national aid support with other 28 EU member states and possible implications of a new calculation of support in Croatia. Preserving the autochthonous and protected breeds is not just a following of a global trend due to the biological and economic importance, but also the moral obligation to past and future generations.

Key words: autochthonous and protected breeds, support, risk status, population growth rate

Regionalna strategija očuvanja autohtonih pasmina domaćih životinja

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Sažetak

Očuvanje farmskih genetskih resursa od višestruke je važnosti za raznovrsnost i sigurnost proizvodnje hrane, identitet područja te održivost ekosustava. Izvorne pasmine odlikuje jedinstven genotip te naglašena adaptabilnost. Stvarane višestoljetnim djelovanjem čovjeka i okruženja, gospodarskim zapostavljanjem mogu iščeznuti u kratkom razdoblju. Očuvanje izvornih pasmina provodi se kroz nacionalne programe, no regionalno povezivanje i usmjereno djelovanje može značajno povećati njihovu učinkovitost. Dio izvornih pasmina je regionalnog karaktera što dodatno opravdava uspostavu regionalne suradnje. Cilj rada je komparativna analiza dvaju nacionalnih programa očuvanja i afirmacije izvornih pasmina. Pitanja inventarizacije i karakterizacije izvornih pasmina, nadzora populacijskih trendova i rizika ugroze, njihova održivog korištenja i afirmacije, uspostave i razvoja *in situ* i *ex situ* modela očuvanja te pravnog okvira su moguća područja suradnje. Učinjena inventarizacija fenotipa i genotipa izvornih pasmina omogućava kreiranje srodnih programa uzgoja i gospodarske afirmacije. Dio populacija izvornih pasmina promatranog područja su metapopulacije u konzervacijskom smislu. Srodni uzgojni programi i ciljana razmjena genetskog materija može pomoći konsolidaciji uzgoja. Uspostava zajedničke regionalne strategije, posebice u području afirmacije izvornih pasmina, razvoju *in situ* i *ex situ* modela zaštite može značajno unaprijediti samoodrživost izvornih pasmina, posebice regionalnih.

Ključne riječi: autohtone pasmine, očuvanje, reafirmacija, strategija,

Regional conservation strategy for autochthonous breeds of domestic animals

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Summary

Preservation of farm genetic resources is important for diversity and security of food production, region identity and ecosystem sustainability. Native breeds are characterized by unique genotype and adaptability. Created by centuries with human activities and influence of environment, native breeds can disappear in a short period of time if they are economically neglected. Preservation of native breeds is implemented in national programs, but regional integration can considerably increase their effectiveness. Part of the native breeds is of regional character what further justifies the establishment of regional cooperation. The aim of this paper is comparative analysis of two national programs for preserving and affirmation of the native breeds. Further cooperation could include: inventarisation and characterization of native breeds, monitoring of population trends and risk status, their sustainable use, establishment of *in situ* and *ex situ* models and legal frameworks. Performed phenotype and genotype analysis enable to create a similar breeding programs and economic affirmation. One part of the native breeds populations of the area under study belongs to metapopulations, thus similar breeding programs and targeted exchange of genetic material can help in the breeding consolidation. Establishment of a common regional strategy in the affirmation of native breeds and development of *in situ* and *ex situ* models can improve sustainability of native breeds, especially regional ones.

Key words: autochthonous breeds, preservation, reaffirmation, strategy

Utjecaj genotipa svinja na masnokiselinski profil i oksidativni status pršuta

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Sažetak

S ciljem da se utvrdi utjecaj genotipa svinja na fizikalno-kemijska svojstva istarskog pršuta (P) zaklano je 10 svinja genotipa (veliki jorkšir, ♀ x njemački landras, ♂) x durok, ♂ (1) i 10 svinja genotipa švedski landras, ♀ x veliki jorkšir, ♂ (2), uz pretpostavku da će P1 imati veći udio intramuskularne masti (IMM) te da će masnokiselinski profil i oksidativni status dvije grupe pršuta (P1 i P2) biti različit. Nakon 18 mjeseci prerade sa svakog je pršuta uzet uzorak mišićnog tkiva radi utvrđivanja osnovnog kemijskog sastava, udjela NaCl, sastava masnih kiselina (MK), te oksidativnog statusa (kiselinski broj-Kb kao pokazatelj količine slobodnih-SMK i peroksidni broj-Pb kao pokazatelj stupnja primarne oksidacije SMK), nakon čega je na temelju Pearsonovih koeficijenata korelacije (***r***) procijenjen utjecaj pojedinih MK i NaCl na stupanj lipolize i oksidacije pršuta. Udio (%) IMM je očekivano bio veći u P1 (16,01 vs. 12,24; P<0,01), dok je udio (%) NaCl bio veći u P2 (8,29 vs. 9,04; P<0,01). Od 23 identificirane MK, za udjele njih 14 su utvrđene značajne razlike P1 vs. P2, pri čemu su P1 sadržavali (%) više sljedećih MK: 12:0 (0,08 vs. 0,07; P<0,001), 18:0 (13,72 vs. 11,23; P<0,001), 18-2n-6 (11,84 vs. 8,48; P<0,001), 18-3n-3 (0,60 vs. 0,17; P<0,001), 20-2 (0,62 vs. 0,48; P<0,05), 24-0 (0,03 vs. 0,00; P<0,001), 24-1 (0,09 vs. 0,00; P<0,001), a P2 su sadržavali (%) više: 16-1 (2,53 vs. 2,84; P<0,05), 17-0 (0,28 vs. 0,40; P<0,05), 17-1 (0,22 vs. 0,37; P<0,05), 18-1n-9t (0,29 vs. 0,46; P<0,001), 18-1n-9c (41,11 vs. 46,42; P<0,001), 22-0 (0,00 vs. 0,23; P<0,001), 20-1 (0,88 vs. 1,04; P<0,01), 21-0 (0,05 vs. 0,39; P<0,001) te neidentificiranih, vjerojatno dugolančanih nezasićenih MK (0,64 vs. 0,89; P<0,05). P1 su sadržavali (%) više zasićenih (Z) MK (39,98 vs. 37,39; P<0,001), polinezasićenih (PN) MK (14,25 vs. 10,35; P<0,001), n-6 (12,79 vs. 9,52; P<0,001) i n-3 (0,84 vs. 0,36; P<0,001), a P2 su sadržavali (%) više mononezasićenih (MN) MK (45,13 vs. 51,16; P<0,001), nezasićenih (N) MK (59,39 vs. 61,51; P<0,001) i n-9 (41,40 vs. 46,87; P<0,001). Na temelju koeficijenata korelacije (*r*) pretpostavlja se da su promotori lipolize bile MK: 18-1n-9t (0,74; P<0,001), 18-1n-9c (0,66; P<0,01), 22-0 (0,76; P<0,001), 20-1 (0,60; P<0,01) i 21-0 (0,82; P<0,001), a njeni protektori MK: 12-0 (-0,45; P<0,05), 18-0 (-0,79; P<0,001), 18-2n-6 (-0,50; P<0,05), 18-3n-3 (-0,71; P<0,001), 24-0 (-0,68; P<0,01), dok su promotori oksidacije bile MK: 17-0 (0,44; P<0,05), 17-1 (0,49; P<0,05), 21-0 (0,58; P<0,01) i 22-0 (0,48; P<0,05) koja nije nađena u P1, a protektori oksidacije MK: 16-0 (-0,57; P<0,01), 18-0 (-0,53; P<0,05) i 24-0 (-0,43; P<0,05) koja nije nađena u P2. Udio SMK (Kb) je bio veći u pršutima s više MNMK (0,68; P<0,01), NMK (0,73; p<0,001) i n-9 (0,67; P<0,01) te pršutima s manje IMM (-0,48; P<0,05), ZMK (-0,69; p<0,01), PNMK (-0,46; P<0,05), n-6 (-0,45; P<0,05) i n-3 (-0,54; P<0,05). Stupanj oksidacije SMK (Pb) je bio manji u P1 s većim udjelom ZMK (-0,66; P<0,01) te manjim udjelima MNMK (0,42; P<0,05) i NMK (0,66; P<0,01). Utjecaj NaCl na Kb i Pb pršuta nije utvrđen. Rezultati ukazuju na pretpostavku da genotip 1, osim na udio IMM utječe i na sastav MK koji je s gledišta oksidativne stabilnosti bio povoljniji.

Ključne riječi: genotip svinja, masne kiseline, pršut, lipoliza, oksidacija

The fatty acid profile and the oxidative status of Istrian prosciutto: impact of pig genotipe

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Summary

In order to determine the impact of pig' genotype on chemical properties of Istrian prosciutto (P), 10 pigs (Large White x German Landrace) x Duroc (P1) and 10 pigs Swedish Landrace x Large White (P2), were slaughtered, assuming that the P1 will have more intramuscular fat (IMF) and fatty acid profile and oxidative status between the groups P1 vs. P2 will be different. In order to determine the basic chemical composition, NaCl content, fatty acid (FA) profile and oxidative status (acid N°-A as an indicator of free fatty acids-FFA content and peroxide N°-P as an indicator of FFA primary oxidative status), after 18 months of processing the muscle tissues were sampled from each hams. The effect of individual FA and NaCl content on the degree of lipolysis and oxidation of ham was estimated based on Pearsons correlation coefficient (***r***). IMF content (%) was higher in P1 (16.01 vs. 12.24; P<0.01), and NaCl content (%) was higher in P2 (8.29 vs. 9.04; P<0.01). There were 23 FA identified in total, and contents of 14 FA between the groups were different. P1 were contained (%) more: 12:0 (0.08 vs. 0.07; P<0.001), 18:0 (13.72 vs. 11.23; P<0.001), 18-2n-6 (11.84 vs. 8.48; P<0.001), 18-3n-3 (0.60 vs. 0.17; P<0.001), 20-2 (0.62 vs. 0.48; P<0.05), 24-0 (0.03 vs. 0.00; P<0.001), 24-1 (0.09 vs. 0.00; P<0.001), and P2 were contained (%) more: 16-1 (2.53 vs. 2.84; P<0.05), 17-0 (0.28 vs. 0.40; P<0.05), 17-1 (0.22 vs. 0.37; P<0.05), 18-1n-9t (0.29 vs. 0.46; P<0.001), 18-1n-9c (41.11 vs. 46.42; P<0.001), 22-0 (0.00 vs. 0.23; P<0.001), 20-1 (0.88 vs. 1.04; P<0.01), 21-0 (0.05 vs. 0.39; P<0.001) and unidentified FA, presumably unsaturated C20 or bigger (0.64 vs. 0.89; P<0.05). P1 were contained (%) more saturated (S) FA (39.98 vs. 37.39; P<0.001), polyunsaturated (PU) FA (14.25 vs. 10.35; P<0.001), n-6 (12.79 vs. 9.52; P<0.001) and n-3 (0.84 vs. 0.36; P<0.001). P2 were contained (%) more monounsaturated (MU) FA (45.13 vs. 51.16; P<0.001), unsaturated (U) FA (59.39 vs. 61.51; P<0.001) and n-9 (41.40 vs. 46.87; P<0.001). Based on ***r*** it can be assumed that the lipolysis promoters were: 18-1n-9t (0.74; P<0.001), 18-1n-9c (0.66; P<0.01), 22-0 (0.76; P<0.001), 20-1 (0.60; P<0.01) i 21-0 (0.82; P<0,001), and the protectors were: 12-0 (-0.45; P<0.05), 18-0 (-0.79; P<0.001), 18-2n-6 (-0.50; P<0.05), 18-3n-3 (-0.71; P<0.001), 24-0 (-0.68; P<0.01). The oxidation promoters were: 17-0 (0.44; P<0.05), 17-1 (0.49; P<0.05), 21-0 (0.58; P<0.01) and 22-0 (0.48; P<0.05) that was not found in P1. The oxidation protectors were: 16-0 (-0.57; P<0.01), 18-0 (-0.53; P<0.05) and 24-0 (-0.43; P<0.05) that was not found in P2. Content of FFA (A) was higher in P with more MUFA (0.68; P<0.01), UFA (0.73; p<0.001) and n-9 (0.67; P<0.01) and in P with less IMF (-0.48; P<0.05), SFA (-0.69; p<0.01), PUFA (-0.46; P<0.05), n-6 (-0.45; P<0.05) and n-3 (-0.54; P<0.05). FFA oxidative degree (P) was lower in P1 with more SFA (-0.66; P<0.01) and less MUFA (0.42; P<0.05) and UFA (0.66; P<0.01). Effect of NaCl on A and P was not established. Besides the increasing of IMF, it seems that genotype 1 had a significant impact on FA profile of the hams that was more favourable concerning the oxidative stability.

Key words: pig' genotype, fatty acids, dry-cured ham, lipolysis, oxidation

Mikroklimatski pokazatelji na farmama muznih krava u istočnoj Hrvatskoj

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Sažetak

Mikroklima u staji ima veliki utjecaj na zdravlje, dobrobit životinja i samu proizvodnju mlijeka. Nedostatak dobre ventilacije i rashlađivanja može dovesti do previsokih vrijednosti temperature i vlage zraka, a ujedno i visoke koncentracije štetnih plinova. Kao posljedica toga, dolazi do povećanja temperaturno-humidnog indeksa (THI), smanjenja udobnosti, proizvodnosti i zdravlja životinja. Istraživanje je obuhvatilo pet farmi mliječnih krava iz različitih dijelova istočne Hrvatske u razdoblju od ožujka do kolovoza. Farme su otvorenog tipa, s ventilatorima, dvije s dubokom steljom, a preostale tri s liga ležištima. Obavljena su kontinuirana mjerenja (dvanaest mjerenja na dan) temperature i vlage zraka u staji gdje borave visoko proizvodne krave u vrhu laktacije. Trenutna mjerenja ostalih mikroklimatski pokazatelja (ugljični dioksid (CO_2), amonijak (NH_3), sumporovodik (H_2S), brzina strujanja zraka i osvijetljenost) obavljena su jednom mjesečno pomoću odgovarajućih mjernih uređaja. Temperatura zraka u staji kretala se u rasponu od -1,9 do 42°C. Prosječna temperatura za mjesec ožujak i travanj, kretala od 6,1 do 16ºC, što znači da je temperatura u ta dva mjeseca bila optimalna za mliječne krave. Dok se u svibnju, lipnju, srpnju i kolovozu prosječna temperatura kretala od 18,6 do 25,4°C, što je više od preporučene optimalne temperature za mliječne krave. Vlaga zraka je imala vrijednosti od 24,9 do 94,5%, a u prosjeku od 61 do 77% . Prosječne vrijednosti vlage su bile u optimalnim vrijednostima, međutim kada se ta vlaga stavi u kombinaciju s pripadajućom temperaturom zraka dobijemo visoke vrijednosti THI, koje su prelazile dozvoljeni prag od 72. To je pokazatelj da su krave tijekom ljetnog perioda bile izložene toplotnom stresu i da se na farmama nije postigao dovoljan učinak hlađenja. Prosječne vrijednosti koncentracije CO_2 u zraku kretale su se u rasponu od 460 do 849 ppm-a, što ukazuje na to da su te vrijednosti bile ispod dozvoljene granične vrijednosti od 3.000 ppm. Koncentracija NH_3 iznosila je od 0,1 do 7,0 ppm. Najveća vrijednost H_2S bila je 1,0 ppm što je ispod dozvoljene granice. Brzina strujanja zraka iznosila je do 4,91 m/s, a prosječna osvijetljenost farmi se kretala od 395 do 11.198 luxa. Farme su imale dobru ventilaciju, što je omogućilo provjetravanje i izlazak štetnih plinova, međutim rashlađivanje životinja nije u potpunosti zadovoljeno. Potrebno je povećati strujanje zraka i uvođenje vodenih prskalica koje će pospješiti evaporaciju i rashlađivanje krava tijekom nepovoljnih vrijednosti THI.

Ključne riječi: mikroklima, farme muznih krava, temperaturno-humidni indeks

Microclimate parameters on the dairy farms in Eastern Croatia

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Summary

Microclimate in the barn has large impact on the health, welfare and milk production. Deficiency of good ventilation and cooling can lead to excessive temperature and humidity, and also high concentrations of harmful gases. As consequence of that, the temperature-humidity index grows, reducing comfort, production and health of animals. The study included five dairy farms from different parts of the eastern Croatian during the period from March to August. Farms are open type, with fans, two with deep litter and the other three with a league boxes. The continuous measurements are made (twelve measurements per day) temperature and humidity in the barn where staying highly productive cows in the top of lactation. Current measurements of other microclimates parameters (carbon dioxide (CO_2), ammonia (NH_3), hydrogen sulphate (H_2S), air velocity and illumination) were measured monthly using the appropriate measuring devices. Air temperature in the barn ranged from -1,9 to 42 °C. The average temperature for the month of March and April, ranged from 6,1 to 16 °C, which means that the temperature in these two months was optimal for dairy cows . While in May, June, July and August, the average temperature ranged from 18,6 to 25,4 °C, which is higher than the recommended optimum temperature for dairy cows . Humidity had a value of 24,9 to 94,5 %, with an average of 61-77 %. Average values of humidity were the optimum values, but when the humidity is put in combination with the accompanying air temperature get high value of THI, which exceeded the permitted threshold of 72. This is an indication that the cows during the summer period were exposed to heat stress, and that the farm did not achieve sufficient cooling effect. Average values of CO_2 were in the range of 460 - 849 ppm, which indicates that these values were below the threshold limit value of 3000 ppm. NH3 concentration was 0,1 to 7,0 ppm. The greatest value of H2S was 1,0 ppm which is below the limit. Air velocity was up to 4,91 m/s, and the average illumination of farms ranged from 395 to 11.198 lux . Farms have had good ventilation, which allow ventilation and release of harmful gases, but cooling of animals was not fully satisfied. It is necessary to increase the are flow from the introduction of sprinklers that will increase evaporation and cooling cows during adverse THI values.

Key words: microclimate, dairy farms, temperature-humidity index

Utjecaj dobi kod prvog jarenja na proizvodnju mlijeka u prvoj laktaciji koza alpina pasmine

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Sažetak

Cilj rada je bilo utvrditi utjecaj dobi koza pri početku prve laktacije na količinu i kemijski sastav mlijeka. U analizi su korišteni podaci 10.857 zaključenih laktacija Alpina pasmine iz 294 stada. Podaci su uzeti iz središnje baze podataka Hrvatske poljoprivredne agencije za razdoblje od siječnja 2.000. godine do travnja 2012. godine. Kontrola mlijeka je obavljena prema A4, AT i B4 metodi sukladno pravilima ICAR-a (International Committee for Animal Recording). Podaci su statistički obrađeni primjenom procedure GLM statističkog paketa SAS. Najmanja proizvodnja mlijeka utvrđena je kod koza s početkom prve laktacije u dobi 12 mjeseci koja je iznosila prosječno 349,51 kg. Povećanjem dobi koza kod početka prve laktacije povećavala se i količina proizvedenog mlijeka da bi svoj maksimum dosegnula kod laktacija započetih pri dobi koza od 20 mjeseci i tada je prosječno iznosila 424,67 kg. Isti utjecaj dobi koza je i na proizvodnju ukupne količine mliječne masti i bjelančevina. Minimalna količina proizvedene masti u laktaciji je utvrđena za laktacije s početkom pri dobi koza od 12 mjeseci i iznosila je prosječno 12,84 kg, a maksimalna od 15,33 kg pri dobi od 20 mjeseci. Sadržaj bjelančevina se kretao od 10,73 kg s početkom laktacije pri dobi koza od 12 mjeseci do maksimuma od 12,85 kg s početkom pri dobi 20 mjeseci. Dob koza kod početka prve laktacije nije imala statistički značajan utjecaj na postotak masti i bjelančevina tijekom prve laktacije. I pored toga što je količina proizvedenog mlijeka, mliječne masti i bjelančevina bila veća kod jarica pripuštenih pri dobi većoj od 12 mjeseci, povećanje proizvodnje ipak nije toliko da opravda gubitak cijele jedne sezone jarenja, a posljedično i laktacije.

Ključne riječi: alpina, laktacija, dob, mast, bjelančevine

Effect of goats' age at first kidding on production of milk in the first lactation at Alpina breed

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Summary

The aim of the study was to determine the effect of age of goats at the beginning of the first lactation on the amount and chemical composition of milk. The analysis used data of 10,857 concluded Alpina breed lactations from 294 herds. Data were taken from the central database of the Croatian Agricultural Agency for the period from January 2000. until April 2012. year. Milk control is performed by A4, B4 and AT method in accordance with the rules of ICAR (International Committee for Animal Recording). Data were statistically analyzed using the GLM procedure of SAS statistical package. The lowest milk production was observed in goats with beginning of first lactation at age 12 months, which amounted to an average of 349.51 kg. With the increasing age of goats at the beginning of the first lactation increased the amount of milk produced, which reaches its maximum at lactation started with 20 months of age goats and then has ranged on average 424.67 kg. The same effect of age of goats has on production of the total amount of fat and protein. The minimum amount of fat produced in lactation was observed for lactation starting at the age of goats of 12 months and had an average of 12.84 kg, and the maximum was in goats with 20 months of age when the average was 15.33 kg. Range of proteins was from 10.73 kg in goats of age 12 months to a maximum of 12.85 kg in goats of age 20 months. Age goats at the beginning of the first lactation had no statistically significant effect on the percentage of fat and protein during the first lactation. Despite the fact that the quantity of milk, fat and protein content was higher in goats mated at 12 months of age, increasing production is not enough to justify the loss of an entire season of kidding , and subsequent lactation.

Key words: Alpina, lactation, age, fat, protein

Preliminarni rezultati analize genetske strukture autohtone crne slavonske pasmine svinja

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Sažetak

Autohtona hrvatska pasmina, crna slavonska svinja je vrlo mala populacija. Populacija crne slavonske svinje obuhvaća 900 krmača i 121 nerasta aktivnih u populaciji. S namjerom početka provođenja izračuna uzgojinh vrijednosti u populaciji potrebna je analiza pedigrea. Cilj ovog rada bio je procijeniti genetsku varijabilnost kod autohtone crne slavonske pasmine svinja koristeći rodoslovlje. Referentna populacija crne slavonske svinje sastojala se od 2126 svinja rođenih od 1994 do 2012. Za opis varijabilnosti u populaciji, sljedeći parametri su analizirani: koeficijent srodstva, efektivan broj osnivača i prednika. Parametri su bili procijenjeni pomoću PEDIG programskog paketa. U srodstvu je procijenjeno 454 jedinke crne slavonske svinje. Prosječni koeficijent srodstva bio je 9,5% s maksimalnom vrijednošću od 31,3%. Efektivan broj osnivača za muške i ženske crne slavonske svinje bio je 50,8 i 51,1. Efektivan broj prednika bio je niži od efektivnog broja osnivača, 35,8 za muške i 34,8 za ženske životinje. Udio gena od važnih predaka koji su pridonijeli muškoj i ženskoj populaciji crne slavonske je 7,1% i 9,1%. Prvih 15 prednika za muške životinje i 12 za ženske objasnilo je oko 50% varijabilnosti. Glavno ograničenje analize je kvaliteta rodoslovlja ove populacije. Pouzdanost procijenjenih parametara koji opisuju genetsku strukturu populacije ovisi o kvaliteti pedigrea.

Ključne riječi: analiza rodoslovlja, crna slavonska svinja, inbriding, efektivan broj prednika

Preliminary results of genetic structure of autochthonous Black Slavonian pig population

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Summary

Autochtonus Black Slavonian pig breed is very small population. Population of Black Slavonian pig consists of 900 active sows and 121 boars in the pedigree. With intention to start with the breeding value evaluation, preliminary analysis of the pedigree data was performed. Therefore, aim of this study was to estimate genetic variability in autochthonous Black Slavonian breed using pedigree as a tool. Reference population included 2126 Black Slavonian pigs born from 1994 to 2012. For description of genetic variability in population, following parameters were analysed: inbreeding coefficient, effective number of founders and ancestors. Parameters were estimated using PEDIG program package. Number of inbred Black Slavonian animals was 454. Average inbreeding was 9.5% with maximum of 31.3%. Effective number of founders was 50.8 for males and 51.1 for females. Effective number of ancestors was lower than effective number of founders, 35.8 for male and 34.8 for female animals, respectively. The proportion of the genes contributed to the reference population of males and females by the most important ancestor was 7.1 % and 9.1%. The first 15 ancestors for males and 12 for females explained around 50% variability in gene pool. A main constraint of the study is the quality of pedigree data. Reliability of estimated parameters which describe genetic structure of the population depends on quality of the pedigree data.

Key words: pedigree analysis, Black Slavonian breed, inbreeding, effective number of ancestors

Kvaliteta svježeg mlijeka na farmama krava u Federaciji Bosne i Hercegovine

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Sažetak

Cilj rada je da se realno predstavi trenutno stanje kvalitete mlijeka prema kemijskim parametrima, na pet većih farmi krava u FBiH, te prikaže uloga uzgojno selekcijskog rada na unaprjeđenje kvalitete mlijeka. U razdoblju od listopada 2012. do listopada 2013. na pet farmi muznih krava rađena je kontrola mliječnosti po AT 9 metodi. U vrijeme kontrole se mjerila količina mlijeka, a uzorak mlijeka od svake krave je analiziran u laboratoriji Federalnog zavoda za poljoprivredu Sarajevo na osnovne kemijske parametre i broj somatskih stanica u jednom ml mlijeka. Kemijski sastav mlijeka određen je metodom infracrvene spektrofotometrije, a broj somatskih stanica u mlijeku određen je fluoro-opto-elektronskom metodom (ukupan broj somatskih stanica u ml) na uređaju MilkoScan FT 6200. Ukupan broj mikroorganizama se nije analizirao kroz ove kontrole. Kontrola je rađena svakih 9 nedelja i to jednom ujutro, a na sljedećoj kontroli uveče. Za procjenu dnevne količine mlijeka korištena je metoda jednostavnog udvostručavanja parcijalnih vrijednosti. U ovom rzdoblju urađeno je ukupno 6 do 7 kontrola mliječnosti kod ukupno 1 327 muznih krava, a dobiveni su sljedeći prosječni rezultati zbrinog mlijeka sa svih farmi: sadržaj masti 4,05% (3,85 – 4,37%) ; proteina 3,3 (3,15 – 3,42 %); laktoze 4,3 (3,9 – 4,45); somatskih stanica 315000 u ml mlijeka (230 800 – 111 6000). Broj krava u stadu koje su proizvodile mlijeko sa preko 400 000 somatskih stanica je iznosio 16,3%, a one su proizvele 15,4% mlijeka od ukupnog proizvedenog mlijeka. Prosječna mliječnost po kravi je iznosila 25,5 litara. Na manjim farmama kvaliteta mlijeka je slabijeg kvaliteta u odnosu na farme sa velikim brojem muznih krava, koje posjeduju razvijeniju uzgojno selekcijsku službu. Kemijska kvaliteta mlijeka na ispitivanim farmama u FBiH zadovoljava važeće zakonske legislative BiH ali je i dalje veliki procenat krava u stadima koje proizvode mlijeko sa povećanim brojem somatskih stanica. Upornim uzgojno selekcijskim radom te kontrolom mliječnosti kao najvažnijim dijelom ovog rada, moguće je znatno poboljšati kvalitetu zbirnog mlijeka što je dokazano kroz ovaj rad. Na farmama koje su izlučile grla koja su proizvodila mlijeko sa povećanim brojem somatskih stanica došlo je do znatnog poboljšanja kvalitete mlijeka. Neophodno je u FBiH ali i na cijelom području BiH ojačati uzgojno slekcijski rad koji treba da doprinese poboljšanju kvalitete mlijeka.

Ključne riječi: kvaliteta mlijeka, somatske stanice, mliječnost

Fresh Milk Quality on the cow farms in the Federation of Bosnia and Herzegovina

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Summary

The main object of this work is to present realistic picture of the current condition of milk quality according to the chemical parameters on the five major cow farms in the Federation of Bosnia and Herzegovina. Also, the object is to present a role of breeding and selection work to improve milk quality. The control of diary production was done according to AT 9 method from October 2012. to November 2013. on the five dairy farms. The milk yield was measured in this control period, and a milk sample of each cow was analysed on the basic chemical parameters and the somatic cell counts per millilitre of milk in the Laboratory of Agricultural Institute of Federation in Sarajevo. The chemical composition of milk has been determined by infrared spectrophotometric technique, and the somatic cell counts have been determined using the flour-opto-electronic method (total number of the somatic cells per millilitre) on MilkoScan FT 6200. Total number of micro-organisms has not been analysed during these controls. The control has been done every nine weeks, once in the morning and the other in the evening. Simply doubling of partial milk yield has been used to estimate daily milk yield. The six to seven controls of dairy production have been done on the total number of 1 327 dairy cows, the average results of the total milk from all these farms is as it follows: the content of fat 4.05 % (3.85 – 4.37%) protein 3.3% (3.15 – 3.42%), lactose 4.3% (3.9-4.45%); the somatic cells 315 000 per millilitre of milk (230 800 – 1 116 000). The number of cows in the herd that produced milk with more than 400,000 somatic cells amounted to 16.3%, while those produced 15.4% of the total milk produced milk. The average milk yield per cow was 25.5 litres. On the minor farms milk has less effective quality compared to the larger dairy cow farms including highly developed breeding and selection service. The chemical composition of milk on the analysed farms in the Federation of Bosnia and Herzegovina has met the current legislatives, but still there are a lot of percentage of heard which produce milk with increasing the somatic cells counts. This work proves possibility to significantly improve the total milk quality by persistently breeding and selection as well as the control of diary production as the most important part of this work. There is considerably improvement of milk quality on the farms that breed head producing milk with increasing the somatic cell counts. It is necessary to intensify breeding and selection that should make milk quality better in the Federation but also in the whole area of Bosnia and Herzegovina.

Key words: milk quality, the somatic cells, dairy production

Book of Abstracts

Viticulture, Enology and Pomology

08

Voćarstvo, vinogradarstvo i vinarstvo

Zbornik sažetaka

Učinkovitost primjene enzima na parametre boje vina Plavca malog (*Vitis Vinifera* L.)

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Sažetak

Fenolni sastav crnih vina od temeljne je važnosti za njihovu kakvoću, posebice senzorna svojstva boje, te okusna svojstva punoću, gorčinu i trpkost. Primjena pektolitičkih enzima u maceraciji masulja jedan je od načina poboljšanja kompleksnog fenolnog potencijala vina. Cilj istraživanja bio je ispitati utjecaj primjene pektolitičkih enzima na parametre kakvoće boje crnog vina Plavca malog (*Vitis vinifera* L.), podrijetlom iz prosječnih agroekoloških uvjeta. Uz standardnu maceraciju i alkoholnu fermentaciju u trajanju od sedam dana na temp 20 ^{0}C, ispitivana su dva pripravka enzima (pektinaza sa sekundarnom aktivnošću hemi-celulaze i celulaze i pektinaze s inaktivnim stanicama kvasca), u istim uvjetima kao i kontrolni tretman. Ispitivanja kakvoće provedena su međunarodno prihvaćenim metodama, u nekoliko faza proizvodnje; nakon prešanja, nakon prvog i drugog pretoka, odnosno u vrijeme kada vina idu na tržište. Oba pripravka značajno su utjecala na kvantitativne parametre boje; intenzitet i nijansu, te udjele žute, crvene i plave boje. Na kvantitativnoj razini ispitivanih parametara boje i koncentraciju antocijana bolju učinkovitost imao je pripravak čistih pektolitičkih enzima, bez obzira na godinu i tehnološku fazu proizvodnje. U svim vinima dobiveni su vrlo visoki koeficijenti korelacije odnosa antocijani/intenzitet boje. Senzorno ocjenjivanje vina potvrdilo je učinkovitost pripravka pektolitičkih enzima u odnosu na maceraciju bez dodatka enzima. Egzogena enzimatska aktivnost može biti važan „bonifikator“ kakvoće u proizvodnji vina Plavca malog, uz pravilan izbor pripravka, temeljen na poznavanju njegovog sastava i svojstava.

Ključne riječi: Plavac mali, pektolitički enzimi, maceracija, svojstva boje

Efficiency of the applied enzymes on cromatic properties of Plavac mali wine (*Vitis vinifera* L.)

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Summary

Phenolic structure of red wines is fundamental for their quality, especially sensory properties; color and taste properties fullness, bitterness and acerbity. Appliance of pectolytic enzymes during skin maceration is one way to improve the complex phenolic potential of wine. The aim of this study was to determine the effect of application of pectolytic enzymes to color parameters of Plavac mali wines (*Vitis vinifera* L.),originating from the everage agroecological conditions.With standard maceration and alcoholic fermentation for a period of 7 days at 20 °C, two preparations of pectolytic enzymes were investigated (pectinase preparation with a secondary activity, hemi cellulase and cellulase and pectinase preparation with inactive yeast cells), in the same conditions as standard maceration. Specific quality parameters were carried out with internationally accepted methods, in several stages of production; after pressing, and after the first and the second decanting, at a time when these wines usually go on the market. Both preparations showed significantly efficiency on quantitative parameters of color; intensity and hue, the percentage shares of yellow, red and blue colors. At the quantitative level, pectolytic enzyme preparations showed the better value of color parameters and concentration of anthocyanins, regardless of year and technological stage of production. All wines have obtained very high coefficient of correlation between anthocyanins and color intensity. Sensory evaluation of wines has confirmed the effectiveness of the enzymes preparation, in relation to maceration without addition of enzymes. Exogenous enzymatic activity has been recognised as an important potential quality „bonificator“ in Plavac mali wine production, with proper choice of preparation, based on knowledge of its composition and properties.

Key words: Plavac mali, pectolytic enzymes, maceration, chromatic properties

Overwatching of *Lobesia botrana* (Den. et Schiff.) from grapes with help of pheromone bait in Miniş - Măderat podgory

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Summary

The pheromon bait were used at S.C.D.V.V. Miniş in 2010 -2013 period in the action of tracking and determination of the habitat, dispersion of *Lobesia botrana* (Den. et Schiff.), moth grapes, in supervising the evolution and the dynamics of populations as much as fixing the opportunity treatments application. Lobesia botrana is the most pest present in the wine-growing region Miniş - Măderat podgory. The economic and ecological estimation of moth grapes it concerns importance in all wine-growing ecosystems, conditioning the life of the whole system – a integrated system by pest control fulfilled by using pheromone bait, traps. In wine-growing regions were located traps with pheromone bait whose captures were get three times per week. We were elaborated the trace of the flight curves required to take the call, judgement of application of treatments. The used procedure has straight effect on the costs of production, on the environmental pollution and on the finished product – the wine.

Key words: pheromone bait, pest, economic estimation, integrated system.

Populacija crvenog voćnog pauka u različitim sustavima uzgoja jabuke

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Sažetak

Crveni voćni pauk (*Panonychus ulmi* Koch) registriran je u Hrvatskoj davne 1956. godine, a tek sedamdesetih godina prošlog stoljeća postaje važan štetnik gotovo svih poljoprivrednih kultura. Na populaciju crvenog voćnog pauka utječe nekoliko čimbenika, kao što je ishranjenost biljaka, klimatski uvjeti i postojanje prirodnih neprijatelja. U posljednje vrijeme registriramo veće populacije crvenog voćnog pauka u voćnjacima jabuke. Cilj našeg rada bio je utvrditi utjecaj sortimenta jabuke na populaciju crvenog voćnog pauka, te utjecaj protugradne mreže na populaciju štetnika. Redovitim pregledima voćnjaka u kojemu se obavlja isti program zaštite uočene su razlike u broju jaja pauka u zimskom mirovanju na različitim sortama, te broj jaja po listu u vegetaciji. Razlike su se pokazala na istom sortimentu ali s različitim sustavom uzgoja. Analizirali smo uvjete koji mogu utjecati na populaciju ovog štetnika. Utvrdili smo značajne razlike u populaciji crvenog voćnog pauka na sortama. Štetnik preferira jabuke grupe Delicious i veća mu je populacija u voćnjaku koji je zasjenjen protugradnom mrežom. Sadržaj dušika u listu jabuka iz različitog uzgoja također je različit. Možemo zaključiti da se populacija crvenog voćnog pauka u voćnjacima jabuke može držati u tolerantnoj visini poštujući sve agrotehničke mjere integrirane proizvodnje.

Ključne riječi: jabuka, crveni voćni pauk, integrirana proizvodnja, dušik, protugradna mreža

The red spider mite populations in different apple production systems

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Summary

Red spider mite (*Panonychus ulmi* Koch) was registered in 1956 in Croatia. An important pest of almost all crops has become in seventies last century. The several factors, such as nutritional status of plants, climatic conditions and the presence of natural enemies, effected on the population of red spider mite. We registered higher population of red spider mite in apple orchards recently. The aim of our study was to determine the effect of apple cultivars on populations of red spider mite, and the impact of hail-net on the population of pests. We were observed differences in the number of spider's eggs in the winter dormant time in different varieties with the same plant protection program. Same situation was in the vegetation time also. Differences were found in the same cultivars but with different production systems. We analyzed the conditions that can affect on this pest population. The significant differences in the population we have found on fruit varieties. The pest prefers Delicious apples group and orchards which are overshadowed by hail-nets. Nitrogen content of different apple cultivation is also different. We conclude that the red spider mite population can be kept in a tolerant amount of respect all cultural integrated production measures in apple orchards.

Key words: apple, red spider mite, integrated production, nitrogen, hail-net

Mineralni sastav lišća i antioksidativni kapacitet ploda višnje Maraske na kiselim i karbonatnim supstratima

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Sažetak

Polazeći od činjenice da višnja Maraska nije samo hrvatski brend, nego i kultura koja ima potencijal da se na temelju kemijskog sastava i izvanrednih organoleptičkih svojstava svrsta u kategoriju funkcionalne hrane, cilj istraživanja bio je utvrditi nutritivnu vrijednost višnje Maraske te vezu između mineralnog sastava lišća i kemijskog sastava ploda. Istraživanja su provedena u razdoblju 2011-2012. godine, na lokalitetu Vlačine-Zadar (Maraska d.d.). U tu svrhu uzeti su prosječni uzorci lišća u fazi formiranja ploda i u berbi, na kiselim i karbonatnim tlima. U oba uzorkovanja utvrđena je optimalna opskrbljenost lišća dušikom (2,2-2,9% N/ST), magnezijem (0,47-0,62% Mg/ST) i kalcijem (1,73-3,03% Ca/ST), slaba do umjerena opskrbljenost fosforom (0,14-0,50% P/ST), manganom (31,8-94,2 mg/kg ST) i bakrom (3,6-7,2 mg/kg ST) te slaba opskrbljenost kalijem (0,74-1,39 %K/ST), cinkom (11,2-24,8 mg/kg ST) i željezom (40,0-82,4 mg/kg ST). Kemijskom analizom plodova utvrđene su značajne razlike u količini suhe tvari, ukupnih kiselina, ukupnih polifenola, antioksidativnom kapacitetu i antocijanima ovisno o reakciji tla kao i o stupnju zrelosti i položaju. Ukupne kiseline u plodu višnje Maraske varirale su u vrlo širokom rasponu od 1,22 g/L, na karbonatnom supstratu do 1,89 g/L jabučne kiseline na kiselim tlima. Vrijednosti antioksidativnog kapaciteta kretale su se u rasponu od 2,89 do 5,22 mmola/100 g.

Ključne riječi: višnja Maraska, mineralni sastav, antioksidativni kapacitet, reakcija tla

Mineral composition of leaves and fruits antioxidant capacity of cherry Marasca on acid and calcareous substrates

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Summary

Starting from the fact that cherry Marasca is not just the Croatian brand, but also a culture that has the potential to be, on the basis of chemical composition and exceptional organoleptic properties, reclassified to the category of functional foods, the aim of the study was to determine the nutritional value of cherry Marasca and the link between the mineral composition of the leaves and fruit chemical composition. Investigation was carried out in the period 2011-2012, on the area Vlačine-Zadar (Maraska d.d.). For this purpose, the average leaf samples were taken in the phase of formation of the fruit and in the harvest, on the acid and calcareous soils. In both sampling the optimal supply of leaf nitrogen (2.2 to 2.9% N/DM), magnesium (0.47 to 0.62% Mg/DM) and calcium (1.73 to 3.03% Ca/DM), as well as low to moderate supply of phosphorus (0.14 to 0.50% P/DM), manganese (31.8 to 94.2 mg/kg DM) and copper (3.6 to 7.2 mg/kg DM) were determined. Leaf supply of potassium (0.74 to 1.39% K/DM), zinc (11.2 to 24.8 mg/kg DM) and iron (40.0 to 82.4 mg /kg DM) was poor. Chemical analysis of fruits showed significant differences in dry matter content, total acidity, total polyphenols, anthocyanins and antioxidant capacity depending of soil reaction as well as the degree of maturity and position. Fruit total acidity (as malic acid) varied in a wide range from 1.22 g/L on the carbonate substrate up to 1.89 g/L on acidic soils. The values of antioxidant capacity were in the range of 2.89 to 5.22 g mmol/100 g.

Key words: cherry Maraska, mineral composition, antioxidant capacity, soil reaction

Utjecaj razmaka sadnje i gnojidbe dušikom na prinos nekih sorata aronije (*Aronia melanocarpa* [Michx] Elliot)

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Sažetak

Aronija (*Aronia melanocarpa* [Michx]Elliot) je voćna vrsta koja nema dugu tradiciju uzgoja u Republici Hrvatskoj. Do sada se uzgajala gotovo isključivo na okućnicama, a tek u posljednje vrijeme podignuti su veći suvremeni nasadi ali na temelju iskustava proizvođača iz drugih zemalja, različitih agroekoloških uvjeta. Cilj istraživanja je bio ustanoviti razlike u prinosu između pojedinih sorata aronije (Viking, Nero i Galicijanka) te divljoj aroniji s obzirom na primjenu različitih razmaka sadnje (1 i 1,5 m) i gnojidbu dušikom (0, 45 i 70 kg/ha) u proizvodnim uvjetima istočne Hrvatske u 2013. godini. Pokus je postavljen u proljeće 2011. godine. Sve tri sorte aronije signifikantno su se razlikovale u prosječnom prinosu po biljci u odnosu na divlju aroniju (0,43 kg/biljci). Najviši prosječni prinos po biljci ostvaren je kod sorte Nero (1,72 kg/biljci). Kod oba razmaka sadnje divlja aronija statistički se značajno razlikovala od ostalih sorata. Kod svih sorata postignut je značajno viši prinos u odnosu na divlju aroniju pri obje razine prihrane dušikom. Razlike u prinosu između gnojidbenih tretmana s 45kg N/ha (1,57 kg/biljci) i 70 kg N/ha (2,18 kg/biljci) kod sorte Nero bile su statistički značajne. Razmak sadnje nije imao značajnog utjecaja na veličinu prinosa po biljci. Nije zabilježen značajan utjecaj interakcije prihrane dušikom i razmaka sadnja na veličinu prinosa.

Ključne riječi: aronija, sorte, gnojidba, razmak sadnje

Effect of plant spacing and nitorgen fertilization on the yield of some chokeberry cultivars (*Aronia melanocarpa* [Michx] Elliot)

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Summary

Chokeberry (*Aronia melanocarpa* [Michx]Elliot) is a fruit species which doesn't have long cultivation tradition in the Republic of Croatia. It has been grown only on infieldes until recently, when new modern plantations were raised on the experience of producers from foreign countries with different agro ecological conditions. Aim of this research was to determinate yield differences between certain chokeberry cultivars (Viking, Nero and Galicijanka) and wild chokeberry, considering different plant spacing (1 and 1,5 m) and nitrogen fertilization (0, 45 and 70 kg/ha) used in eastern Croatia production conditions during 2013. The trial was set up during the spring of 2011. All three chokeberry cultivars had significantly bigger average yield per plant than the wild chokeberry (0,43 kg/plant). Nero gained the greatest average yield per plant (1,72 kg/plant). At both plant spacing, wild chokeberry has shown significant difference in yield compared to the other varieties. Average yield at all varieties was significantly bigger compared to the wild chokeberry at both nitrogen fertlization levels. The differences between nitrogen fertilizations with 45 kg N/ha (1,57 kg/plant) and 70 kg N/ha (2,18 kg/plant) at Nero cultivar were significant. Different plant spacing did not significantly influence yield per plant. Interaction between nitrogen fertilization and plant spacing on yield wasn't recorded.

Key words: chokeberry, cultivars, fertilization, plant spacing

Fizikalna i kemijska svojstva plodova šljiva u agroekološkim uvjetima istočne hrvatske

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Sažetak

U RH šljiva zauzima treće mjesto po površinama i proizvodnji plodova. Sorte šljiva zastupljene u hrvatskim voćnjacima često su tržišno neatraktivne ili su osjetljive na virus šarke te je njihova proizvodnja nekonkurentna. Oplemenjivački program šljive u Njemačkoj stvorio je nekoliko novih sorata šljiva (Topstar, Toptaste, Haganta, Tophit) koje su tolerantne na virus šarke, a odlikuju se boljim pomološkim, fizikalnim i kemijskim svojstvima. Sorte su 2005. godine introducirane na pokušalištu Tovljač Poljoprivrednog instituta Osijek s ciljem istraživanja adaptibilnosti novih njemačkih sorata na agroekološke uvjete istočne hrvatske gdje je veliki bazen uzgoja šljiva i gdje se šljiva tradicionalno uzgaja stoljećima. Istraživanje je pokazalo značajno variranje kemijskih svojstava kroz godine. Istraživanje je obuhvatilo mjerenje topive suhe tvari, ukupnih kiselina, ukupnih polifenola i antocijana te tvrdoću i masu ploda. Najveći sadržaj topive suhe tvari pokazala je sorta Toptaste (20,46%Brix), a najmanji Topstar (14,25%Brix). Najveći sadržaj kiselina ima sorta Topstar (1,04 mg/100 g jabučne kis.), a najniži Tophit (0,74 mg/100 g jabučne kis.). Najveći sadržaj antocijana ima sorta Topstar, a najmanji Tophit. Polifenoli su najveći kod sorte Haganta, a najniži kod sorte Topstar. Masa ploda najmanja je kod sorte Topstar (43 grama), a najveću masu ploda ima sorta Tophit (66,5 grama).

Ključne riječi: šljiva, plod, kemijska svojstva, sorta, klima

Physical and chemical properties of fruits plums in agro-ecological conditions of eastern Croatian

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In Croatia plum occupies third place on surfaces and the production of fruits. Plum varieties represented in Croatian orchards are often commercially unattractive or are sensitive to PPV, and their production is not competitive. Plum breeding program in Germany has created several new varieties of plums (Topstar, Toptaste, Haganta, Jojo, Tophit) that are tolerant to plum pox virus, and are characterized by better pomological, physical and chemical properties. In 2005th varieties were introduced in the experimental orchard Agricultural Institute Osijek - Tovljač in order to explore adaptability of new German varieties on the eastern Croatian agro-ecological conditions, where a large pool of plum production and plums where traditionally cultivated for centuries. Research has shown significant variation in chemical properties over the years. The study included measurement of soluble solids, total acidity, total polyphenols and anthocyanins, as well as hardness and fruit weight. The highest soluble solids were produced in variety Toptaste (20.46 % Brix), and the smallest in variety Topstar (14.25 % Brix). The highest content of acid has a variety Topstar (1.04 mg/100 g of malic acid), and the lowest Tophit (0.74 mg/100 g of malic acid). The highest content of anthocyanins has a variety Topstar, and the lowest Tophit. Polyphenols are the highest in variety Haganta, and the lowest in variety Topstar. Fruit weight is the lowest in variety Topstar (43 grams), and the maximum mass has a variety Tophit (66.5 grams).

Key words : plum, fruit, chemical properties, variety, climate

Wine and Health

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Summary

Wine is not only an alcoholic beverage but also a health agent with its polyphenols content. The antioxidants in wine help to keep humans healthy by fighting infection and protect cells against the effects of free radicals, which may play role in cancer and other diseases. LDL levels also decrease by 9% and participants with high cholesterol experienced a drop of 12% by red wine consumption, because of wine polyphenols that help keeping blood vessels flexible and reduce the risk of unwanted clotting. The skin of red grapes that is rich about resveratrol, may actually help diabetics regulate their blood sugar, by helping stimulation insulin secretion or activating a protein that helps regulate glucose and insulin sensitivity. Resveratrol may also be the key to keeping your memory sharp by hampering the formation of beta-amyloid protein, a key ingredient in the plaque found in the brains of people with Alzheimer's.

Key Words: wine, health, polyphenols, antioxidants

Utjecaj giberelina GA3 na karakteristike ploda sorti trešnje (*Prunus avium* L.)

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Sažetak

U nasadu trešanja pokusnog voćnjaka Zavoda za voćarstvo, Hrvatskog centra za poljoprivredu, hranu i selo proveden je pokus sa giberelinima. Stabla su posađena 2006. godine, cijepljena na podlogu Gisela 5. Razmak između redova je 4 m, a u redu 2,5 m. U nasadu je postavljena armatura, navodnjavanje i zaštitna mreža. Cilj je bio utvrditi djelovanje giberelina na karakteristike ploda sorti trešnje. Mjerena svojstva su: masa i veličina, topiva suha tvar, čvrstoća i boja ploda. Boja ploda je izmjerena spektrofotometrom i izražena prema CIE L*a*b* sustavu. Sorte trešnje Kordia, Techlovan i Vanda su u vrijeme promjene boje ploda iz zelene u žutu tretirane otopinom giberelina koncentracije 10 ppm – a. Vanda je tretirana 21.5.2013., a Techlovan i Kordia 5.6.2013.. Plodovi tretirani giberelinima su bili čvršći od kontrole kod sorti Kordia (K:825 kg/cm2, G:935 kg/cm^2) i Vanda (K:576 kg/cm2, G:727 kg/cm^2), dok kod sorte Techlovan (K:533 kg/cm2, G:518 kg/cm^2) nije utvrđena značajna razlika. Utjecaj giberelina na količinu crvene boje (a*) plodova kod svake sorte je bio drukčiji. Značajne razlike između tretmana kod Kordie (K:3,93, G:4,46) nije bilo. Techlovan je imao značajno više crvene boje kod kontrole (K:8,46, G:5,93), dok je kod Vande značajno veća vrijednost postignuta kod tretmana s giberelinom (K:11,33, G:14,20). Giberelini su utjecali na povećanje čvrstoće plodova. Utjecaj sorte na razlike izmjerene kod ostalih ispitivanih svojstava bio je veći od tretmana.

Ključne riječi: giberelin, trešnja, plod

The effect of GA3 application on fruit characteristic of cherry varietes (*Prunus avium* L.)

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Summary

In experimental orchard of Institute of Pomology, experiment with GA3 on cherry varieties was conducted. Cherry trees were planted in 2006. Trees were grafted on GiSeLa5 rootstock. Planting distance between rows is 4 m, and 2,5 m within a row. Armature, irrigation system and protective net are installed in plantation. The aim of this research was to identify the effect of GA3 application on fruit quality characteristics of cherry varieties. Fruit weight and size, soluble solids content, firmness and colour was measured. Fruit colour was measured with spectrophotometer by using CIE L*a*b* system. Cherry varieties Kordia, Techlovan and Vanda were treated with GA3 at concentration of 10 ppm during the stage of fruit colour change from green to straw yellow. Treatments were applied on May 21, 2013 for Vanda and on June 5, 2013 for Kordia and Techlovan. Fruit firmness of GA3 treated fruit was significantly higher for Kordia and Vanda than of control, while for Techlovan significant difference wasn't revealed. There wasn't any significant difference in amount of red colour (a*) between treatments for Kordia (K:3,93, G:4,46). For Techlovan a* value was significantly higher in control (K:8,46, G:5,93) but for Vanda significantly higher a* value was in GA3 (K:11,33, G:14,20). GA3 application increased the fruit firmness. On other measured fruit characteristics varieties had larger influence than treatments.

Key words: GA3, cherry, fruit

Utjecaj tretiranja preparatom na bazi T*hiobacillus* spp. na fizikalno-kemijska svojstva ploda šljive (*Prunus domestica* L.)

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Sažetak

Sredinom ljeta 2013. godine na pokušalištu Zavoda za voćarstvo, Hrvatskog centra za poljoprivredu, hranu i selo, primjenjeno je višekratno tretiranje sorti šljive (Bistrica, Haganta, Jojo, President, Top 2000 i Topking) preparatom na bazi *Thiobacillus* spp. Cilj postavljenog pokusa bio je istražiti utjecaj *Thiobacillus* spp. na fizikalne i kemijske karakteristike ploda navedenih sorti šljive. Stabla su posađena 2006. godine prema slučajnom bloknom rasporedu u tri repeticije. Sorte su cijepljene na podlozi WaxWa i WaVit, razmaka sadnje 4 x 2,2 m, uzgojnog oblika vretenasti grm. Tretiranja su izvršena 23.7.2013., 2.8.2013., 13.8.2013. Sredstvo aktivne tvari Thiobacillus spp. primjenjeno je u koncentraciji od 0,5 %. Utvrđene su značajne razlike između sorti i tretmana u svim mjerenim parametrima osim debljine ploda i topive suhe tvari. Sorte Jojo i Topking su imale značajno veću masu ploda kod kontrole (22,23 i 25,87 g) nego kod tretmana (34,20 i 33,47 g). Tretman je kod sorti Bistrica, Topking, Jojo, Haganta i President dao tvrđi plod od kontrole. Kod mjerenja boje kožice ploda, kromatska vrijednost b* (odnos plave i žute boje u CIE L*a*b* sustavu) se značajno razlikovala kod svih sorti osim Bistrice, pri čemu je veća vrijednost utvrđena kod kontrole. Utjecaj *Thiobacillus* spp. na fizikalno – kemijske karakteristike ploda je u zavisnosti od sorte šljive.

Ključne riječi: šljiva, *Thiobacillus* spp, fizikalno – kemijska svojstva ploda

Influence of treatment with *Thiobacillus* spp. preparation on physical and chemical characteristics of plum (*Prunus domestica* L.)

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Summary

In the middle of summer of 2013, in the Experimental orchard of the Institute of Pomology of Croatian Centre of Agriculture, Food and Rural Affairs, multiple treatments with Thiobacillus spp. preparation were applied to plum varieties (Bistrica, Haganta, Jojo, President, Top 2000 and Topking). The aim of the trial was to study the effect of Thiobacillus spp. on physical and chemical properties of fruits of mentioned plum varieties. Trees were planted in 2006 according to randomized block design in three repetitions. Varieties were grafted on WaxWa and WaVit rootstock, planting distance 4 x 2,2 m, trained as palmspindle. Treatments were carried out on 23.7.2013., 2.8.2013., 13.8.2013. Preparation with Thiobacillus spp. active compound was used in concentration of 0,5 %. Significant differences were determined between varieties and treatments in all measured parameters except fruit thickness and soluble solids content. Cvs Jojo and Topking had significantly higher fruit weight in control (22,23 and 25,87 g) then in treatment (34,20 and 33,47 g). Treatments for cvs Bistrica, Topking, Jojo, Haganta and President had firmer fruits then control. For fruit skin colour measurements, chromatic value b* (blue and yellow ratio within CIE L*a*b* system) significantly differed for all varieties except for Bistrica, whereas control had higher b* value. Influence of Thiobacillus spp. on fruit physical and chemical characteristics depend on variety.

Key words: plum, *Thiobacillus* spp, fizikalno – kemijska svojstva ploda

Kakvoća jabučnog vina sorata 'Cripps Pink' i 'Idared'

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Sažetak

Cilj rada je bio utvrditi pogodnost dviju sorata jabuka ('Cripps Pink' i 'Idared') i komercijalnih sojeva kvasca Saccharomyces bayanus (Lalvin EC1118, Fermol Blanc) na osnovni kemijski sastav te senzorna svojstva jabučnog vina. Plodovi su ubrani u optimalnom roku za čuvanje, podvrgnuti tjedan dana dospijevanju na 20 °C, usitnjeni u mlinu za voće i isprešani u vodenoj preši uz pritisak 3 bara. Prilikom usitnjavanja dodan je pektolitički enzim i 20 g/hl sredstva za sulfitiranje (Aromax). Mošt je stacionarno taložen preko noći na temperaturi od 10 °C, pretočen i inokuliran kvascem. Fermentacija je provedena na 15 °C. Po završetku alkoholne fermentacije u vinima je provedena osnovna kemijska analiza te su organoleptički ocijenjena. Sorta je imala značajan utjecaj na udio alkohola ('Cripp's Pink': 7,9 % vol.; 'Idared': 6,5 % vol.), ukupnog ekstrakta ('Cripps Pink': 27,0 g/L.; 'Idared': 19,8 g/L.) i pepela ('Cripps Pink': 2,74 g/L; 'Idared': 1,96 g/L). Razlike u sadržaju pojedinačnih organskih kiselina i pH bile su minimalne. Kinetika fermentacije te razgradnja šećera kod korištenih sojeva kvasaca bila je vrlo ujednačena. U senzornim svojstvima dobivenih vina izdvojila se sorta 'Idared' te 'Fermol Blanc' komercijalni soj kvasca.

Ključne riječi: *Malus* x *Domestica* Borkh., jabučno vino, kemijski sastav, senzorna svojstva

The quality of apple vines made from cvs. 'Cripps Pink' and 'Idared'

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Summary

The aim of this study was to determine the suitability of two apple cultivars (cvs. 'Cripps Pink' and 'Idared') and two commercial strains of *Saccharomyces bayanus* (Lalvin EC1118, Fermol Blanc) on the chemical composition and sensory characteristics of apple wine. The fruits were harvested at the optimum date for storage, ripened for a week at 20 °C, milled and pressed in a water press under pressure of 3 bar with addition of pectolytic enzyme and 20 g/hl sulphitation with Aromax. Must was settled stationary overnight at 10 °C, poured and inoculated with yeast. Fermentation was carried out at 15 °C. Upon completion of alcoholic fermentation, basic chemical and sensory analyses were performed. Cultivar had a significant impact on the alcohol concentration (cv. 'Cripps Pink': 7,9 % vol ; cv. 'Idared': 6.5% vol), total extract (cv. 'Cripps Pink' : 27.0 g/L ; cv. 'Idared': 19.8 g/L) and ash (cv. 'Cripps Pink': 2.74 g/L; cv. 'Idared': 1.96 g/L). Differences in the content of individual organic acids and pH were minimal. Fermentation kinetics and sugar decomposition were uniform in both yeast strains. The sensory properties of apple wine made from cv. 'Idared' using 'Fermol Blanc' commercial yeast strain were of better sensory quality.

Key words: *Malus* x *domestica* Borkh., cider, chemical analysis, sensory quality

Sastav masnih kiselina u ulju sjemenki vinove loze (*V. vinifera* L.) različitih kultivara

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Sažetak

Sjemenke vinove loze za dobivanje ulja i drugih proizvoda izdvajaju se iz krutog ostatka (komine) preostalog nakon prerade grožđa u vino. U zavisnosti od sorte vinove loze, u svježoj komini udio sjemenki iznosi 20 – 25 %, dok u suhoj 40 – 65 %. Sjemenke sadrže od 8 – 22 % ulja koje se ekstrahira različitim postupcima što prvenstveno ovisi o namjeni ulja. Ulje se koristi za spravljanje kozmetičkih proizvoda, pripremi hrane, prehrambenoj industriji i proizvodnji grožđica. Najveći svjetski proizvođači su Italija, Španjolska, Francuska i Argentina. Od ulja dobivenog iz sjemenki četiri kultivara (Cabernet sauvignon, Frankovka, Syrah, Zweigelt), prema metodi ISO 5509:2000, pomoću bortrifluorida (BF3), pripremljeni su metilni esteri masnih kiselina. Sastav masnih kiselina je određen plinskom kromatografijom na sustavu Shimadzu GC-2010 Plus. Masne kiseline su razdvojene prema ugljikovim atomima i broju dvostrukih veza i identificirane usporedbom retencijskog vremena prema standardu (AOCS FAME standard #3, Restek, SAD). Kvantifikacija masnih kiselina napravljena je prema površini pika metodom normalizacije površine. Rezultati analize ukazuju da je ulje sjemenki grožđa značajan izvor linolne (69,49 – 72,83 %), oleinske (13,87 – 18,44 %), palmitinske (7,79 – 8,13 %) i stearinske kiseline (3,21 – 4,38 %), dok su miristinska, linolenska, arahinska, behenska, eruka i lignocerinska prisutne u tragovima (<0,5 %). Sortne razlike za sastav masnih kiselina u ulju određene su faktorijalnom analizom varijance i bile su statistički visoko značajne.

Ključne riječi: sorte, vinova loza, masne kiseline

Fatty acids composition in the grape seed oil of different grape cultivars (*V. vinifera* L.)

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Summary

Grapevine seeds for oil and other products obtaining are seceding from solid residues (grape pomace) left after processing grape to wine. Depending of the grape varieties, in fresh grape pomace seeds participate 20-25% while in dry 40-65%. Seeds contain 8-22% of oil which can be extracted by different procedures, which primarily depends on oil purpose. Oil can be used for cosmetics products preparing, food preparation, food industry and raisins production. The world's largest producers are Italy, Spain, France and Argentina. Oil obtained from four different cultivars (Cabernet Sauvignon, Blauer Limberger, Syrah and Zweigelt) according to International Standard ISO 5509:2000 (boron trifluoride method) preparation of methyl esters of fatty acids was carried out. The fatty acid methyl esters were analyzed using a Shimadzu GC-2010 Plus gas chromatography system. Fatty acids were separated according to carbon atoms and number of double bonds and were identified by comparing their retention time to standard (AOCS FAME standard #3, Restek, USA). Fatty acids were quantified based on peak area by method of area normalization. The results of analysis show that grape seeds oil can be an important source of linoleic (69,49 – 72,83%, oleic (13,87 – 18,44%), palmitic (7,79 – 8,13%), and stearic acid (3,21 – 4,38%), while myristoleic, linolenic, arachidonic, behenic, erucic and lignoceric are present only in traces (< 0,5%). Varieties differences for fatty acids composition in oil are defined by analysis of variance and have been highly statistically significant.

Key words: varieties, grapevine, fatty acids

Promjene u raznolikosti sortimenta vinove loze u Republici Hrvatskoj

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Sažetak

Vinogradarska područja Republike Hrvatske, prema prirodnim uvjetima za uzgoj vinove loze, dijele se na regije: Istočna kontinentalna Hrvatska, Zapadna kontinentalna Hrvatska i Primorska Hrvatska. Temeljem definiranih uvjeta, vinogradarske zone u Republici Hrvatskoj su B, CI, CII i CIII. Analizom podataka iz Vinogradarskog registra, preko 54% od ukupnih vinogradarskih površina nalazi se u regijama Kontinentalne Hrvatske. U sortimentu dominiraju bijele sorte; preko 85% vinogradarskih površina u regijama Kontinentalne Hrvatske zasađeno je s bijelim sortama. U regiji Primorska Hrvatska, bijele i crne sorte zastupljene su podjednako. U periodu od 1999. do 2012. godine u Republici Hrvatskoj podignuto je oko 10 000 ha novih vinograda. Temeljna odrednica kod izbora sorte su ekološki uvjeti i sortna svojstva. U navedenom razdoblju zabilježen je značajan porast novih vinogradarskih površina pod crnim sortama. Preko 70% ukupnih vinogradarskih površina pod crnim sortama, u Kontinentalnoj Hrvatskoj, zasađeno je u tom razdoblju. Sadile su se slijedeće sorte: Frankovka, Cabernet sauvignon, Pinot crni, Merlot, Portugizac, Cabernet franc, Zweigelt, Syrah, Alicante Bouschet i Dornfelder. Osim tradicionalnih preporučenih sorata, određene površine zasađene su s novim sortama koje su u istraživačkoj fazi. Također, sorta Plavac mali, ograničena desetljećima na područje podregije Srednja i Južna Dalmacija, unutar zone CIII, u ovom razdoblju izišla je iz tih okvira. Značajne površine Plavca malog podignute su u području podregija Sjeverna Dalmacija i Hrvatsko primorje, unutar vinogradarske zone CII. Evidentirane promjene sortimenta mogu se dovesti u vezu i s promjenom klime.

Ključne riječi: novi vinogradi, sorte, klima

The changes in diversity of grape varieties in the Republic of Croatia

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Regarding to natural conditions for vine growing in the Republic of Croatia, viticulture regions are divided into: Eastern Continental Croatia, Western Continental Croatia and Coastal Croatia. According to defined conditions, in Republic of Croatia there are following viticulture zones: B, CI, CII, CIII. Based on the Vine Register, more than 54% of total areas under vineyards are located in regions of Continental Croatia. There are dominant vine varieties; over 85% of vineyards in Continental Croatia are planted with white vine varieties. In period from year 1999 to 2012, more than 10 000 ha of new vineyards was planted in the Republic of Croatia. The main determinants at variety selection are ecological conditions, with reference to climate and soil, and variety abilities. In above mentioned period, it was found an increase of red vine varieties planting. Over 70% of total areas under red vine varieties, in the regions of Continental Croatia, were planted in that period. Following cultivars were planted: Frankovka, Cabernet sauvignon, Pinot crni, Merlot, Portugizac, Cabernet franc, Zweigelt, Syrah, Alicante Bouschet and Dornfelder. Except with recommended and traditoinal varieties, some of areas are planted whith new varieties wich are still under investigation. Variety Plavac mali, for decades was limited to area of sub-region Middle and Southern Dalmatia within zone CIII. In mentioned period this variety came out of this frames. There are considerable areas under variety Plavac mali planted in sub-region of Northern Dalmatia and Coastal Croatia, which belongs to viticulture zone CII. The changes in varieties can be influenced by climate changes.

Key words: new vineyards, varieties, climate

Razvoj dopunske boje kožice ploda 6 sorti jabuke (*Malus domestica* Borkh.) iz grupe Gala mjerene na stablu

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Sažetak

Tijekom 2011. i 2012. g. praćen je razvoj dopunske boje kožice ploda 6 sorti jabuke (*Malus domestica* Borkh.) grupe Gala (Annaglo®, Baigent Brookfield®, Galaxy, Mitchgla Mondial Gala®, Tenroy Royal Gala® i Schnitzer Schniga®) posađenih u pokusnom voćnjaku Zavoda za voćarstvo Hrvatskog centra za poljoprivredu, hranu i selo u Donjoj Zelini. Dopunska boja ploda mjerena je višekratno u pravilnim razmacima od 7 dana počevši od promjene osnovne boje iz zelene u zeleno-žutu. Boja je mjerena prenosivim Konica Minolta Spectrophotometrom CM-700d korištenjem CIE L*a*b* sustava. U vrijeme tehnološke zriobe, uz boju mjerena je i čvrstoća plodova ne-destruktivno pomoću Bareiss HPE Fff testera i destruktivno pomoću Magness Taylor penetrometra. Dobivene vrijednosti za boju analizirane su analizom varijance (ANOVA), a korelacije između nedestruktivnih i destruktivnih mjerenja čvrstoće pomoću Pearsonovog r koeficijenta. Kod sorti su utvrđene značajne razlike u mjerenjima u obje vegetacijske godine u razvoju boje za vrijednosti L*, a* i b*, pri čemu je kod sorti Schnitzer Schniga® i Annaglo® utvrđeno ranije i izraženije crveno obojenje, a slijede ih Baigent Brookfield®, Mitchgla Mondial Gala®, Galaxy te Tenroy Royal Gala®. Utvrđena je značajna korelacija između nedestruktivnog i destruktivnog mjerenja čvrstoće u obje godine istraživanja: r =0.561 (2011.g.) te r=0.317 (2012.g). Rezultati istraživanja sugeriraju da na boju i čvrstoću utječu sorta, vegetacijska godina i njihova interakcija.

Ključne riječi: jabuka, dopunska boja kožice, nedestruktivno mjerenje

Development of fruit skin over-colour of 6 apple cultivars (*Malus domestica* Borkh.) of Gala Group measured on tree

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Summary

Monitoring of fruit skin over-colour development of 6 apple cultivars (Malus domestica Borkh.) of Gala Group (Annaglo®, Baigent Brookfield®, Galaxy, Mitchgla Mondial Gala®, Tenroy Royal Gala® and Schnitzer Schniga®) planted in Experimental orchard of the Institute of Pomology of the Croatian Centre for Agriculture, Food and Rural Affairs in Donja Zelina, during 2011 and 2012. Fruit skin over-colour was multiply measured in regular 7 day interval starting with the change of the ground-colour form green to green-yellow. Colour was measured by portable Konica Minolta Spectrophotometer CM-700d by using CIE L*a*b* system. During technological harvest, fruit firmness was measured nondestructively with Bareiss HPE Fff tester and destructively with Magness Taylor penetrometer. Colour values were analyzed with analysis of variance (ANOVA), and correlation between nondestructive and destructive firmness measurements with Pearson r coefficient. Significant differences were found in both vegetation years in fruit skin colour for L*, a*and b* values, where for cvs Schnitzer Schniga® and Annaglo® earlier and stronger red coloration was determined, followed by cvs. Baigent Brookfield®, Mitchgla Mondial Gala®, Galaxy and Tenroy Royal Gala®, respectively. Significant correlation was determined between nondestructive and destructive firmness measurements in both vegetation years: r =0.561 (2011.g.) and r=0.317 (2012.g). Results of this research suggest that fruit skin over-colour and fruit firmness are influenced by cultivar, vegetation year and its interaction.

Key words: apple, fruit skin over-colour, nondestructive measurement

Utjecaj terroira i kontrolirane ishrane vinove loze na kvalitetu mošta cv. Malvazije Istarske

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Sažetak

Zahtjevi tržišta sve su veći pa treba uskladiti uvjete uzgoja vinove loze kako bi se osigurao dobar prinos, ali i kvaliteta grožđa i vina, a time i bolja konkurentnost. U tom konceptu važno mjesto pripada opskrbi tla i biljke biogenim elementima, ali i ukupnom terroiru, koji predstavlja agrotehniku, klimu, sortu i tip tla. Istru odlikuju četiri različita tipa tla (crveno, crno, sivo i bijelo), a u kombinaciji s Malvazijom istarskom kao autohtonom i najraširenojim bijelom sortom Istre predstavlja izvrsnu podlogu za isticanje terroira kao bitne značajke ovog kraja. U tu svrhu, u Brtonigli (Istra, Hrvatska) 2013. godine postavljen je gnojidbeni pokus s 4 gnojidbena tretmana (kontrola, NPK 7-14-21, folijarni tretman Oligogreen+Drin+Hascon M10 AD te kompleksno folijarno gnojivo Greenplant) na sorti Malvazija Istarska u proizvodnim vinogradima na četiri tipa tla (mikrolokacije – terroira: crveno, crno, sivo i bijelo) u tri ponavljanja. U moštu su određeni šećeri, ukupne kiseline i pH koristeći standardne metode. Utvrđena količina šećera u moštu kretala se od 72 do 87 °Oe, a ukupnih kiselina od 5,5 do 6,8 g L^{-1}. Najveća količina šećera utvrđena je u moštu s crvenog i sivog tipa tla (81 i 87 °Oe), dok je u istim tipovima tala utvrđena najmanja količina kiselina (5,5 i 5,6 g L^{-1}). Najmanji pH mošta utvrđen je u moštu s crnog tipa tla (3,17), a najveći s crvenog tla (3,40). Rezultati pokazuju značajniji utjecaj terroira u odnosu na gnojidbene tretmane. To je bilo za očekivati, obzirom da je vinova loza višegodišnja kultura. Gnojidbeni tretmani mogu imati tek dugoročniji učinak obzirom na zalihe hraniva u drvenastim organima biljke.

Ključne riječi: gnojidba, mošt, pH, šećeri, ukupne kiseline

Effect of terroir and guided plant nutrition on cv. Istrian Malvasia must quality

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Summary

Market demands are growing and need to harmonize the requirements of growing vines in order to ensure a good yield, but also the quality of grapes and wine, and consequently better competitiveness. In this concept, an important place belongs to the supply of soil and plant with nutrients, but also the overall terroir, formed by agricultural practices, climate, variety and soil type. Istria is characterized by four different soil types (red, black, gray and white), and combined with the Istrian Malvasia as indigenous and most spread white Istrian variety provides an excellent base for highlighting terroir as an essential feature of this region. For this purpose, in Brtonigla (Istria, Croatia) in 2013 a fertilization experiment with four fertilizer treatments (control, NPK 7-14-21, foliar treatment Oligogreen+Drin+Hascon M10 AD and complex foliar fertilizer Greenplant) on Istrian Malvasia in production vineyards on four soil types (microlocations - terroirs : red, black, gray and white) with three repetitions. Sugars, total acidity and pH were determined using standard methods. Sugar content in must ranged from 72 to 87 °Oe, while total acidity from 5.5 to 6.8 g L^{-1}. The highest sugar content was found in must from red and gray soil types (81 and 87 °Oe, respectively), while in the same soil types the minimum total acidity was determined (5.5 and 5.6 g L^{-1}, respectively). The lowest pH must value was determined in must from black soil type (3.17), and the highest in must from red soil (3,40). The results show a more significant influence of terroir in relation to fertilizer treatments. It was expected, given that grapevine is a perennial crop. Fertilizer treatments can have only long-term effect due to nutrient stocks in plant woody organs.

Key words: fertilization, must, pH, sugars, total acidity

Analiza mineralnog sastava vina tehnikom spektrometrije optičke emisije induktivno spregnute plazme (ICP-OES)

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Sažetak

Kemijski sastav vina predstavlja složenu otopinu različitih elemenata, organskih i anorganskih spojeva te njihovih kompleksa. Ovisi o brojnim faktorima kao što su: regija proizvodnje, vinogradarska praksa, sorte vinove loze, tlo, klima, kvasci te postupci u proizvodnji vina. Vino je kompleksan medij u kojem makro i mikroelementima pripada vrlo važno mjesto, radi pozitivnih, ali i potencijalno negativnih učinaka. Konzumacija vina na dnevnoj bazi doprinosi potrebama ljudskog organizma za esencijalnim elementima, kao što su kalcij, krom, kalij, cink. Aluminij, bakar, željezo, mangan i cink, ovisno o koncentraciji, mogu imati štetan učinak na stabilnost vina i na njegovu komercijalnu vrijednost, dok su kadmij, olovo te brom potencijalno toksični. Cilj rada bio je odrediti makro i mikroelemente u vinu „Graševina“ iz različitih vinogradarskih podregija i zona proizvodnje, u svrhu povezivanja udjela makro i mikroelemenata s geografskim porijeklom vina. Korištena je tehnika spektrometrije optičke emisije induktivno spregnute plazme (ICP–OES). U uzorcima su utvrđene vrijednosti za makro i mikroelemente. Na temelju dobivenih rezultata, vina „Graševine“, podrijetlom iz zone CI, imala su veći sadržaj makro i mikroelemenata u odnosu na vina iz zone B.

Ključne riječi: vino, mineralni sastav, ICP-OES, vinogradarska zona proizvodnje

The Analysis of the Mineral Composition of Wine by Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES)

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Chemical composition of the wine is a complex solution of various elements, organic and inorganic compounds and their complexes. It depends on many factors such as: region of production, winemaking practice, grape variety, soil, air, yeasts and procedures in the production of wine. Wine is complex medium in which macro and microelements have very important place, for positive but also potentially negative effects. Consumption of wine on a daily basis contributes to the needs of the human body for essential elements such as calcium, chromium, potassium, zinc. Aluminum, copper, iron, manganese, zinc depending on the concentration can have a detrimental effect on the stability of the wine and its commercial value, while cadmium, lead and bromine are potentially toxic. The aim was to determine macro-and microelements in „Graševina“ wine from different wine-growing sub-regions and zones of production for the purpose of linking macro and microelements to the geographical origin of wine. Inductively coupled plasma optical emission spectrometry (ICP–OES) technique was used. In the samples were determined values for macro and microelements. Based on the results the wine „Graševina“ from production zone CI have higher content of macro and microelements compared to wines from production zone B.

Key words: wine, mineral composition, ICP-OES, wine production zone

Potencijal aroma grožđa klonskih kandidata sorte 'Škrlet bijeli' procijenjen serijama mirisa

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Sažetak

Posljednjih dvadesetak godina u hrvatskom vinogradarstvu ukazuje se na potrebu klonske selekcije kod autohtonih sorti kako bi se pojedine sorte vratile na nivo održive proizvodnje te općenito podigle na višu razinu u ponudi reprodukcijskog materijala. Specifična, sortna aroma vina potiče od hlapivih spojeva sintetiziranih u grožđu a čine ih terpeni, alifatski spojevi, fenilpropanoidi, metoksipirazini te hlapivi sumporni spojevi, koji u brojnim kombinacijama čine jedinstvenu, prepoznatljivu tipičnu aromu sorte. Navedeni spojevi mogu se koristiti za identifikaciju sorte, ali nije poznato do koje mjere oni mogu razlikovati i klonove. U ovom radu je provedena evaluacija klonskih kandidata sorte 'Škrlet bijeli' temeljem aromatskog profila grožđa (mošta). Ekstrakcija hlapljivih spojeva provedena je SPME metodom, a analiza aromatskih spojeva metodom plinske kromatografije uz masenu spektrometriju (GC-MS) uz unutarnji standard 3-oktanol. Usporedba klonskih kandidata temeljem dobivenih podataka za četiri serije mirisa: voćno, cvjetno, zeleno-svježe i ostalo provedena je analizom varijance. Utvrđeno je da klonski kandidat ŠK-32 ima najviše vrijednosti relativne površine pika (RPP) za sve četiri serije mirisa, dok ŠK-74 ima najniže vrijednosti RPP voćne, ŠK-11 cvjetne te ŠK-69 zeleno-sviježe serije. Dobiveni rezultati ukazuju da je karakteristični (najzastupljeniji) miris sorte 'Škrlet bijeli', cvjetni miris kojeg prati miris na zeleno-svježe te voćni miris.

Ključne riječi: aroma, 'Škrlet bijeli', klonski kandidati, serije mirisa

Potention of Grape Aroma of Variaty 'Škrlet bijeli' Clones Judged by Aromatic Series

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Summary

In last two decade, within Croatian viticulture need for clonal selection of autochthonous varieties exists from the reason that particular variety could be returned to the level of sustainable production and overall erected to the higher level in offering propagating material. Specific varietal wine aroma originates from volatile compounds such as monoterpenes, norisoprenoids, aliphatic compounds, phenylpropanoids, methoxypyrazine and volatile sulfur compounds synthesized in grapes, which in numerous combinations make a unique, distinctive, typical varietal aroma. Listed compounds can be used for variety identification but it is not known to what extent they can distinguish clones. In this study, evaluation of clones based on aromatic profile of 'Škrlet bijeli' grape (must) was carried out. Extraction of volatile compounds was done by SPME method, while analysis of aromatic compounds by gas chromatography-mass spectrometry (GC-MS) using 3 octanol as internal standard. Comparison of clones based on obtained data for four aromatic series: fruity, floral, green fresh and others was performed by the analysis of variance. It was found that clone ŠK-32 has the highest values of relative area peak (RAP) for all four aromatic series, while clone ŠK-74 has the lowest values of RAP for fruity, ŠK-11 for floral and ŠK-69 for green fresh series. The obtained results indicate that distinctive (the most abundant) aroma of 'Škrlet bijeli' variety is floral which is followed by green fresh and fruity odor.

Key words: aroma, 'Škrlet bijeli', clones, aromatic series

Hlapivi spojevi mošta Malvazije istarske (*Vitis vinifera* L.) uzgajane na 2 različita tipa tla

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Sažetak

Pedološka heterogenost tipična je za vinogradarsku podregiju Istra te je u takvim područjima značaj tla za vinogradarsku proizvodnju posebno naglašen. Rezultati dosadašnjih istraživanja upućuju na povezanost pedoloških uvjeta s kvalitetom grožđa i vina. Cilj ovog istraživanja bio je utvrditi utjecaj tipa tla na profil najvažnijih hlapivih spojeva arome u moštu autohtone sorte Malvazija istarska, koja je ujedno i najzastupljenija sorta u Istri. Istraživanje je provedeno 2011. godine na lokaciji Bajkini, gdje se unutar 1 km udaljenosti nalaze nasadi na 2 tipa tla: rendzini i tipičnoj crvenici. Nasadi su bili u punoj rodnosti, uzgojni oblik bio je dvokraki Guyot te je primjenjivana ista agrotehnika. Uzorci grožđa uzeti su 14 i 7 dana prije redovnog roka berbe te u redovnom roku berbe. Hlapive tvari mošta određene su nakon mikroekstrakcije na čvrstoj fazi tehnikom plinske kromatografije/spektrometrije masa (HS-SPME-GC-MS). Linearna diskriminantna analiza pokazala je da razlikovanju mošteva prema tipu tla najviše doprinose slijedeći terpenski spojevi: cis-linalol-furan-oksid, lilial i linalol. Među alkoholima i aldehidima, u diskriminaciji su najviše sudjelovali: trans-2-heksan-1-ol, trans-2-heksenal, cis-2-heksenal, 1-heksanol, benzaldehid, trans-2-oktenal, 2-feniletanol, nonanal i cis-2-heksan-1-ol. Dobiveni rezultati ukazuju na razlike u aromatskom profilu mošta s obzirom na tip tla te u budućnosti mogu pomoći u formiranju različitih tipova vina Malvazije istarske.

Ključne riječi: tip tla, Malvazija istarska, hlapivi spojevi, linearna diskriminantna analiza

Volatile compounds in juice of Istrian Malvasia grapes (*Vitis vinifera* L.) grown on two different soil types

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Soil heterogeneity is typical for the vinegrowing subregion of Istria, and the importance of soil in vinegrowing is particularly emphasized in such areas. Results of previous studies indicate a relationship between pedological conditions and quality of grape and wine. The aim of this study was to determine the influence of soil type on the profile of the most important volatile aroma compounds in juice of autochthonous Istrian Malvasia, which is the most common grape variety in Istria. The study was conducted in 2011 at the location Bajkini, where vineyards on 2 soil types, rendzina and typical red soil, were grown within 1 km. Vineyards were at full maturity, trained to double Guyot and the same vineyard management practices were used. Grape samples were taken 14 and 7 days before usual harvest time, and at the usual harvest time. Volatile compounds in grape juice were determined by gas chromatography/mass spectrometry after solid phase microextraction (HS-SPME-GC-MS). Linear discriminant analysis showed that in classification of juices by soil type, the following terpenic compounds contributed the most: cis-linalool-furan-oxide, lilial and linalool. Among alcohols and aldehydes, the most important compounds for classification were: trans-2-hexan-1-ol, trans-2-hexenal, cis-2-hexenal, 1-hexanol, benzaldehyde, trans-2-octenal, 2-phenylethanol, nonanal, and cis-2-hexan-1-ol. Results obtained indicate the differences in the aroma profile of grape juice given the type of soil exist, and can contribute to the future formation of different types of Istrian Malvasia wine.

Key words: soil type, Istrian Malvasia, volatile compounds, linear discriminant analysis

Kompatibilnost i otpornost voćnih plemki i podloga te njihova otpornost prema utjecaju negativnih temperatura

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Sažetak

Istraživanje je provedeno 2012. godine u rasadniku (Koprivna, Istočna Hrvatska) na ukupnom uzorku od 32127 sadnica, odnosno 11 sorti šljiva, 9 sorti trešnji te 3 sorte marelica cijepljenih na podloge Prunus myrabolana, P. myrabolana 29C, Gisela 5 i Gisela 6. S obzirom da su temperature bile ekstremno niske u veljači 2012. očekivan je negativan utjecaj na okulirani pup (smrzavanje). Cilj istraživanja je analizirati postotak izmrzlih, odbačenih i primljenih pupova. Na taj način omogućena je i procjena štete za svaku sortu posebno, kao i za cijeli rasadnik ukupno. Postotak ukupno primljenih pupova (okulanti) iznosio je 68,29%. Marelice su imale ukupno najmanji postotak primitka (51,44%). Razlog propadanja okulanata je odbacivanje pupa od strane podloge te smrzavanje pupova. Postotak smrznutih okulanata prosječno za sve biljke u pokusu iznosio je 19,44%, a odbačenih 11,8%. Prosječno za čitav pokus najotpornije na smrzavanje pokazale su se trešnje koje ujedno imaju i najslabiji afinitet podloge i plemke. Najotpornije sorte na niske temperature u pokusu su: Jojo, Top First, Čačanska rana (šljive), Grace Star, Black Star, Carmen (trešnje), Pincot (marelice). Najosjetljivije sorte na niske temperature su: Čačanska rodna, Čačanska najbolja, Top Star (šljive), Sunburst, Kordia, Burlat (trešnje), Aurora (marelica). Najslabiji utvrđeni afinitet podloge i plemke imaju: Čačanska rodna, Top Hit, Stanley (šljiva), Grace Star, Regina, Burlat (trešnja), Aurora i Pincot (marelica).

Ključne riječi: sadnice, sorte, podloge, smrzavanje, afinitet

Compatibility and resistance of fruit scions and rootstocks and their resistance to the effects of negative temperatures

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Summary

The study was conducted 2012th in the fruit nursery (Koprivna, Eastern Croatia) on the total sample of 32,127 seedlings with 11 varieties of plums, 9 varieties of cherry and 3 apricot varieties grafted onto rootstocks: P. myrabolana, P. myrabolana 29C , Gisela 5 and Gisela 6. Given that the temperatures were extremely low in February 2012. we expected negative impact on the inoculated bud (freezing). The aim of the research is to analyze the percentage of winterkill, discarded and received (callus formed) buds. Thus enabling an assessment of damages for each variety separately, as well as for the entire nursery in total. Percentage of total received buds (oculant) was 68.29%. Apricots had the smallest percentage of total receipt (51.44 %). The reason for the such deterioration is oculanat rejection bud by the rootstock and the freezing of buds. Percentage of frozen oculants average for all plants in the experiment was 19.44 % and discarded 11.8 %. The average for the whole experiment proved that most resistant to freezing is cherries which also have the lowest affinity between rootstock and scion. The most resistant varieties to low temperatures in the experiment are: Jojo, Top First, Cacanska rana (plum), Grace Star, Black Star, Carmen (cherry), Pincot (apricot). The most susceptible varieties to low temperatures: Cacanska rodna, Cacanska najbolja, Top Star (plum), Sunburst, Kordia, Burlat (cherry), Aurora (apricot). The weakest fortified affinity for stock and scion are at: Cacanska rodna, Top Hit, Stanley (Plum), Grace Star, Regina, Burlat (cherry), Aurora and Pincot (apricot).

Key words: seedlings , varieties , rootstocks , freezing , affinity

Ciklanilid u induciranju lateralnog grananja trešnje na podlozi gisela 6

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Sažetak

Istraživanje u cilju standardiziranja tehnike indukcije lateralnog grananja provedeno je 2013. godine u rasadniku voćnih sadnica (Koprivna, Istočna Hrvatska) na 3 sorte trešnje cijepljenih na podlozi Gisela 6. Tretmani su uključivali aplikaciju različitih kombinacija BA+GA3 i ciklanilida na sorte Carmen, Grace Star i Black Star. Prema F testu na razini čitavog pokusa utvrđen je visoko signifikantan utjecaj sorte (** P≤0,01) za promatrane parametre ukupne visine, visina zadnje grane, broj grana, kut grananja te tretmana za broj grana, dužinu grana i kuta grananja. Interakcija sorta x treman vrlo značajna je bila za parametar broja grana. Signifikantan (* P≤0,05) je bio i utjecaj tretmana na visinu prve grane odnosno sorte na dužinu grane. Sorta Black Star inducirala je razvoj najvećeg broja grana (5,4; LSD test, ** P≤0,01). Sorta Carmen imala je značajno manji kut (30,9°) formiranja grana u odnosu na ostale sorte (LSD test, ** P≤0,01). Tretmani ciklanilidom (C1-150 ppm; C2-250 ppm) visoko signifikantno su utjecale na broj grana (C1-5,8 i C2-5,1; LSD test, ** P≤0,01). Tretmani BA + GA3 (B1-3,8 i B1-3,7) također su vrlo značajno odstupali od kontrolne varijante (K-2,1). Kut grananja pod utjecajem tretmana (B2, C2, C1) vrlo značajno se razlikovao od kontrole (28,3°).

Ključne riječi: lateralne grane, trešnja, ciklanilid

Cyclanilide in inducing lateral cherry branching on rootstock Gisela 6

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Summary

Research in aim to standardize the lateral branching induction technique conducted 2013th in fruit seedlings nursery (Koprivna, Eastern Croatia) on three sweet cherry varieties grafted on the rootstock Gisela 6. Treatments included the application of different combinations of BA+GA3 and Cyclanilide on the Carmen, Grace Star and Black Star varieties. According to the F test at the level of the whole experiment was found highly significant effect (P≤0.01) of cultivar for the observed parameters of the total height, the height of the last branches, number of branches, branching angle and also treatments for a number of branches, branch length and branching angle. The interaction of cultivar x treatment was very significant for the number of branches. A significant (P≤0.05) was the effect of treatment on the height of the first branch and also the variety for the branches length. Variety of Black Star induce the development of the largest number of branches (5.4, LSD test, ** P≤0.01). Carmen variety had a significantly lower branch forming angle (30.9 °) relative to the other varieties (LSD test, ** P≤0.01). Cyclanilide treatments (C1-150 ppm, C2-250 ppm) had highly significant effect on the number of branches (C1-5,8 and C2-5,1; LSD test, ** P≤0.01). Treatments BA+GA3 (B1-3,8; B1-3,7) are also very significantly differed from the control variant (K-2,1). Branching angle under the influence of treatment (B2, C2, C1) are significantly different from controls (28.3°).

Key words: lateral branch, sweet cherry, cyclanilide

Orezana biomasa i koštice šljive kao visokovrijedni energent u Republici Hrvatskoj

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Sažetak

Poljoprivredni ostaci u Europi predstavljaju značajni energetski potencijal za razvoj industrije biomase u mnogim zemljama, a pri tome značajan udio čine ostaci proizašli iz primarne proizvodnje, ali i dorade voćarskog sektora. Temeljem direktiva EU navedene ostatke je nužno ekološki prihvatljivo zbrinuti. Cilj ovoga rada bio je utvrditi negoriva (udio vlage, pepela, fiksiranog ugljika, hlapive tvari) i goriva svojstva (ugljik, vodik, dušik, sumpor, kisik) te ogrjevne vrijednosti (gornja, donja) kao i ukupni energetski potencijal ostataka proizašlih nakon rezidbe (orezani ostatci) i prerade šljive (koštice). Analizirano je i međusobno uspoređeno pet različitih sorti (Bistrica, Čačanska ljepotica, Čačanska rodna, President i Stanley), uzgajanih na području Republike Hrvatske. Usporedbom analiziranih podataka s CEN/TS 14961 (2005) normom za kruta biogoriva i relevantnih literaturnih navoda, oba istraživana tipa biomase su potvrđena kao energetski visokovrijedne sirovine, dok značajnija razlika između istraživanih sorata šljive nije uočena.

Ključne riječi: biomasa, orezani ostatci, koštice, potencijal, „zelena“ energija

Plum prunned and stone biomass as high valuable fuel in Croatia

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Summary

Agricultural residues in Europe are representing a significant energy potential for development of biomass industry in many countries, where a significant share of residues are coming from primary production but also processing pomology sectors. Based on EU directives, it is necessary to dispose mentioned residues in an environmentally friendly way. The aim of this paper was to determine the proximate (moisture, ash, fixed carbon, volatile matter) and ultimate fuel properties (carbon, hydrogen, nitrogen, sulfur, oxygen) as well as calorific value (higher, lower) and the total energy potential of Croatian residues which derives from pruning (pruned residues) and prune processing (stone). Five different varieties cultivated in Croatia were analyzed and compared with each other (Bistrica, Čačanska ljepotica, Čačanska rodna, President i Stanley). Both investigated types of biomass have been determined as energy high valuable raw material, while a significant difference between the studied plum cultivars have not been determined by the comparison of obtained data with the CEN/TS 14961 (2005) standard for solid biofuels and relevant literature citations.

Key words: biomass, pruned residues, potential, “green” energy

Sadržaj bioatkivnih spojeva u suhim šljivama

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Sažetak

Suhe šljive nutritivno su izrazito kvalitetna sirovina u prehrani ljudi, a količinom antiokisadcijskih spojeva ne zaostaju za svježom sirovinom. Glavni cilj rada bio je utvrditi razlike u količini bioaktivnih komponenti plodova dviju sorti šljive 'Stanley' i 'Čačanska ljepotica' prije i nakon procesa sušenja i odgovarajućeg predtretmana. Plodovi navedenih sorti šljiva prije procesa sušenja podvrgnuti su predtretmanima u cilju uklanjanja voštane prevlake. Količina antocijana utvrđena u svježim plodovima šljiva kretala se u rasponu od 14,15 ('Čačanska ljepotica') do 62,12 mg/kg svježe tvari ('Stanley') dok je količina fenola bila u rasponu od 216,22 ('Čačanska ljepotica') do 372,04 mg GAE/100 g svježe tvari ('Stanley'). Nakon procesa sušenja u plodovima šljiva tretiranih vrućom destiliranom vodom količina antocijana bila je u rasponu od 0,615 ('Čačanska ljepotica') do 22,75 mg/kg svježe tvari ('Stanley'), a fenola od 152,41 ('Čačanska ljepotica') do 298,53 ('Stanley') mg GAE/100 g svježe tvari; dok je količina antocijana u plodovima tretiranim natrijevom lužinom (60°C) bila od 0,615 ('Čačanska ljepotica') do 9,84 ('Stanley') mg/kg svježe tvari, a fenola od 137,02 ('Čačanska ljepotica') do 220,24 mg GAE/100 g svježe tvari ('Stanley'). Možemo zaključiti da su analizirani svježi plodovi šljiva bogat izvor antocijana i fenola, spojeva snažne antioksidacijske aktivnosti, te da vrsta predtretmana utječe na očuvanje navedenih bioaktivnih komponenata.

Ključne riječi: ukupni antocijani, ukupni fenoli, 'Stanley', 'Čačanska ljepotica', predtretman

The content of bioactive compounds in dried plums

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Summary

Dried plums are high quality nutrient raw materials in the people diet and the amount of antioxidant compounds do not fall behind fresh raw material. The main aim of the study was to determine differences in the amount of bioactive compounds of two varieties of plum fruits 'Stanley' and 'Čačanska ljepotica' before and after the drying process and the appropriate pretreatment. Fruits of the above mentioned plum varieties before the drying process were subjected to pretreatment to remove the wax coating. The amount of total anthocyanins found in fresh plum fruits ranged from 14.15 ('Čačanska ljepotica') to 62.12 mg/kg fresh matter ('Stanley'), while the amount of total phenols was in the range of 216.22 ('Čačanska ljepotica') to 372.04 mg GAE/100 g fresh weight ('Stanley'). After the drying process in the plum fruits treated with hot distilled water, the amount of total anthocyanins ranged from 0.615 ('Čačanska ljepotica') to 22.75 mg/kg fresh matter ('Stanley') and total phenols from 152.41 ('Čačanska ljepotica') to 298.53 ('Stanley') GAE/100 mg g fresh weight, while the amount of total anthocyanins in fruits treated with sodium hydroxide solution (60°C) was from 0.615 ('Čačanska ljepotica') to 9.84 ('Stanley') mg/kg of fresh matter and total phenols from 137.02 ('Čačanska ljepotica') to 220.24 mg GAE/100 g fresh weight ('Stanley'). We conclude that analyzed fresh plum fruits are rich source of anthocyanins and phenols, compounds of strong antioxidant activity, and that sort of pretreatment effects on the preservation of the mentioned bioactive compounds.

Key words: total anthocyanins, total phenols, 'Stanley', 'Čačanska ljepotica', pretreatment

Validacija spektrofotometrijskih metoda određivanja L(+)-vinske kiseline, L(-)-jabučne kiseline, L(+)-mliječne kiseline u vinu

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Sažetak

Organske kiseline daju veliki doprinos sastavu, stabilnosti i organoleptičnim svojstvima vina. Porijeklo kiselina može biti direktno iz grožđa (vinska, jabučna, limunska), ili one nastaju tijekom procesa fermentacije (mliječna, octena). Kako bi se utvrdili uzroci mogućih problema tijekom korištenja neke analitičke metode, vrlo je važno izvršiti njezinu validaciju. Cilj rada bio je provesti validaciju spektrofotometrijskih metoda za određivanja L(+)-vinske, L(-)-jabučne i L(+)-mliječne kiseline u vinu. Mjerenja su provođena automatskim sekvencijalnim analizatorom sa spektofotometrom, s nizom dioda kao detektorom, a apsorbancija je mjerena u vidljivom području spektra. Određivane su L(+)-vinska kiselina s amonijevim vanadatom u octenoj kiseloj otopini, L(-)-jabučna kao oksaloacetat s NAD, u prisutnosti L-MDH i L(+)-mliječna, kao piruvat, u reakciji NAD u prisutnosti (L)-LDH. U svrhu validacije metode utvrđena je preciznost s dva parametra, ponovljivost mjerenja i ponovljivost priprave standardnih otopina. Linearnost i točnost metode određene su cijepljenjem uzorka vina s ispitivanim kiselinama. Rezultati validacije pokazuju da su metode kvantitativnog određivanja kiselina prikladne za analizu vina primjenom automatskog sekvencijalnog analizatora jer su zadovoljeni postavljeni kriteriji za preciznost i točnost. Postoji pomak prema višim vrijednostima iskorištenja kod određivanja točnosti metode za enzimatska određivanja. Predložene metode su jednostavne, osjetljive, točne i pogodne za primjenu u kontroli kvalitete vina.

Ključne riječi: vino, organske kiseline, validacija, spektrofotometrija

Validation of Spectrofotometric Methods for Determination of L(+)-tartaric acid, L(-)-malic acid and L(+)-lactic acid

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Organic acids make a major contribution to content, stability and sensorial properties of wine. The origin of acids can be directly from grape (tartaric, malic, citric) or can be formed during the fermentation proces (lactic, acetic). In order to establish possible difficulties during conduction of analitical method it is very important to perform its validation. The objective of this work is to validate spectrofotometric method for determination of L(+)-tartaric acid, L(-)-malic acid and L(+)-lactic acid in wine. Measurements are performed by automatic sequential analyser using spectrofotometer equipped with diode series as detector, and absorbance is mesured in visible range of spectrum. In this work determination of L(+)-tartaric acid with amonium vanadate in solution of acetic acid , L(-)-malic as oxaloacetate with NAD in presence of L-MDH and L(+)-lactic acid as pyruvate in reaction of NAD in presence of L-MDH was conducted. In the aim of validation, precision with two parameters such as repetability of measurement and repetability of standard solutions preparation were determinated. Linearity and accuracy of method which is determinated by adding tested acids in the samples of wine are established for the same purpose. The results of validation indicate that the methods of quantitative determination of acids are appropriate for wine testing using automatic sequential analyser because all criteria for accuracy and preccision were accomplished. In enzimatic acids testing, there is a trend to higher values of recovery at accuracy determination of method. Suggested methods are simple, sensitive, accurate and usable for wine quality control.

Key words: wine, organic acids, validation, spectrometry