UNIVERZITET U KRAGUJEVCU
AGRONOMSKI FAKULTET U ČAČKU

UNIVERSITY OF KRAGUJEVAC
FACULTY OF AGRONOMY
CACAK

XXVII SAVETOVANJE O BIOTEHNOLOGIJI

sa međunarodnim učešćem

- ZBORNIK RADOVA -



Čačak, 25 - 26. mart 2022. godine

XXVII SAVETOVANJE O BIOTEHNOLOGIJI

sa međunarodnim učešćem

-Zbornik radova–

ORGANIZATOR I IZDAVAČ

Univerzitet u Kragujevcu,
Agronomski fakultet u Čačku

Organizacioni odbor

Dr Duško Brković, prof. dr Biljana Veljković, dr Mirjana Radovanović, dr Marko Petković, dipl. inž. Radmila Ilić, dipl. inž. Dušan Marković

Programski odbor

Prof. dr Vladimir Kurćubić, prof. dr Tomo Milošević, prof. dr Leka Mandić, prof. dr Vladeta Stevović, prof. dr Drago Milošević, prof. dr Snežana Bogosavljević-Bošković, prof. dr Radojica Đoković, prof. dr Milomirka Madić, prof. dr Aleksandar Paunović, prof. dr Milena Đurić, prof. dr Goran Dugalić, prof. dr Milun Petrović, prof. dr Biljana Veljković, prof. dr Gordana Šekularac, prof. dr Mlađan Garić, dr Goran Marković, dr Gorica Paunović, prof. dr Tomislav Trišović, prof. dr Snežana Tanasković, dr Pavle Mašković, dr Jelena Mašković, dr Jelena Mladenović, dr Vladimir Dosković, dr Ivan Glišić, dr Dragan Vujić, dr Marko Petković, dr Nemanja Miletić, dr Igor Đurović, dr Simeon Rakonjac, dr Dalibor Tomić, dr Marija Gavrilović, dr Mirjana Radovanović

Tehnički urednici

Prof. dr Biljana Veljković, dipl. inž. Dušan Marković

Tiraž: 110 primeraka

Štampa

Štamparija Birograf Comp, 11080 Beograd

Godina izdavanja, 2022.

PREDGOVOR

Poljoprivreda je primarna i strateška delatnost koja obezbeđuje prehrambenu sigurnost, stabilnost tržišta hrane i štiti životni standard stanovništva. Svedoci smo da je u kriznim situacijama u zemlji poljoprivreda odgovorila svom zadatku i bila glavni oslonac u snabdevanju tržišta prehrambenim proizvodima. Proizvodnjom dovoljnih količina zdravstveno bezbedne hrane omogućava se razvoj radno sposobnog stanovništva koje aktivno učestvuje u ekonomskom razvoju društva. Specifični uslovi u kojima se poljoprivreda razvija zahtevaju konkretne ekonomske mere podrške i subvencije države za očuvanje domaće poljoprivrede. Planiranim investicijama u poljoprivredi uvođenjem savremene tehnologije i efikasne organizacije u proizvodnji i prometu smanjuju se ekonomski i tržišni rizici, a samim tim omogućavaju stabilni uslovi poslovanja. Razvoj poljoprivrede se mora bazirati na multifunkcionalnom povezivanju sa ostalim delatnostima (prehrambenom industrijom, trgovinom, turizmom i td.)

Poljoprivredna nauka i struka prati i proučava promene koje se dešavaju u ovoj oblasti ukazuje na aktuelne probleme poljoprivredne prakse i pronalazi rešenja. Agronomski fakultet u Čačku, pored edukacije studenata, svake godine tradicionalno već dvadeset sedmi put, organizuje i Savetovanje o biotehnologiji. Osnovni cilj Savetovanja je upoznavanje šire naučne i stručne javnosti sa rezultatima najnovijih naučnih istraživanja, domaćih i inostranih naučnika iz oblasti osnovne poljoprivredne proizvodnje i prerade hrane, kao i zaštite životne sredine.

U Zborniku radova XXVII Savetovanja o botehnologiji sa međunarodnim učešćem, predstavljeno je ukupno 84 rada iz oblasti Ratarstva, povrtarstva i krmnog bilja, Voćarstva i vinogradarstva, Zootehnike, Zaštite bilja, proizvoda i životne sredine i Prehrambene tehnologije.

Ministarstvu prosvete, nauke i tehnološkog razvoja Republike Srbije i Gradu Čačku kao glavnim pokroviteljima dugujemo veliku zahvalnost što su pomogli kao i svake godine da se ovo Savetovanje održi. Zahvaljujemo privrednicima i svim dugogodišnjim prijateljima Agronomskog fakulteta što su nam pružili materijalnu i organizacionu podršku.

Bavljenje poljoprivredom pored ekonomije i biznisa je i socijalna plemenita delatnost, s obzirom da zadovoljava osnovnu nasušnu potrebu ljudi za hranom. Poljoprivredni proizvođači zaslužuju ugled i poštovanje u društvu i treba im omogućiti da pristojno žive od svoga rada, a društvo bi to trebalo da prepozna.

U Čačku, marta 2022. godine

Programski i Organizacioni odbor
XXVII Savetovanja o biotehnologiji

SADRŽAJ

Sekcija: Ratarstvo, povrtarstvo i krmno bilje

Desimir Knežević, Aleksandar Paunović, Vesna Djurović, Svetlana Roljević Nikolić, Danica Mićanović, Milomirka Madić, Mirjana Menkovska, Veselinka Zečević: POBOLJŠANJE KVALITETA PŠENICE ZA ISHRANU LJUDI..... 11

Vojin Đukić, Jegor Miladinović, Zlatica Mamlić, Gordana Dozet, Marija Bajagić, Dragana Miljaković, Jelena Marinković: UTICAJ GODINE I SORTE SOJE NA BROJ I MASU ZRNA PO BILJCI..... 21

Gorica Cvijanović, Vojin Đukić, Marija Bajagić, Vesna Stepić, Vojin Cvijanović, Nenad Đurić, Gordana Dozet: UTICAJ INOKULACIJE SEMENA NS NITRAGINOM NA PRINOS SOJE..... 27

Dalibor Tomić, Vladeta Stevović, Dragan Đurović, Milomirka Madić, Miloš Marjanović, Nenad Pavlović: ALTERNATIVNI NAČINI SNABDEVANJA VIŠEGODIŠNJIH KRMNIH LEGUMINOZA FOSFOROM..... 33

Mirjana Jovovic, Verica Prodanovic, Aleksandra Govedarica -Lucic, Zoranka Malesevic: EFFECT OF APPLAYING OF HUMIC ACID ON SEEDLING GROWTH OF TOMATO (*Lycopersicon esculentum* L.) 39

Nataša Bezarević, Biljana Veljković, Goran Dugalić, Ranko Koprivica, Miloš Marjanović, Bratislav Mijailović: KALKULACIJA PROIZVODNJE KROMPIRA NA GAZDINSTVU U USLOVIMA DRAGAČEVA..... 45

Vesna Milić, Igor Đurđić, Branka Govedarica, Tatjana Krajišnik, Slavica Samardžić Gordana Radovanović: KARAKTERIZACIJA STARIH RATARSKIH SORTI TREBINJSKOG KRAJA..... 51

Milena Simić, Vesna Dragičević, Milan Brankov, Miodrag Tolimir, Života Jovanović: KOMBINOVANA PRIMENA PLODOREDA I HERBICIDA ZA UNAPREĐENJE SUZBIJANJA KOROVA U KUKURUZU..... 59

Miloš Marjanović, Dalibor Tomić, Mirjana Radovanović, Vesna Đurović, Vladeta Stevović, Aleksandar Paunović, Nenad Pavlović: KOMPONENTE PRINOSA SEMENA GENOTIPOVA OBIČNE TIKVE..... 67

Ranko Koprivica, Biljana Veljković, Marija Gavrilović, Almir Muhović, Dragan Terzić, Dragoslav Đokić: PRIMENA OPTIMALNE METODE ZA OBRAČUN AMORTIZACIJE TRAKTORA I KOMBAJNA..... 73

Branka Govedarica: PRINOS ODABRANIH SORTI KROMPIRA GAJENIH U RAZLIČITIM AGROEKOLOŠKIM USLOVIMA..... 79

Milomirka Madić, Dragan Đurović, Aleksandar Paunović, Vladeta Stevović, Dalibor Tomić: PRINOS ZRNA, VISINA BILJKE I OTPORNOST NA POLEGANJE LINIJA PŠENICE..... 87

Markola Saulić, Ivica Đalović, Dragana Božić, Sava Vrbničanin: PROCENA AKTIVNE REZERVE SEMENA KOROVSKIH BILJAKA U ZEMLJIŠTU..... 93

Marina Crnković, Jovana Šućur, Đorđe Malenčić, Suzana Jovanović-Šanta: PROCENA OKSIDATIVNOG STRESA KUKURUZA I SUNCOKRETA TRETIRANIH HOLNOM KISELINOM U RAZLIČITIM MEDIJUMIMA – SKRINING TEST..... 99

Valentina Nikolić, Marijana Simić, Slađana Žilić, Natalija Kravić, Vojka Babić, Milomir Filipović, Jelena Srdić: SUITABILITY OF THE SELECTED LOCAL MAIZE HYBRIDS FOR SILAGE PRODUCTION..... 105

Gordana Dozet, Vojin Đukić, Jegor Miladinović, Zlatica Mamlić, Gorica Cvijanović, Snežana Jakšić, Olga Kandelinskaja: UTICAJ FOLIJARNE PRIMENE NPK ĐUBRIVA SA MIKROELEMENTIMA I EFEKTIVNIH MIKROORGANIZAMA NA PRINOS SOJE..... 111

Violeta Mickovski Stefanović, Dragana Stanisavljević, Jasmina Bačić: UTICAJ GENOTIPA I LOKALITETA NA SADRŽAJ OLOVA U STABLU PŠENICE U FAZI PUNE ZRELOSTI..... 117

Đorđe Lazarević, Vladeta Stevović, Jasmina Radović, Dalibor Tomić, Jordan Marković, Mladen Prijović, Vladimir Zornić: UTICAJ INOKULACIJE NA KVALITET FERMENTACIJE I HEMIJSKI SASTAV SILAŽE LUCERKE..... 123

Dušan Marković, Uroš Pešović, Slađana Đurašević, Mihailo Knežević, Dalibor Tomić, Vladeta Stevović: LORA (LONG-RANGE) TEHNOLOGIJA U PRECIZNOJ POLJOPRIVREDI..... 129

Vladimir Zornić, Mirjana Petrović, Snežana Anđelković, Snežana Babić, Dejan Sokolović, Zoran Lugić, Jordan Marković: UTICAJ MINERALNIH ĐUBRIVA NA FLORISTIČKI SASTAV I PRINOS TRAVNE ZAJEDNICE *FESTUCO-NARDETUM STRICTAE SUBALPINUM*..... 137

Alma Memić, Aleksandra Govedarica-Lučić, Vedrana Komlen, Aida Šukalić: UTICAJ NAČINA ĐUBRENJA NA LJEKOVITA SVOJSTVA PERŠUNA..... 143

Pašić Sanid , Lavić Dževad: PRINOS SALATE „SHANGORE“ UZ UPOTREBU RAZLIČITIH NAČINA ISHRANE I NASTIRANJA ZEMLJIŠTA..... 149

Sekcija: Voćarstvo i vinogradarstvo

Nebojša Novković, Nataša Vukelić, Beba Mutavdžić, Tihomir Novaković, Dragana Tekić, Veljko Šarac: ANALIZA I PREDVIĐANJE PROIZVODNIH OBELEŽJA ŠLJIVE U SRBIJI..... 155

Nebojša Milošević, Ivana Glišić, Milena Đorđević, Sanja Radičević, Slađana Marić: UTICAJ NOVIH VEGETATIVNIH PODLOGA NA BUJNOST, PRINOS I POMOLOŠKE OSOBINE SORTI ŠLJIVE 'ČAČANSKA LEPOTICA' I 'JOJO'..... 161

Mlađan Garić, Vera Vukosavljević, Zoran Bosiočić: PRINOS I KVALITET GROŽĐA SORTE KABERNE SOVINJON U OPLENAČKOM VINOGORJU..... 173

Nedim Badžak, Mirjana Radović, Jasmina Aliman, Mirko Kulina, Jasna Hasanbegović Sejfić, Aleksandra Šupljeglav Jukić: FIZIČKE OSOBINE PLODA SORTI TREŠNJE NA PODLOZI GISELA 6 179

Tatjana Jovanović-Cvetković, Dragutin Mijatović, Ivana Radojević, Danijela Starčević: RODNOST STONIH SORTI INTERSPECIES HIBRIDA U USLOVIMA BANJALUČKE REGIJE..... 187

Sekcija: Zootehnika

Alexandr D. Lukyanov, Danila Yu. Donskoy, Miroslav A. Vernezi, Maria S. Mazanko, Svetlana G. Studennikova: EXPERIENCE IN DEVELOPING MODELS OF ARTIFICIAL GASTROINTESTINAL TRACTS OF ANIMALS..... 193

Nikolija Gligović, Vladan Bogdanović, Radica Đedović, Dragan Stanojević, Krstina Zeljić: UTICAJ ODGAJIVAČKIH USLOVA NA VARIJABILNOST MIKROKLIMATSKIH PARAMETARA U OBJEKTIMA ZA DRŽANJE MLEČNIH KRAVA U REPUBLICI SRBIJI..... 199

Goran Mirjanić, Nebojša Nedić, Lejla Biber: UTICAJ SEZONE I RAZLIČITE PRIHRANE ZIMSKIH PČELA NA POVRŠINU SAKUPLJENOG POLENA..... 207

Simeon Rakonjac, Snežana Bogosavljević-Bošković, Vladimir Dosković, Miloš Lukić, Zdenka Škrbić, Veselin Petričević, Milun D. Petrović: UTICAJ SISTEMA GAJENJA I GENOTIPA KOKOŠI NOSILJA NA SADRŽAJ HOLESTEROLA U JAJIMA..... 213

Radojica Đoković, Marko Cincović, Milun Petrović, Miloš Petrović, Boban Jašović, Biljana Anđelić Miroslav Lalović: DIJAGNOZA KETOZE KOD MLEČNIH KRAVA..... 219

Vladimir Dosković, Snežana Bogosavljević-Bošković, Zdenka Škrbić, Božidar Milošević, Miloš Lukić, Simeon Rakonjac, Veselin Petričević: ENZIMI U ISHRANI BROJLERA..... 229

Boban Jašović, Radojica Đoković, Bisa Radović, Jovan Stojković, Božidar Milošević, Miloš Petrović: KOMPARACIJA PORODNE MASE JAGNJADI SJENIČKE PRAMENKE SA RAZLIČITIH LOKALITETA RAŠKE OBLASTI..... 237

Miloš Petrović, Radojica Đoković, Milun D. Petrović, Branislava Belić, Jože Starič, Miodrag Radinović, Jašović Boban, Miroslav Lalović, Marko Cincović: METABOLIČKI STRES KOD MLEČNIH KRAVA U RANOJ LAKTACIJI – OPŠTE KARAKTERISTIKE..... 243

Radojica Đoković, Marko Cincović, Milun Petrović, Miloš Petrović, Boban Jašović, Biljana Anđelić, Miroslav Lalović: ŠEPAVOST MLEČNIH KRAVA - UZROCI, OBLICI, TRETMAN.. 249

Milun Petrović, Snežana Bogosavljević-Bošković, Vladan Bogdanović, Radojica Đoković, Simeon Rakonjac, Miloš Petrović: SISTEM GAJENJA I PROIZVODNJE U ORGANSKOM SVINJARSTVU..... 257

Talija Hristovska, Kosta Petrović, Marko Cincović, Branislava Belić, Maja Došenović Marinković, Radojica Đoković, Miloš Petrović, Dražen Kovačević: UTICAJ APLIKACIJE NIACINA NA VREDNOST NJEGOVIH VITAMERA U KRVI KRAVA U RANOJ LAKTACIJI... 263

Nenad Đorđević, Bojan Stojanović, Aleksa Božičković, Blagoje Stojković, Dušica Radonjić: UTICAJ LIPOLITIČKIH PROMENA U SILAŽI NA SADRŽAJ POLINEZASIĆENIH MASNIH KISELINA U MLEČNOJ MASTI PREŽIVARA..... 269

Milun Petrović, Snežana Bogosavljević-Bošković, Radojica Đoković, Simeon Rakonjac, Miloš Petrović, Halid Žigić: UTICAJ NEGENETSKIH FAKTORA NA MASU JAGNJADI PRI ROĐENJU, SA 30 I 90 DANA STAROSTI KOD SJENIČKE PRAMENKE..... 277

Sekcija: Zaštita bilja, proizvoda i životne sredine

Gorica Đelić, Aleksandra Mitrović, Duško Brković, Goran Marković,Milica Pavlović: ETNOBOBANIČKI PREGLED TRADICIONALNOG KORIŠĆENJA BILJAKA BANATSKOG, ŠUMADIJSKOG I ZLATIBORSKOG OKRUGA..... 285

Snežana Branković, Radmila Glišić, Duško Brković, Gorica Đelić, Filip Grbović, Vera Rajičić, Maija Marin, Marijana Vasić, Jelena Bogosavljević: BIOAKUMULACIONI I TRANSLOKACIONI POTENCIJAL VRSTE *HOLCUS LANATUS* L. NA JALOVIŠTU RUDNIK DOO „RUDNIK“ 291

Duško Brković, Snežana Branković, Gorica Đelić, Goran Marković, Filip Grbović: ANALIZA ŽIVOTNIH FORMI FLORE BRDSKO-PLANINSKOG PODRUČJA SEVEROZAPADNE SRBIJE I ŠUMADIJE 297

Jelena Popović-Djordjević, Goran Marković, Vibor Roje, Beka Sarić, Jelena Mutić: EVALUATION OF IRON AND MANGANESE IN WATER FROM DELIBLATO SANDS AREA 303

Filip Grbović, Gordana Gajić, Snežana Branković Zoran Simić, Andrija Ćirić, Danijela Mišić, Marina Topuzović: MOGUĆNOSTI I RIZICI PRIMENE INVAZIVNIH DRVENASTIH VRSTA U OBNOVI VEGETACIJE NA DEGRADIRANIM STANIŠTIMA 309

Ivana Pajčin, Vanja Vlajkov, Selena Dmitrović, Aleksandar Jokić, Mila Grahovac, Jelena Dodić, Jovana Grahovac: DISTILLERY FRUIT WASTE AS A SUBSTRATE FOR BIOCONTROL AGENTS PRODUCTION 315

Žiko Milanović, Marko Antonijević, Svetlana Jeremić, Jelena Đorović Jovanović, Dejan Milenković: NAPREDNI PROCESI OKSIDACIJE HLORFENOLNIH JEDINJENJA IZ OTPADNIH VODA-KINETIČKA DFT STUDIJA 321

Gorica Đelić , Zoran Simić, Milan Stanković, Snežana Branković, Tatjana Jakšić, Predrag Vasić, Milica Pavlović, Anđelka Popadić: POTENCIJAL BIOAKUMULACIJE I TRANSLOKACIJE Pb i Cr U BILJNIM VRSTAMA KOJE RASTU NA JALOVIŠTU 327

Avdul Adrović, Edina Hajdarević, Alen Bajrić, Ernad Kucalović: BIODIVERZITET VODOZEMACA (KLASA: AMPHIBIA) SJEVEROISTOČNE BOSNE 333

Milica Mačkić, Vojislava Bursić, Gorica Vuković, Tijana Stojanović, Dušan Marinković, Aleksandra Petrović, Nikola Puvača, Snežana Tanasković: DEVELOPMENT AND VALIDATION OF A RELIABLE LC-MS/MS METHOD FOR THE QUANTITATIVE ANALYSIS OF PESTICIDE RESIDUES IN SOIL 339

Branka Uzelac, Dragana Stojičić, Snežana Budimir, Svetlana Tošić, Bojan Zlatković, Saša Blagojević, Branislav Manić, Mirjana Janjanin, Violeta Slavkovska: ESSENTIAL OILS AS POTENTIAL BIOCONTROL PRODUCTS AGAINST PLANT PATHOGENS AND WEEDS: *IN VITRO* CULTURE APPROACH 345

Dejana Stanić: FENOLOGIJA I MONITORING INSEKATA U ZASADIMA KRUŠKE NA PODRUČJU ISTOČNOG SARAJEVA 351

Bogdan Garalejić, Helena Majstorović, Maja Sudimac, Miloš Pavlović, Vladimir Čolović: FIZIČKE OSOBINE ZEMLjIŠTA U FUNKCIJI TIPA ZEMLjIŠTA NA TERITORIJI GRADA PANČEVA 359

Jelena M. Mašković, Nenad Kuč, Goran Marković, Vladimir Kurćubić: HEMIJSKE ANALIZE OTPADNE VODE MLEKARE „ KUČ KOMPANI“ 365

Milica Vranešević, Atila Bezdan, Boško Blagojević, Gordana Šekularac, Radovan Savić, Miroljub Aksić: HIDROHEMIJSKA OCENA KVALITETA VODE ZA NAVODNJAVANJE U BANATU, SRBIJA 371

Zorana Đekanović, Duška Delić, Vojo Radić, Aleksandra Šmitran, Nevena Jokić, Relja Suručić, Ranko Škrbić: IN VITRO TRIAL FOR ANTIMICROBIAL ACTIVITY OF INDUSTRIAL HEMP EXTRACTS..... 377

Dragutin Đukić, Leka Mandić, Monika Stojanova, Vesna Đurović, Bojana Trifunović: INFICIRANJE HIDROBIONATA SA POTENCIJALNO PATOGENIM MIKROORGANIZMIMA 383

Milan Mitić, Pavle Mašković, Jelena Mitić: MATHEMATICAL MODELING OF TOTAL FLAVONOID COMPOUNDS EXTRACTION FROM DILL (*Anethum graveolens L.) LEAVES* 389

Helena Majstorović, Bogdan Garalejić, Maja Sudimac, Miloš Pavlović, Vladimir Čolović: PARAMETRI PLODNOST ZEMLJIŠTA U FUNKCIJI TIPA ZEMLJIŠTA NA TERITORIJI GRADA PANČEVA..... 395

Olga Radulović, Tatjana Popržen, Marija Marković: POTENCIJAL RIZOSFERE SOČIVICE (LEMNA MINOR L.) ZA PRODUKCIJU AUKSINA BAKTERIJSKOG POREKLA..... 401

Alexandr D. Lukyanov, Maria S. Mazanko, Ksenia I. Boldareva, Tatiana S. Onoiko: QUALITATIVE MODELING OF THE EFFECT OF PROBIOTICS ON THE DEVELOPMENT OF MICROFLORA "IN-VITRO"..... 407

Radijana Đekanović, Branimir Nježić: REPRODUCTIVE POTENTIAL OF TWO SPECIES OF ENTOMOPATHOGENIC NEMATODES ON GRATE WAX MOTH LARVAE (*GALLERIA MELLONELLA*) 413

Marija Marković, Biljana Veljković, Goran Dugalić, Simeon Rakonjac, Marija Gavrilović: RURALNO PODRUČJE OPŠTINE REKOVAC POTENCIJALI I RIZICI..... 419

Vladimir Čolović , Bogdan Garalejić, Helena Majstorović, Maja Sudimac, Miloš Pavlović: TAČNOST FORMULACIJE I EKOLOŠKI ASPEKT NEKIH MINERALNIH ĐUBRIVA..... 425

Dragana-Linda Mitić, Milica Živković, Vesna Teofilović: TRAGOVI TEŠKIH METALA U VODAMA BELOCRKVANSKIH JEZERA..... 431

Ljubica Šarčević-Todosijević, Snežana Đorđević, Vera Popović, Ljubiša Živanović, Bojana Petrović, Nikola Đorđević, Jelena Golijan: ZDRAVSTVENI ASPEKTI ZNAČAJA HRANE..... 437

Sekcija: Prehrambena tehnologija

Vladimir Kurćubić, Slaviša Stajić, Nemanja Miletić, Vesna Đurović, Marko Petković, Marko Dmitrić, Branko Jakovljević: „CLEAN LABEL“ MEAT PRODUCTS - HOW TO GAIN CONSUMER CONFIDENCE? 443

Milica Kanjevac, Biljana Bojović, Marija Todorović, Dragana Jakovljević, Jovana Momčilović, Milan Stanković: EFEKAT HORMOPRAJMINGA NA POBOLJŠANJE OTPORNOSTI KLIJANACA KUKURUZA NA USLOVE SLANOG STRESA..... 449

Marko Antonijević, Žiko Milanović, Edina Avdović, Dušica Simijonović, Zoran Marković: ANOTHER LOOK AT THE BIOLOGICAL ROLES OF A PLANT ALKALOID-BERBERINE..... 455

Vladimir Kurćubić, Slaviša Stajić, Nemanja Miletić, Vesna Đurović, Marko Petković, Marko Dmitrić, Branko Jakovljević: MEAT PRODUCTS WITH REDUCED SODIUM CONTENT - HOW TO ACHIEVE CONSUMER FAVOR? 461

Milan Stanković, Tatjana Marković, Nenad Zlatić, Gorica Đelić, Biljana Bojović: VARIJABILNOST SASTAVA ETARSKOG ULJA VRSTE *COTINUS COGGYGRIA* SCOP. (ANACARDIACEAE) SA TERITORIJE SRBIJE..... 469

Monika Stojanova, Dragutin Djukic, Marina Todor Stojanova, Aziz Şatana, Blazo Lalevic: DETERMINATION OF ANTIBACTERIAL POTENTIAL OF *AGARICUS MACROSPORUS* AND *RUSSULA VESCA* MUSHROOM EXTRACTS..... 477

Marijana Kosanić, Aleksandra Vesić, Nevena Petrović: BIOAKTIVNOST ACETONSKIH EKSTRAKATA VRSTA *HERICIUM CLATHROIDES I AURICULARIA MESENTERICA*..... 483

Neda Pavlović, Jelena Mijalković, Verica Đorđević, Branko Bugarski, Zorica Knežević Jugović: CHARACTERISTICS OF OCTADECYLAMINE-STABILIZED LIPOSOMES CONTAINING SOY PROTEIN HYDROLYSATES..... 489

Milica Luković, Sonja Veljović, Marija Kostić: EDIBLE INLAND HALOPHYTES: POTENTIAL INGREDIENT OF INNOVATIVE GASTRONOMIC PRODUCTS WITH INCREASED NUTRITION VALUE..... 497

Jovana Momčilović, Dragana Jakovljević, Milica Kanjevac, Biljana Bojović: FIZIOLOŠKE KARAKTERISTIKE RASTENJA PŠENICE (*Triticum aestivum* L.) U USLOVIMA *IN VITRO*..... 503

Dragana Stanisavljević, Dušica Ćirković, Violeta Mickovski Stefanović, Dragan Veličković: HEMIJSKI SASTAV I SENZORNE KARAKTERISTIKE RAKIJA OD VOĆA..... 509

Mirjana Radovanović, Dalibor Tomić, Vesna Đurović, Miloš Marjanović, Radmila Ilić, Vera Katanić: HLADNO PRESOVANA ULJA TIKVE I ORAHA..... 515

Sanja Lj. Matić, Nikola Srećković, Jelena S. Katanić Stanković, Vladimir Mihailović: IN VIVO PROTEKTIVNI EFEKAT EKSTRAKATA BILJKE *Lysimachia vulgaris* NA DNK OŠTEĆENJA INDUKOVANA ETIL METANSULFONATOM..... 523

Antonio Petrov, Fidanka Ilieva, Sanja Velichkovich Kostadinovska, Violeta Dimovska: INFLUENCE OF INDIGENOUS AND COMMERCIAL YEASTS ON THE PRODUCTION OF RED WINE FROM VRANEC, MERLOT AND FRANKOVKA IN VINICA WINE REGION..... 529

Branislav Vlahović, Kristina Kukolj: STAVOVI POTROŠAČA U POTROŠNJI MEDA..... 535

Danijela Stojković, Verica Jevtić, Maja Đukić, Đorđe Petrović, Sandra Jovičić Milić, Marijana Kasalović: SADRŽAJ VITAMINA C U EKSTRAKTIMA ŠIPURKA..... 541

Darko Manjenčić, Mirjana Antonijević Nikolić, Vladan Mićić, Anja Manjenčić: UTICAJ DODATKA RAZLIČITIH TIPOVA NANOPUNILA NA FINALNA SVOJSTVA UMREŽAVAJUĆIH SISTEMA SILIKONSKIH MATERIJALA TAČNO ODREĐENOG SPECIFIČNOG ODNOSA NA AKCENTU UMREŽIVAČA..... 547

Jasur Safarov, Sunil Verma, Shakhnoza Sultanova, Abhijit Tarawade, Azamat Usenov: SORPTION AND DESORPTION OF RAW MATERIALS..... 553

DOI: 10.46793/SBT27.529P

INFLUENCE OF INDIGENOUS AND COMMERCIAL YEASTS ON THE PRODUCTION OF RED WINE FROM VRANEC, MERLOT AND FRANKOVKA IN VINICA WINE REGION

Antonio Petrov[1], Fidanka Ilieva[1], Sanja Velichkovich Kostadinovska[1],Violeta Dimovska[1]

Abstract: The aim of this study was the influence of yeasts on the production of red wines from the wine region of Vinica. The research was conducted on three grape varieties, cultivated in 3 different micro locations, each of which has its own unique characteristics and different altitudes. The three grape varieties were included: Vranec (cultivated in the area of Krshla, Vinica, at an altitude of 400m), Frankovka (cultivated in the area of Baltaci, Vinica, at an altitude of 520m) and Merlot (cultivated in Dragobrashte, Vinica, at an altitude of 540m). The main goal of the research is to define the effect of the yeast on the quality of young wines. The indigenous types of yeast already present in the grapes (wild yeasts) and the commercial types from the *Saccharomyces cerevisiae* family which were isolated for use in international production of red wines of average tannin value (SELECTYS® LA DÉLICIEUSE) were applied**.**

The research of the wines was carried out in the Wine Institute at the State Phytosanitary Laboratory in Skopje(North Macedonia) and involved examination of the wine quality parameters such micro and macro wine elements with ICP/MS and FOSS WINESCAN, parameters for alcohol, sugar, total acids, volatile acids, pH, total/volatile acids. This research gave insight of the correlation between samples of the wine and their parameters. It was further expanded with parameters for micro and macro wine elements which also shows the correlation of the wine samples. The wine region of Vinica is a developing region of great potential and this is the first step to presenting a vision for wine development in the region.

Key words: wine, yeast, quality, impact, indigenous

Introduction

The wine types of Vranec, Merlot and Frankovka are some of the most cultivated grape varieties in Macedonia and the Balkans. For the purposes of modern production, commercial yeasts are used, which in a way guarantees a good quality final product. The fast and controlled fermentation, the resistance to high temperatures, alcohol, sugar and sulphur dioxide are just some of the reasons for the use of commercial yeasts.

[1]University Goce Delčev, Faculty of Agriculture , Krste Misirkov bb, Štip, North Macedonia (antonio.209109@student.ugd.edu.mk)

However, the increased use of such yeasts leads to loss of the indigenous ones(wild yeast). The indigenous yeasts possess the best characteristics typical for each region which is confirmed with the production of quality wines. The main goal of the research is to compare the wines and their characteristics when fermented with indigenous(wild) yeasts and commercial yeasts.

The prospects of the wine production sector are limitless, every winemaker has their own affinities. One of the areas which we believe should be further developed is the isolation of yeasts in all the production regions to increase the quality of the products. Research is necessary for each wine region with proven quality and uniqueness. To that end, in-depth and wider research is necessary to further develop the regions. Within the master thesis, the results received will be presented and will be available to the wider public. Starting from the basic quality parameters such as the amounts of alcohol, sugar, pH. value, total acids etc. and then macro and micro wine elements, all have an influence on the sensory characteristics of the wine and are key in the development of excellent wines.

Material and methods

The varieties used in the research come from three different locations with unique characteristics. Vranec is found at the altitude of 400m from wine yard in village Vinichka Krshla in Vinica(North Macedonia), Frankovka at 520m and Merlot is at an altitude of 540m both of the grapes are harvested from wine yards in village Dragobrashte in Vinica(North Macedonia).

They were all harvested during the period of their technological maturity. After the harvest the grapes were crushed and destemmed with Fibreno 20 electrical destemmer and treated with potassium metabisulphite at a 10g/100kg ratio and kept in plastic vessels of 70 liters. After three hours some of the samples were treated with commercial yeasts while others were left to continue with wild yeasts. The period of maceration was 5 days for all of the samples. During the fermentation the wines were under remontage(stirred) three times a day. After the fermentation the wines were transferred to stabilization vessels for aging.

For the purpose of the fermentation, commercial yeasts were used, a yeast of French origin specially developed for a broader (international) use of the brand OenoFrance La Deliciouse. All of the samples in the research were fermented at a sustainable temperature of 22-25°C to ensure uninterrupted quality fermentation. The rooms where the research was conducted were attended to hygiene throughout the entire process. The wines were controlled several times a day until the end of the process.

The resulting samples were analyzed at the Wine Institute in the State Phytosanitary Laboratory in Skopje where the wine quality parameters were

examined with FOSS WINE SCAN wine analyzer with approved method to OIV standards, this analyzer uses aeration-oxidation method reaction, the macro and micro wine elements were examined with mass spectrometry that uses inductively coupled plasma that ionize the sample.

Results and discussion

Based on the given table we can analyze and discuss the final results.

Tabela. 1. Hemijske karakteristike Vranca, Frankovke I Merloa
Table. 1. Chemicals characteristics of Vranec, Frankovka and Merlot

Vino ***Wine***	Kvasac ***Yeast***	Alkohol % ***Alcohol %***	Secer (g/l) ***Sugar (g/l)***	Ukupne Kiseline (g/l) ***Total acids (g/l)***	Ph ***Ph***	Slobodan SO2 (mg/l) ***Free SO2 (mg/l)***	Ispraljiva Kiselost (g/l) ***Volatile Acidity (g/l)***
Vranac ***Vranec***	***SELECTYS® LA DÉLICIEUSE***	***12,154***	***2,112***	***5,914***	***3,2***	***9,24***	***0,34***
Vranac ***Vranec***	Avtohtoni kvasci ***Wild Yeasts***	***12,738***	***4,542***	***5,803***	***3,4***	***8,238***	***1,233***
Frankovka ***Frankovka***	***SELECTYS® LA DÉLICIEUSE***	***12,358***	***4,421***	***6,58***	***3,3***	***8,203***	***1,581***
Frankovka ***Frankovka***	Avtohtoni kvasci ***Wild Yeasts***	***12,1011***	***4,314***	***5,512***	***3,2***	***7,8261***	***1,17135***
Merlot ***Merlot***	***SELECTYS® LA DÉLICIEUSE***	***13,079***	***4,677***	***5,154***	***3,4***	***7,589***	***0,781***
Merlot ***Merlot***	Avtohtoni kvasci ***Wild Yeasts***	***12,592***	***1,759***	***6***	***3,5***	***6,438***	***1,242***

The highest level of alcohol during the fermentation was noted in the Merlot variety, which was fermented with a commercial yeast, while the lowest level of alcohol was noted in Vranec, also fermented with commercial yeast. The level of alcohol found in the final samples of Merlot and Frankovka fermented with commercial yeast is higher than the samples fermented with the wild yeasts (spontaneous fermentation). The highest acid level was found in the Frankovka fermented with commercial yeast, while the lowest acid level was found in the Merlot fermented with wild yeasts .

The highest pH level was noted in the Merlot sample fermented with wild yeasts, while the lowest (identical) for all the Vranec samples (fermented with commercial yeast) and the Frankovka samples (fermented with wild yeasts).

We can see from the samples that there is a correlation in the final values with a leap in the values of the Frankovka and Merlot samples fermented with the commercial yeast La Delicieuse. The Vranec samples show higher values in the parameters received from the fermentation with wild yeasts (spontaneous fermentation) as opposed to the sample received by commercial yeast fermentation.

The amounts of metals seen in Table.2. vary differently in all the samples, we can say that this variation is the result of the fermentation processes and locations of the grapes origin and the uniqueness of the soil where they were cultivated.

Tabela. 2. Makro I Mikro elemenata u Vranca, Frankovke I Merlot
Table. 2. Macro and micro elements in Vranec, Frankovka and Merlot

Vino ***Wine***	Kvasac ***Yeast***	Zeljezo ***Fe57*** ***ppb ug/L***	Mangan ***Mn55*** ***ppb ug/L***	Rubidium ***Rb85*** ***ppb ug/L***
Vranac ***Vranec***	***SELECTYS® LA DÉLICIEUSE***	**3947,093**	**1272,261**	**1993,653**
Vranac ***Vranec***	Avtohtoni kvasci ***Wild Yeasts***	**10827,73**	**1311,186**	**2557,076**
Frankovka ***Frankovka***	***SELECTYS® LA DÉLICIEUSE***	**4343,716**	**2117,811**	**2586,231**
Frankovka ***Frankovka***	Avtohtoni kvasci ***Wild Yeasts***	**3576,469**	**2019,026**	**2280,822**
Merlot ***Merlot***	***SELECTYS® LA DÉLICIEUSE***	**5037,64**	**3000,609**	**3176,055**
Merlot ***Merlot***	Avtohtoni kvasci ***Wild Yeasts***	**4040,567**	**2669,345**	**3232,755**

Conclusion

As a result of this research, where a total of 6 wine samples of 3 different varieties, fermented with 2 different yeasts during the process of production, we can conclude that the use of cultivated (commercial yeasts) enables a more certain and more effective fermentation. The use of commercial yeasts has a positive effect on both the quality parameters and the micro and macro elements in the wine as one of the key factors for quality wines. Although the differences in the values presented in the table and the graph are not considerable, they still play a

significant role in the quality of the final product. The use of commercial yeasts positively influences wine production. Therefore, it is necessary to conduct more scientific research as well as more processes of yeast isolation in the region of the grapes' cultivation in order to contribute to a better wine quality and uniqueness.

Acknowledgment

The above research is part of a master thesis with the same title prepared by the first author of the paper, a student at the Faculty of Agriculture – Enology at the University "Goce Delcev" Shtip, N.Macedonia.

References

Bambalov G. Spasov H. Cvetanov O. Bambalov K. (1996). New strains of yeast for the production of red wines, Viticulture and winemaking, 5,22-26.

Илиева Ф. (2013). Изолирање и селекција на винени дрожди од реона на Тиквеш и приложението им за производство на регионални црвени вина. Универзитет по хранителни технологии гр.Пловдив.142.

Ilieva, Fidanka and Petrov, Kire and Kostadinovic Velickovska, Sanja and Natasa, Gunova and Dimovska, Violeta and Rocha, Joao Miguel F. and Esatbeyoglu, Tuba (2021). Influence of Autochthonous and Commercial Yeast Strains on Fermentation and Quality of Wines Produced from Vranec and Cabernet Sauvignon Grape Varieties from Wine-Growing Region, Republic of North Macedonia. Applied Science, 11 (13). p. 6135. ISSN 2076-3417, https://eprints.ugd.edu.mk/28278/

Ilieva F. Velickovska S. Dimovska V. Mirhosseini H. Spasov H. (2016). Selection of 80 newly isolated autochthonous yeast strains from the Tikveš region of Macedonia and their impact on the quality of red wines produced from Vranec and Cabernet Sauvignon grape varieties. Food Chemistry,216.309-315.

Ilieva F. Velickovska S. Dimovska V. Mirhosseini H. Spasov H. (2015). The impact of some wine-making practices on the quality of Vranec red wines from Macedonia produced by the newly-selected local strain ''F-78". Food Chemistry,194.1123-1131.

Абрашева П., Бамбалов К., Георгиев А., (2008). Лозарство и винарство. Софиа, изд. "Матком", 344

Ingledew W., Kunkee R., (1985). Factors Influencing Sluggish Fermentations of Grape Juice. American Journal of Enology and Viticulture, vol.36, 1, 65-76

Божиновиќ З., (2005). Ампелографија, 112-146

CIP - Каталогизација у публикацији

Народна библиотека Србије, Београд

63(082)
606:63(082)

САВЕТОВАЊЕ о биотехнологији са међународним учешћем (27 ; 2022 ; Чачак)
Zbornik radova / XXVII savetovanje o biotehnologiji sa međunarodnim učešćem, Čačak, 25 - 26. mart 2022. godine ; [organizator] Univerzitet u Kragujevcu, Agronomski fakultet u Čačku. - Kragujevac : Univerzitet, Agronomski fakultet u Čačku, 2022 (Beograd : Birograf Comp). - 558 str. : ilustr. ; 25 cm

Na vrhu nasl. str.: University of Kragujevac, Faculty of Agronomy Cacak. - Radovi na srp. i engl. jeziku. - Tiraž 110. - Bibliografija uz svaki rad. - Abstracts.

ISBN 978-86-87611-86-3

а) Пољопривреда -- Зборници
б) Биотехнологија -- Зборници

COBISS.SR-ID 60661769

DOI: 10.46793/SBT27