

The logo for AgroSym 2022 is an oval with a dark red background and a gold border. The text "AgroSym" is in a gold serif font, with a stalk of wheat behind the 'y'. Below it, "2022" is in a smaller gold sans-serif font.

AgroSym
2022

A large, curved photograph of a sunflower field under a blue sky with light clouds. The sunflowers are in various stages of bloom, with bright yellow petals and dark brown centers. The leaves are green and large.

**BOOK OF
PROCEEDINGS**

*XIII International Scientific Agriculture Symposium
"AGROSYM 2022"
October 6-9, 2022*

The logo for AgroSym 2022 features a green leaf icon above the text "AGRO 2022" in a bold, sans-serif font. Below "AGRO 2022" is the word "sym" in a blue, lowercase, sans-serif font.

AGRO 2022
sym

BOOK OF PROCEEDINGS

**XIII International Scientific Agriculture Symposium
“AGROSYM 2022”**



Jahorina, October 06 - 09, 2022

Impressum

XIII International Scientific Agriculture Symposium „AGROSYM 2022“

Book of Proceedings Published by

University of East Sarajevo, Faculty of Agriculture, Republic of Srpska, Bosnia
University of Belgrade, Faculty of Agriculture, Serbia
Mediterranean Agronomic Institute of Bari (CIHEAM - IAMB) Italy
International Society of Environment and Rural Development, Japan
Balkan Environmental Association (B.EN.A), Greece
CDR, University of Natural Resources and Life Sciences (BOKU), Austria
Perm State Agro-Technological University, Russia
Voronezh State Agricultural University named after Peter The Great, Russia
Tokyo University of Agriculture, Japan
Faculty of Agriculture, University of Western Macedonia, Greece
Chapingo Autonomous University, Mexico
Selçuk University, Turkey
University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania
Slovak University of Agriculture in Nitra, Slovakia
National University of Life and Environmental Sciences of Ukraine, Kyiv, Ukraine
Saint Petersburg State Forest Technical University, Russia
University of Valencia, Spain
Tarbiat Modares University, Islamic Republic of Iran
Valahia University of Targoviste, Romania
Faculty of Bioeconomy Development, Vytautas Magnus University, Lithuania
Faculty of Agriculture, University of Akdeniz - Antalya, Turkey
Ukrainian Institute for Plant Variety Examination, Kyiv, Ukraine
Institute of Animal Science- Kostinbrod, Bulgaria
National Scientific Center „Institute of Agriculture of NAAS“, Kyiv, Ukraine
Department of Agricultural, Food and Environmental Sciences, University of Perugia, Italy
Watershed Management Society of Iran
Faculty of Agriculture, Cairo University, Egypt
Higher Institute of Agronomy, Chott Mariem-Sousse, Tunisia
SEASN - South Eastern Advisory Service Network, Croatia
Faculty of Economics Brcko, University of East Sarajevo, Bosnia and Herzegovina
Biotechnical Faculty, Montenegro
Institute of Field and Vegetable Crops, Serbia
Institute of Lowland Forestry and Environment, Serbia
Institute for Applied Science in Agriculture, Serbia
Agricultural Institute of Republic of Srpska - Banja Luka, Bosnia and Herzegovina
Maize Research Institute “Zemun Polje”, Serbia
Faculty of Agriculture, University of Novi Sad, Serbia
Institute for Animal Science, Ss. Cyril and Methodius University in Skopje, Macedonia
Serbian Academy of Engineering Sciences, Serbia
Balkan Scientific Association of Agricultural Economics, Serbia
Institute of Agricultural Economics, Serbia

Editor in Chief

Dusan Kovacevic

Tehcnical editors

Sinisa Berjan
Milan Jugovic
Noureddin Driouech
Rosanna Quagliariello

Website:

<http://agrosym.ues.rs.ba>

CIP - Каталогизacija у публикацији
Народна и универзитетска библиотека
Републике Српске, Бања Лука

631(082)(0.034.2)

INTERNATIONAL Scientific Agriculture Symposium "AGROSYM" (13 ; Jahorina ; 2022)

Book of Proceedings [Електронски извор] / XIII International
Scientific Agriculture Symposium "AGROSYM 2022", Jahorina, October 06
- 09, 2022 ; [editor in chief Dusan Kovacevic]. - Onlajn izd. - El. zbornik. -
East Sarajevo : Faculty of Agriculture, 2022. - Ilustr.

Sistemski zahtjevi: Nisu navedeni. - Način pristupa (URL):

http://agrosym.ues.rs.ba/article/showpdf/BOOK_OF_PROCEEDINGS_2022_FINAL.pdf. - El. publikacija u PDF formatu opsega 1432 str. - Nasl. sa naslovnog ekrana. - Opis izvora dana 30.11.2022. - Bibliografija uz svaki rad. - Registar.

ISBN 978-99976-987-3-5

**XIII International Scientific Agricultural Symposium “Agrosym 2022”
Jahorina, October 06-09, 2022, Bosnia and Herzegovina**

HONORARY COMMITTEE

Prof. dr Boris Pasalic, Minister of Agriculture, Water Management and Forestry of Republic of Srpska, Bosnia and Herzegovina
Mr Srdjan Rajcevic, Minister of Scientific-Technological Development, Higher Education and Information Society of Republic of Srpska, Bosnia and Herzegovina
Prof. dr Mario T. Tabucanon, President of the International Society of Environment and Rural Development, Japan
Prof. dr Milan Kulic, Rector of the University of East Sarajevo, Bosnia and Herzegovina
Prof. dr Dusan Zivkovic, Dean of the Faculty of Agriculture, University of Belgrade, Serbia
Dr. Maurizio Raeli, Director of the Mediterranean Agronomic Institute of Bari, Italy
Prof. dr Metin Aksoy, Rector of the Selcuk University, Turkey
Prof. dr Aleksey Andreev, Rector of the Perm State Agro-Technological University, Russia
Prof. dr Antanas Maziliauskas, Rector of the Vytautas Magnus University Agriculture Academy, Lithuania
Prof. dr Alexey Yu. Popov, Rector of the Voronezh State Agricultural University named after Peter The Great, Russia
Prof. dr Barbara Hinterstoisser, Vice-Rector of the University of Natural Resources and Life Sciences (BOKU), Austria
Prof. dr Sorin Mihai Cimpeanu, Rector of the University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania
Doc. Ing. Klaudia Halászová, Rector of the Slovak University of Agriculture in Nitra, Slovakia
Prof. dr Calin D. Oros, Rector of the Valahia University of Targoviste, Romania
Prof. Dr Katerina Melfou, Dean of the Faculty of Agriculture, University of Western Macedonia, Greece
Prof. dr Amr Ahmed Mostafa, Dean of the Faculty of Agriculture, Cairo University, Egypt
Prof. dr José Sergio Barrales Domínguez, Rector of the Chapingo Autonomous University, Mexico
Prof. dr Davut Karayel, Dean of Faculty of Agriculture, University of Akdeniz - Antalya, Turkey
Prof. Dr EGUCHI Fumio, Rector of the Tokyo University of Agriculture, Japan
Prof. Dr Zeki Bayramoğlu, Dean of Faculty of Agriculture, University of Selçuk- Konya, Turkey
Dr Chokri Thabet, the General Director of the High Agronomic Institute of Chott Mariem, Sousse, Tunisia
Prof. dr Ivan Yanchev, Director of the Institute of Animal Science- Kostinbrod, Bulgaria
Prof. dr Seyed Hamidreza Sadeghi, Professor at Tarbiat Modares University and the President of the Watershed Management Society of Iran, Iran
Prof. dr Francesco Tei, Director of the Department of Agricultural, Food and Environmental Sciences, University of Perugia, Italy
Prof. dr Viktor Kaminskyi, Director of National Scientific Center „Institute of Agriculture of NAAS“, Kyiv, Ukraine
Dr. Igor Hrovatič, President of South Eastern Advisory Service Network, Croatia
Prof. dr Mirza Dautbasic, Dean of the Faculty of Forestry, University of Sarajevo, Bosnia and Herzegovina
Prof. dr Bozidarka Markovic, Dean of the Biotechnical Faculty, University of Podgorica, Montenegro
Prof. dr Rade Jovanovic, Director of the Institute for Science Application in Agriculture, Serbia
Prof. dr Lazar Radovanovic, Dean of the Faculty of Economics Brcko, University of East Sarajevo, Bosnia and Herzegovina
Prof. dr Vojislav Trkulja, Director of Agricultural Institute of Republic of Srpska - Banja Luka, Bosnia and Herzegovina
Dr. Branka Kresovic, Director of the Maize Research Institute “Zemun Polje”, Serbia
Prof. Dr. Jegor Miladinović, Director of the Institute of Field and Vegetable Crops, Serbia
Prof. dr Nedeljko Tica, Dean of the Faculty of Agriculture, University of Novi Sad, Serbia
Prof. dr Rodne Nastova, Director of the Institute for Animal Science, Skoplje, Macedonia
Prof. dr Sasa Orlovic, Director of the Institute of Lowland Forestry and Environment, Serbia
Prof. dr Jonel Subic, Director of the Institute of Agricultural Economics, Serbia
Prof. dr Branko Kovacevic, President of the Academy of Engineering Sciences of Serbia, Serbia
Prof. dr Radovan Pejanovic, President of Balkan Scientific Association of Agricultural Economics, Serbia

SCIENTIFIC COMMITTEE

Chairman: Academician Prof. dr Dusan Kovacevic, Faculty of Agriculture, University of Belgrade, Serbia
Prof. dr Machito Mihara, Tokyo University of Agriculture, Japan
Prof. dr John Brayden, Norwegian Agricultural Economics Research Institute (NILF), Norway
Prof. dr Steve Quarie, Visiting Professor, School of Biology, Newcastle University, United Kingdom
Prof. dr Andreas Melcher, CDR, University of Natural Resources and Life Sciences (BOKU), Vienna, Austria
Prof. dr Dieter Trautz, University of Applied Science, Germany
Prof. dr Sergei Eliseev, Vice-Rector for Research and Innovations, Perm State Agro-Technological University, Russia
Prof. dr Dani Shtienberg, full professor, Department of Plant pathology and Weed Research, ARO, the Volcani Center, Bet Dagan, Israel

Prof. dr William Meyers, Howard Cowden Professor of Agricultural and Applied Economics, University of Missouri, USA

Prof. dr Markus Schermer, Department of Sociology, University of Innsbruck, Austria

Academician Prof. dr Novo Przulj, Faculty of Agriculture, University of Banjaluka, Bosnia and Herzegovina

Prof. dr Thomas G. Johnson, University of Missouri – Columbia, USA

Prof. dr Fokion Papathanasiou, School of Agricultural Sciences, University of Western Macedonia, Greece

Prof. dr Sabahudin Bajramovic, Faculty of Agriculture and Food Sciences, University of Sarajevo, Bosnia and Herzegovina

Prof. dr Hiromu Okazawa, Faculty of Regional Environment Science, Tokyo University of Agriculture, Japan

Prof. dr Tatiana Sivkova, Faculty for Veterinarian Medicine and Zootechny, Perm State Agro-Technological University, Russia

Prof. dr Aleksej Lukin, Voronezh State Agricultural University named after Peter The Great, Russia

Prof. dr Matteo Vittuari, Faculty of Agriculture, University of Bologna, Italy

Prof. dr Seyed Mohsen Hosseini, Faculty of Natural Resources, Tarbiat Modares University, Iran

Prof. dr Ardian Maci, Faculty of Agriculture and Environment, Agricultural University of Tirana, Albania

Prof. dr Regucivilla A. Pobar, Bohol Island State University, Philippines

Prof. dr Sudheer Kundukulangara Pulissery, Kerala Agricultural University, India

Prof. dr EPN Udayakumara, Faculty of Applied Sciences, Sabaragamuwa University, Sri Lanka

Prof. dr Vladimir Smutný, full professor, Mendel University, Faculty of agronomy, Czech Republic

Prof. dr Franc Bavec, full professor, Faculty of Agriculture and Life Sciences, Maribor, Slovenia

Prof. dr Jan Moudrý, full professor, Faculty of Agriculture, South Bohemia University, Czech Republic

Prof. dr Stefan Tyr, full professor, Faculty of Agro-biology and Food Resources, Slovakia

Prof. dr Natalija Bogdanov, Faculty of Agriculture, University of Belgrade, Serbia

Prof. dr Richard Barichello, Faculty of Land and Food Systems, University of British Columbia, Canada

Prof. dr Francesco Porcelli, University of Bari Aldo Moro, Italy

Prof. dr Vasilije Isajev, Faculty of Forestry, University of Belgrade, Serbia

Prof. dr Elazar Fallik, Agricultural Research Organization (ARO), Volcani, Israel

Prof. dr Junaid Alam Memon, Pakistan Institute of Development Economics, Pakistan

Prof. dr. Jorge Batlle-Sales, Department of Biology, University of Valencia, Spain

Prof. dr Pandi Zdruli, Land and Water Resources Department; IAMB, Italy

Prof. dr Mladen Todorovic, Land and Water Resources Department; IAMB, Italy

Dr. Hamid El Bilali, Mediterranean Agronomic Institute of Bari, Italy

Prof. dr Maksym Melnychuk, National Academy of Agricultural Science of Ukraine, Ukraine

Prof. dr Borys Sorochnytskyi, Ukrainian Institute for Plant Variety Examination, Kyiv, Ukraine

Dr. Lorenz Probst, CDR, University of Natural Resources and Life Sciences (BOKU), Vienna, Austria

Prof. dr Mohsen Boubaker, High Institute of Agronomy of Chott Meriem, Sousse, Tunisia

Dr. Nouredin Driouech, Coordinator of MAIB Alumni Network (FTN), Mediterranean Agronomic Institute of Bari, Italy

Prof. dr Ion Viorel, University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania

Prof. dr. Chuleemas Boonthai Iwai, Faculty of Agriculture, Khon Kaen University, Thailand

Prof. dr Wathuge T.P.S.K. Senarath, Department of Botany, University of Sri Jayewardenepura, Colombo, Sri Lanka

Dr. Hamada Abdelrahman, Soil Science Dept., Faculty of Agriculture, Cairo University, Egypt

Prof. dr Maya Ignatova, Agricultural Academy – Sofia, Bulgaria

Prof. dr Ioannis N. Xynias, School of Agricultural Technology & Food Technology and Nutrition, Western Macedonia University of Applied Sciences, Greece

PhD ing. Artur Rutkiewicz, Department of Forest Protection, Forest Research Institute - IBL, Poland

Prof. dr Mohammad Sadegh Allahyari, Islamic Azad University, Rasht Branch, Iran

Dr. Lalita Siritwattananon, Faculty of Agricultural Technology, Rajamangala University of Technology Thanyaburi (RMUTT), Thailand

Prof. dr Konstantin Korlyakov, Perm Agricultural Research Institute, Russia

Dr. Mohammad Farooque Hassan, Shaheed Benazir Bhutto University of Veterinary & Animal Sciences Sakrand, Sindh, Pakistan

Dr. Larysa Prysiazniuk, Ukrainian Institute for Plant Variety Examination, Kyiv, Ukraine

Prof. dr Oksana Kliachenko, National University of Life and Environmental Science of Ukraine, Ukraine

Prof. dr Ivan Simunic, Department of amelioration, Faculty of agriculture, University of Zagreb, Croatia

Dr. Abid Hussain, International Centre for Integrated Mountain Development (ICIMOD), Nepal

Dr. Amrita Ghatak, Gujarat Institute of Development Research (GIDR), India

Prof. dr Naser Sabaghnia, University of Maragheh, Iran

Dr. Karol Wajszczuk, Poznan University of Life Sciences, Poland

Prof. dr Penka Moneva, Institute of Animal Science - Kostinbrod, Bulgaria

Prof. dr Mostafa K. Nassar, Animal husbandry Dept., Faculty of Agriculture, Cairo University, Egypt

Prof. dr Márta Birkás, full professor, St. Istvan University, Godollo - Hungary

Prof. dr Andrzej Kowalski, Director of the Institute for Agricultural and Food Economy, Warszawa-Poland

Prof. dr Yalcin Kaya, The Director of the Plant Breeding Research Center, University of Trakya, Turkey

Prof. dr Sanja Radonjic, Biotechnical Faculty, University of Montenegro, Montenegro

Prof. dr Ionela Dobrin, Department for Plant Protection, University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania

Prof. dr Inocencio Buot Jr., Institute of Biological Sciences, College of Arts and Sciences, University of the Philippines Los Banos, Philippines

Prof. dr Monica Paula Marin, Department for Animal Husbandry, University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania

Prof. dr Nedeljka Nikolova, Institute for Animal Science, Ss. Cyril and Methodius University in Skopje, Republic of Macedonia

Prof. dr Mohammad Al-Mamun, Department of Animal Nutrition, Bangladesh Agricultural University, Bangladesh

Prof. dr Anucha Wittayakorn-Puripunpinyoo, School of Agriculture and Co-operatives, Sukhothai Thammathirat Open University, Nonthaburi, Thailand

Dr. Redouane Choukr-Allah, International Center for Biosaline Agriculture (ICBA), United Arab Emirates

Prof. dr Ignacio J. Díaz-Maroto, High School Polytechnic, University of Santiago de Compostela, Spain

Prof. dr Nidal Shaban, University of Forestry Sofia, Bulgaria

Prof. dr Mehdi Shafaghati, Faculty of Geography, Tarbiat Moalem (kharazmi) University, Iran

Prof. dr Youssif Sassine, Lebanese University Beirut, Lebanon

Prof. dr Cafer Topaloglu, Faculty of Tourism, Mugla Sitki Kocman University, Turkey

Prof. dr Seyed Hamidreza Sadeghi, Faculty of Natural Resources, Tarbiat Modares University, Iran

Prof. dr Mohsen Mohseni Saravi, University of Teheran and Member of WMSI Management Board, Iran

Prof. dr Branislav Draskovic, Faculty of Agriculture, University of East Sarajevo, Bosnia and Herzegovina

Prof. dr Mahmood Arabkhedri, Soil Conservation and Watershed Management Research Institute and Member of WMSI Management Board, Iran

Prof. dr Ataollah Kaviani, Sari Agricultural Science and Natural Resources University and Member of WMSI Management Board, Iran

Prof. dr Tugay Ayasan, Department of Organic Farming Business Management, Osmaniye, Applied Science School of Kadirli, Osmaniye Korkut Ata University, Turkey

Prof. dr Sakine Özpınar, Department of Farm Machinery and Technologies Engineering, Faculty of Agriculture, Çanakkale Onsekiz Mart University, Çanakkale, Turkey

Prof. dr Sherein Saeide Abdelgayed, Faculty of Veterinary Medicine, Cairo University, Cairo, Egypt

Prof. dr Zohreh Mashak, Islamic Azad University, Karaj Branch, Iran

Dr. Khalid Azim, National Institute of Agriculture Research, Morocco

Dr. Mario Licata, Department of Agricultural, Food and Forest Sciences, University of Palermo, Italy

Prof. dr Srdjan Lalic, University of East Sarajevo, Bosnia and Herzegovina

Prof. dr Zeljko Vasko, Faculty of Agriculture, University of Banja Luka, Bosnia and Herzegovina

Prof. dr Muhammad Ovais Omer, Faculty of Bio-Sciences, University of Veterinary & Animal Sciences, Lahore, Pakistan

Dr. Edouard Musabanganji, School of Economics/CBE, University of Rwanda, Rwanda

Prof. dr Kubilay Baştaş, Department of Plant Protection, Faculty of Agriculture, Selçuk University, Turkey

Dr. Branka Kresovic, Director of the Maize Research Institute “Zemun Polje”, Serbia

Dr. Nenad Delic, Maize Research Institute “Zemun Polje”, Serbia

Dr. Milan Stevanovic, Maize Research Institute “Zemun Polje”, Serbia

Dr. Svetlana Balesevic-Tubic, Institute of Field and Vegetable Crops Novi Sad, Serbia

Dr. Ana Marjanovic Jeromela, Institute of Field and Vegetable Crops Novi Sad, Serbia

Prof. dr Tatjana Krajisnik, Faculty of Agriculture, University of East Sarajevo, Bosnia and Herzegovina

Prof. dr Aleksandra Govedarica-Lucic, Faculty of Agriculture, University of East Sarajevo, Bosnia and Herzegovina

Prof. dr Desimir Knezevic, University of Pristina, Faculty of Agriculture, Kosovska Mitrovica - Lesak, Kosovo i Metohija, Serbia

Dr. Snezana Mladenovic-Drinic, Maize Research Institute “Zemun Polje”, Serbia

Prof. dr Nebojsa Momirovic, Faculty of Agriculture, University of Belgrade, Serbia

Prof. dr Osman Mujezinovic, Faculty of Forestry, University of Sarajevo, Bosnia and Herzegovina

Prof. dr Dalibor Ballian, Faculty of Forestry, University of Sarajevo, Bosnia and Herzegovina

Prof. dr Zoran Jovovic, Biotechnical Faculty, University of Montenegro, Montenegro

Prof. dr Danijel Jug, Faculty of Agriculture, University of Osijek, Croatia

Prof. dr Milan Markovic, Biotechnical Faculty, University of Montenegro, Montenegro

Prof. dr Zeljko Dolijanovic, Faculty of Agriculture, University of Belgrade, Serbia

Prof. Mirjana Jovovic, Faculty of Agriculture, University of East Sarajevo, Bosnia and Herzegovina

Prof. Goran Marinkovic, Faculty of Technical Sciences, University of Novi Sad, Serbia

Dr Dejan Stojanovic, Institute of Lowland Forestry and Environment, Serbia

Dr Dobrivoj Postic, Institute for plant protection and environment, Belgrade, Serbia

Dr Srdjan Stojnic, Institute of Lowland Forestry and Environment, Serbia

Dunja Demirović Bajrami, Research Associate, Geographical Institute “Jovan Cvijić,” Serbian Academy of Sciences and Arts, Belgrade, Serbia

ORGANIZING COMMITTEE

Chairperson: Prof. dr Vesna Milic, Dean of the Faculty of Agriculture, University of East Sarajevo, Bosnia and Herzegovina
Dr Marko Gutalj, Vice rector of the University of East Sarajevo, Bosnia and Herzegovina
Dr Jelena Kronic, Vice rector of the University of East Sarajevo, Bosnia and Herzegovina
Dr. Maroun El Moujabber, Mediterranean Agronomic Institute of Bari, Italy
Mrs. Rosanna Quagliariello, Mediterranean Agronomic Institute of Bari, Italy
Prof. dr Aleksandra Despotovic, Biotechnical Faculty Podgorica, University of Montenegro, Montenegro
Dr. Nouredin Driouech, Coordinator of MAIB Alumni Network (FTN), Mediterranean Agronomic Institute of Bari, Italy
Dr Milic Curovic, The journal "Agriculture and Forestry", Biotechnical Faculty Podgorica, University of Montenegro, Montenegro
Dr. Tatiana Lysak, International Relations Office, Voronezh State Agricultural University named after Peter The Great, Russia
Dr. Oksana Fotina, International Relations Center, Perm State Agro-Technological University, Russia
Prof. dr Fokion Papathanasiou, School of Agricultural Sciences, University of Western Macedonia, Greece
Dr Ana Marjanović Jeromela, Institute of Field and Vegetable Crops, Serbia
Dr. Anastasija Novikova, Faculty of Bioeconomy Development, Vytautas Magnus University, Lithuania
Prof. dr Engr. Teodora Popova, Institute of Animal Science - Kostinbrod, Bulgaria
Prof. dr Mehmet Musa Ozcan, Faculty of Agriculture, Selçuk University, Turkey
Dr. Abdulvahed Khaledi Darvishan, Faculty of Natural Resources, Tarbiat Modares University, Iran
Prof. dr Nikola Pacinovski, Institute for Animal Science, Ss. Cyril and Methodius University in Skopje, N. Macedonia
MSc. Erasmo Velázquez Cigarroa, Department of Rural Sociology, Chapingo Autonomous University, Mexico
Dr. Ecaterina Stefan, University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania
Dr. Jeeranuch Sakkhamduang, The International Society of Environmental and Rural Development, Japan
Dr. Raoudha Khanfir Ben Jenana, High Institute of Agronomy of Chott Meriem, Sousse, Tunisia
Dr. Hamada Abdelrahman, Soil Science Dept., Faculty of Agriculture, Cairo University, Egypt
Dr. Dragana Sunjka, Faculty of Agriculture, University of Novi Sad, Serbia
Dr. Vedran Tomic, Institute for Science Application in Agriculture, Serbia
Dr. Milan Stevanovic, Maize Research Institute "Zemun Polje", Serbia
Dr. Andrej Pilipovic, Institute of Lowland Forestry and Environment, Serbia
Dr. Sc. Morteza Behzadfar, Tarbiat Modares University, Tehran, Iran
Dr. Larysa Prysiazniuk, Ukrainian Institute for Plant Variety Examination, Kyiv, Ukraine
Dr. Diana Bilić-Šobot, Faculty of Agriculture, University of Niš, Serbia
Doc. dr Sead Ivojevic, Faculty of Forestry, University of Sarajevo, Bosnia and Herzegovina
Dr. Nenad Markovic, Enterprise E. N. (EEN) Coordinator, University of East Sarajevo, Bosnia and Herzegovina
Domagoj Group, SEASN - South Eastern Advisory Service Network, Croatia
Mrs Branislavka Boroja, Agricultural Institute of Republic of Srpska - Banja Luka, Bosnia and Herzegovina
MSc. Milan Jugovic, Faculty of Agriculture, University of East Sarajevo, Bosnia and Herzegovina
Prof. dr Sinisa Berjan, Faculty of Agriculture, University of East Sarajevo, Bosnia and Herzegovina
MSc. Milena Stankovic, Faculty of Agriculture, University of East Sarajevo, Bosnia and Herzegovina
Dr. Stefan Stjepanovic, Faculty of Agriculture, University of East Sarajevo, Bosnia and Herzegovina
Doc. dr Dejana Stanic, Faculty of Agriculture, University of East Sarajevo, Bosnia and Herzegovina
MSc. Stefan Bojic, Faculty of Agriculture, University of East Sarajevo, Bosnia and Herzegovina
MSc. Tanja Jakisic, Faculty of Agriculture, University of East Sarajevo, Bosnia and Herzegovina
MSc. Tijana Banjanin, Faculty of Agriculture, University of East Sarajevo, Bosnia and Herzegovina
MSc. Boban Miletic, Faculty of Agriculture, University of East Sarajevo, Bosnia and Herzegovina
MSc. Todor Djorem, Faculty of Agriculture, University of East Sarajevo, Bosnia and Herzegovina
Dr. Igor Djurdjic, Faculty of Agriculture, University of East Sarajevo, Bosnia and Herzegovina, General Secretary

CONTENTS

PLANT PRODUCTION.....	28
THE STUDY OF PHOTOSYNTHETIC GAS EXCHANGE PARAMETERS OF BREAD WINTER WHEAT UNDER VARIOUS WATER SUPPLY Atabay JAHANGIROV, Tofiq ALLAHVERDIYEV, Irada HUSEYNOVA.....	29
CARROT QUALITY DEPENDING ON THE TYPE OF ROOT Aleksandra GOVEDARICA-LUČIĆ, Sanid PAŠIĆ, Sanja KOVAČEVIĆ.....	35
DETERMINATION OF PHYSICAL AND CHEMICAL PROPERTIES OF FRUITS OF DIFFERENT PEAR VARIETIES Lejla HERIĆ, Alma MIČIJEVIĆ, Aida ŠUKALIĆ, Alma LETO.....	38
EXAMINATION OF THE VIABILITY OF BARLEY SEEDS USING THE TETRAZOLIUM TEST Mirjana JOVOVIĆ, Zoranka MALEŠEVIĆ, Lenka TOPALOVIĆ.....	44
VARIABILITY OF GLUTEN PROTEINS IN WHEAT (<i>TRITICUM AESTIVUM</i> L.) Desimir KNEŽEVIĆ, Aleksandra Yu. NOVOSELSKAYA DRAGOVICH, Alexander M. KUDRYAVTSEV, Aleksandar PAUNOVIĆ, Mirela MATKOVIĆ STOJŠIN, Danijela KONDIĆ, Veselinka ZEČEVIĆ.....	49
NUTRITIONAL AND PRODUCTION PROPERTIES OF TRITICALE DEPENDING ON THE AMOUNT OF NITROGEN FERTILIZER Dragana LALEVIĆ, Branislav MILADINOVIĆ, Milan BIBERDŽIĆ, Olivera ŠUŠA, Lidija MILENKOVIĆ, Saša BARAĆ, Aleksandar VUKOVIĆ.....	55
CHARACTERISTICS OF EARLY-RIPENING BLACKBERRY CULTIVARS (<i>RUBUS FRUTICOSUS</i> L.) Ivan GLIŠIĆ, Radmila ILIĆ, Tomo MILOŠEVIĆ, Gorica PAUNOVIĆ, Jovana JOVANČEVIĆ.....	62
PROPERTIES OF NEW SERBIAN GENOTYPES OF EUROPEAN PLUM GROWN IN THE REGION OF ČAČAK (SERBIA) Ivana S. GLIŠIĆ, Žaklina KARAKLAJIĆ-STAJIĆ, Vladislav OGNJANOV, Nebojša MILOŠEVIĆ, Sanja RADIČEVIĆ, Slađana MARIĆ, Milena ĐORĐEVIĆ.....	68
EXAMINATION OF SEED QUALITY PARAMETERS OF THREE PEPPER VARIETIES IN A FIVE-YEAR PERIOD (<i>CAPSICUM ANNUUM</i> L.) Jelena DAMNJANOVIĆ, Milan UGRINOVIĆ, Ivana ŽIVKOVIĆ, Tomislav ŽIVANOVIĆ, Suzana PAVLOVIĆ, Lela BELIĆ, Zdenka GIREK.....	75
STATIC MAGNETIC FIELD IMPROVES EFFECTS OF BIOPRIMING BY <i>AZOTOBACTER CHROOCOCCUM</i> F8/2 Slavica KEREČKI, Jelena JOVIČIĆ-PETROVIĆ, Vera KARLIČIĆ, Igor KLJUJEV, Saša ČIRKOVIĆ, Jasna RISTIĆ-ĐUROVIĆ, Vera RAIČEVIĆ.....	81
VARIABILITY AND HERITABILITY OF GRAIN YIELD AND HECTOLITER MASS IN WHEAT	

Kristina LUKOVIĆ, Vladimir PERIŠIĆ, Kamenko BRATKOVIĆ, Veselinka ZEČEVIĆ, Radiša ĐORĐEVIĆ, Vesna PERIŠIĆ, Vladislava MAKSIMOVIĆ	87
COMPARISON OF BIOCHEMICAL METHODS FOR β-CAROTENE EVALUATION OF MAIZE INBRED LINES IMPROVED THROUGH MARKER ASSISTED BREEDING	
Marija KOSTADINOVIĆ, Danijela RISTIĆ, Boško PETROVIĆ, Dragana IGNJATOVIĆ-MIČIĆ, Jelena VANČETOVIĆ	93
GERMINATION OF ZANTHOXYLUM ARMATUM DC. SEED UNDER DIFFERENT TREATMENTS	
Marija MARKOVIĆ, Mihailo GRBIĆ, Dragana SKOČAJIĆ, Danijela ĐUNISIJEVIĆ-BOJOVIĆ, Marijana MILUTINOVIĆ	100
GERMINATION OF TETRADIUM DANIELLII (BENN.) T. G. HARTLEY. SEED EXPOSED TO DIFFERENT TREATMENTS	
Marija MARKOVIĆ, Mihailo GRBIĆ, Dragana SKOČAJIĆ, Danijela ĐUNISIJEVIĆ-BOJOVIĆ, Marijana MILUTINOVIĆ	104
EFFECTS OF RED AND FAR-RED LIGHT ON SEED GERMINATION OF CASUARINA CUNNINGHAMIANA MIQ.	
Marija MARKOVIĆ, Mihailo GRBIĆ, Dragana SKOČAJIĆ, Danijela ĐUNISIJEVIĆ-BOJOVIĆ, Marijana MILUTINOVIĆ	108
THE IMPACT OF THE COVID-19 PANDEMIC ON GREENERY TRADE IN SERBIA	
Marija MARKOVIĆ	112
CONJUNCTIVE EFFECT OF ENVIRONMENT AND GENOTYPE IN MAIZE SEED PRODUCTION	
Marijenka TABAKOVIĆ, Vesna PERIĆ, Vesna DRAGICEVIĆ, Milena SIMIĆ, Rade STANISAVLJEVIĆ, Dobrivoj POSIĆ, Violeta ORO	116
ANALYSIS FOR GRAIN YIELD OF MAIZE HYBRIDS IN WESTERN SERBIA USING EBERHART AND RUSSELL MODEL	
Milomirka MADIĆ, Dragan ĐUROVIĆ, Vladeta STEVOVIĆ, Dalibor TOMIĆ, Milan BIBERDŽIĆ, Aleksandar PAUNOVIĆ, Miloš MARIJANOVIĆ	122
STABILITY PERFORMANCES OF DIFFERENT WHEAT GENOTYPES GROWN UNDER FAVORABLE AND SALINITY STRESS CONDITIONS	
Mirela MATKOVIĆ STOJŠIN, Sofija PETROVIĆ, Borislav BANJAC, Veselinka ZEČEVIĆ, Svetlana ROLJEVIĆ NIKOLIĆ, Radiša ĐORĐEVIĆ, Desimir KNEŽEVIĆ	129
IDENTIFICATION OF <i>ETRI</i> ALLELES IN SOME <i>MALUS</i> MILLER SPECIES	
Slađana MARIĆ, Sanja RADIČEVIĆ, Nebojša MILOŠEVIĆ, Milan LUKIĆ, Ivana GLIŠIĆ, Milena ĐORĐEVIĆ	135
THE RESPONSE OF DIFFERENT CULTIVARS BIRDSFOOT TREFOIL (<i>LOTUS CORNICULATUS L.</i>) ON PRE-SOWING INOCULATION	
Snežana ANĐELKOVIĆ, Snežana BABIĆ, Jasmina MILENKOVIĆ, Marija STEPIĆ, Jordan MARKOVIĆ, Filip BEKČIĆ, Debasis MITRA	142

FORAGE QUALITY OF DIFFERENT FESTULOLIUM CULTIVARS

Snežana BABIĆ, Dejan SOKOLOVIĆ, Snežana ANĐELKOVIĆ, Mirjana PETROVIĆ,
Goran JEVIĆ, Mladen PRIJOVIĆ, Nedeljko RACIĆ 148

GENETIC DIVERSITY OF MAIZE INBREDS WITH DIFFERENT KERNEL TYPE USING SNP MARKERS

Snežana MLADENOVIĆ DRINIĆ,, Violeta ANĐELKOVIĆ, Jelena SRDIĆ, Nikola GRČIĆ, Milomir FILIPOVIĆ, Natalija KRAVIĆ, Ana NIKOLIĆ 154

USE OF CONTROLLED-RELEASE MINERAL FERTILIZER IN PRODUCTION OF POT GROWN *LEVISTICUM OFFICINALE* L.

Snežana MRĐAN, Dragoja RADANOVIĆ, Vladimir FILIPOVIĆ, Stefan GORDANIĆ, Željana PRIJIĆ, Petar BATINIĆ, Ana DRAGUMILO, Tatjana MARKOVIĆ 160

OPTIMIZATION OF THE PROTOCOL FOR *IN VITRO* PROPAGATION OF AUTOCHTHONOUS PLUM GENOTYPE 'METLAŠ'

Tatjana VUJOVIĆ, Darko JEVREMOVIĆ, Tatjana ANĐELIĆ, Bojana VASILJEVIĆ 166

MULTIVARIATE ANALYSIS OF AGRONOMIC TRAITS IN MID-SEASON SOYBEAN VARIETIES

Vesna PERIĆ, Mirjana SREBRIĆ, Danijela RISTIĆ, Marijenka TABAKOVIĆ, Valentina NIKOLIĆ, Snežana MLADENOVIĆ DRINIĆ 173

EFFECTS OF *BACTERIA AND ENZYME* MIXTURE INOCULANTS ON QUALITY OF HIGH-MOISTURE MAIZE GRAIN SILAGE

Violeta MANDIĆ, Zorica BIJELIĆ, Vesna KRNJAJA, Marija GOGIĆ, Maja PETRIČEVIĆ, Snežana ĐORĐEVIĆ, Aleksandar SIMIĆ 178

ACCURACY DETECTION OF INTEL® REALSENSE D455 DEPTH CAMERA FOR AGRICULTURAL APPLICATIONS

Abdullah BEYAZ 185

DETERMINATION OF AGRONOMIC CHARACTERISTICS AND CARVACROL RATES OF B CLONES OF IMPROVED ISTANBUL OREGANO (*Origanum vulgare* subsp. *hirtum*)

Olcay ARABACI, Emine BAYRAM, Çiğdem SÖNMEZ, Gülsüm BOZTAŞ, Nazlıcan ATAMAN 195

EFFECT OF DEFICIT IRRIGATION ON ANTIOXIDANT, ANTIRADICAL AND FLAVONOID CONTENTS OF *Origanum vulgare* subsp. *hirtum* GENOTYPES

Uğur TAN, Olcay ARABACI 203

SIGNIFICANCE OF FERTILIZATION AND SOIL TYPE FOR THE DEVELOPMENT OF SUNFLOWER (*HELIANTHUS ANNUUS*)

Ana KATSAROVA, Zdravka PETKOVA, Iliana GERASSIMOVA 210

SIGNIFICANCE OF FERTILIZATION FOR WINTER WHEAT DEVELOPMENT AND YIELD IN A FIELD EXPERIMENT ON ALLUVIAL MEADOW SOIL

Zdravka PETKOVA, Irena ATANASSOVA, Ana KATSAROVA, Iliana GERASSIMOVA 217

THE POTENTIAL OF LED ILLUMINATION ON THE YIELD, MORPHOLOGICAL PROPERTIES AND COLORATION OF BROCCOLI MICROGREENS

Roberta VRKIĆ, Kristijan DEBELEC, Božidar BENKO, Jana ŠIĆ-ŽLABUR.....224

EVALUATION OF A MEDICINAL PLANT *ECHINACEA PURPUREA* IN TERMS OF STEROID AND TRITERPENOID CONTENT

Sara PAGEAUX, Cezary PAĆZKOWSKI, Anna SZAKIEL.....230

EFFECTS OF BIOSTIMULATORS ON GROWTH OF TOMATO PLANTS CULTIVATED UNDER PROTECTED AND FIELD CONDITIONS

Slavica DUDAŠ, Markos BULIĆ, Martina PERSIĆ, Michael H. BÖHME236

MORPHOLOGICAL DESCRIPTION OF *CROCUS SATIVUS* IN THE AREA OF KOZANI, GREECE

Konstantinos VOGDOPOULOS, Theano B. LAZARIDOU.....245

THE EFFECTS OF AN INNOVATIVE DIGESTATE AND WOOD ASH MIXTURE FERTILIZER ON POTATO YIELD QUALITY

Aleksandrs ADAMOVICS, Lydia ANTIPOVA.....250

INFLUENCES OF HIGH TEMPERATURE ON VIGOUR OF MAIZE SEEDS CULTIVATED IN THE REPUBLIC OF MOLDOVA

Raisa IVANOVA, Alla BOROVSKAIA, Elena LUTCAN.....256

CHARACTERISTICS OF THE CONTENT OF LIPOPHILIC COMPOUNDS IN PROPOLIS AND SELECTED TYPES OF HONEY

Bartosz SŁOTWIŃSKI, Cezary PAĆZKOWSKI, Anna SZAKIEL262

RESULTS OF TESTING THE QUALITY OF WORK OF DIFFERENT TYPES OF CROP SPRAYER NOZZLES

Saša BARAĆ, Milan BIBERDŽIĆ, Rade RADOJEVIĆ, Aleksandar ĐIKIĆ, Aleksandar VUKOVIĆ, Dragana LALEVIĆ.....269

EFFICIENCY OF CORN HYBRIDS GROWING TECHNOLOGIES DEPENDING ON THE KINDS OF FERTILIZER APPLICATION

Tetyana ANTAL, Svitlana KALENSKA, Roman GOVENKO, Volodimir MOKRIENKO, Ludmila KARPENKO, Viktor KALENSKY, Tetyana STOLYARCHUK, Lesya GARBAR, Andriy KOVALENKO.....276

CROP PRODUCTION: FOOD SECURITY AND SOLUTIONS IN UKRAINE

Svitlana KALENSKA, Elena KASHTANOVA, Anatoliy BYKIN, Nataliia NOVYTSKA, Valentina NAIDENKO, Lesya GARBAR, Viktoriya PILIPENKO, Roman SONKO.....283

MODERN BIOTEHNOLOGICAL APPROACHES TO THE BERRY CROPS STUDY (*VACCINIUM CORYMBOSUM* L.)

Olga CHIZHIK, Andrei YUKHIMUK, Iryna KONDRATSKAYA, Vladimir RESHETNIKOV291

INFLUENCE OF INTERCROPPING SWEET SORGHUM WITH CLIMBING BEAN ON FORAGE YIELD AND QUALITY

Darko UHER, Zlatko SVEČNJAK, Zvonko PACANOSKI, Dubravka DUJMOVIĆ-PURGAR, Martina KOVAČEVIĆ, Ivan HORVATIĆ.....297

EFFECTS OF COMPOST APPLICATION RATES AND MULCH THICKNESS ON TOMATO YIELD UNDER SALT AFFECTED SOIL OF EAST SHEWA OROMIA NATIONAL REGIONAL STATE, ETHIOPIA

Derartu SEDATA, Amare HAILESLASSIE, Adugna DEBELA.....304

ANTIOXIDANT POTENTIAL AND PHOTOSYNTHETIC PIGMENTS IN KALE (*BRASSICA OLERACEA ACEPHALA SABELLICA*) FROM DIFFERENT SOURCES

Monika KAMIŃSKA.....314

WEED CONTROL IN SUDAN GRASS CROP (*Sorghum sudanense*)

Dalibor TOMIĆ, Vladeta STEVOVIĆ, Ivan MARKOVIĆ, Đorđe LAZAREVIĆ, Miloš MARJANOVIĆ, Nenad PAVLOVIĆ, Milomirka MADIĆ320

DRONE - SMART TECHNOLOGY ON SMALL AND MEDIUM FARMS

Dragan ŠALER, Markola SAULIĆ, Darko STOJICEVIĆ, Zlata ŽIVKOVIĆ327

ASSOCIATION OF AGRONOMIC AND FORAGE QUALITY TRAITS IN RED CLOVER (*TRIFOLIUM PRATENSE* L.)

Irena RADINOVIĆ, Sanja VASILJEVIĆ, Gordana BRANKOVIĆ, Tomislav ŽIVANOVIĆ, Slaven PRODANOVIĆ332

DIRECT ORGANOGENESIS OF *CATUNAREGAM SPINOSA* THROUGH NODAL AND INTERNODAL EXPLANTS

Prasanthi Kumari LAWRENCE, Sandun Kumari SENARATH.....338

DETERMINATION OF THE DIFFERENCES IN BIOACTIVE COMPOUNDS OF PUMPKIN FROM THE SEED TO THE PEEL

Nurhan USLU, Mehmet Musa ÖZCAN345

THE INFLUENCE OF THE ROOTSTOCK ON THE PROPERTIES OF LEAF OF PLUM (*PRUNUS DOMESTICA* L.) CULTIVARS

Mirjana RADOVIĆ, Dragan MILATOVIĆ, Gordan ZEC, Đorđe BOŠKOV352

GROWTH OF MEDITERRANEAN SAGE SPECIES AND INTERSPECIFIC HYBRIDS UNDER LIMITED IRRIGATION IN A GREEN ROOF

Aikaterini N. MARTINI, Lamprini TASSOULA, Maria PAPAFOTIOU, Eleftherios G. STYLIAS, Anastasios KALANTZIS, Eleftherios DARIOTIS361

MORPHOLOGICAL CHARACTERS OF NEW INTERSPECIFIC HYBRIDS OF SAGE ORIGINATED FROM *SALVIA OFFICINALIS*, *S. POMIFERA* SSP. *POMIFERA* AND *S. TOMENTOSA*

Konstantinos F. BERTSOUKLIS, Aikaterini N. MARTINI, Sofia-Nikoleta ROUSSAKI, Ilias MELEAS, Maria PAPAFOTIOU369

A FIRST STUDY ON FLOWER MORPHOLOGY OF SIX ARBUTUS SPECIES, ONE HYBRID AND ONE CULTIVAR OF THE MEDITERRANEAN BASIN AND NORTH AMERICA

Konstantinos F. BERTSOUKLIS, Roy W. MARTIN, Maria PAPAFOTIOU.....376

MEDITERRANEAN SAGE HYBRID *Salvia officinalis* × *S. ringens* AS GROWN UNDER REDUCED IRRIGATION IN A GREENHOUSE AND AN EXTENSIVE GREEN ROOF

Maria PAPAFOTIOU, Aikaterini N. MARTINI, Lamprini TASSOULA, Eleonora PAPANIKOLAOU, Eleftherios G. STYLIAS, Anastasios KALANTZIS.....	381
GROWTH OF THE NEW <i>Salvia officinalis</i> × <i>S. tomentosa</i> HYBRID UNDER REDUCED IRRIGATION IN GREENHOUSE AND GREEN ROOF CONDITIONS	
Maria PAPAFOTIOU, Aikaterini N. MARTINI, Lamprini TASSOULA, Eleonora PAPANIKOLAOU, Eleftherios G. STYLIAS, Anastasios KALANTZIS.....	388
THE EFFECT OF CYTOKININ TYPE AND CONCENTRATION ON <i>in vitro</i> MULTIPLICATION OF <i>Salvia fruticosa</i>	
Maria PAPAFOTIOU, Georgia VLACHOU, Aikaterini N. MARTINI.....	395
EFFECT OF EXPLANT TYPE AND BENZYLADENINE CONCENTRATION ON <i>in vitro</i> MULTIPLICATION OF <i>Salvia tomentosa</i>	
Maria PAPAFOTIOU, Georgia VLACHOU, Aikaterini N. MARTINI.....	402
VARIABILITY OF STEM HEIGHT IN WHEAT AND TRITICALE UNDER INFLUENCE OF APPLIED INSECTICIDES	
Dragan GRČAK, Milosav GRČAK, Dragana GRČAK, Snežana GOŠIĆ DONDO, Dejan DODIG, Vesna KANDIĆ, Desimir KNEŽEVIĆ	408
PHENOTYPIC VARIABILITY AND SIMILARITY OF NUMBER OF PRODUCTIVE TILLERS IN WHEAT VARIETIES (<i>TRITICUM AESTIVUM</i> L.)	
Dušan UROŠEVIĆ, Desimir KNEŽEVIĆ, Mirela MATKOVIĆ STOJŠIN, Jelica ŽIVIĆ, Vesna ĐUROVIĆ, Adriana RADOSAVAC, Danica MIĆANOVIĆ	415
PROPAGATION OF ZELKOVA CARPINIFOLIA (PALL.) DIPPEL. BY SOFTWOOD AND HEEL CUTTINGS	
Marija MARKOVIĆ, Mihailo GRBIĆ, Dragana SKOČAJIĆ, Danijela ĐUNISIJEVIĆ-BOJOVIĆ, Marijana MILUTINOVIĆ	423
EFFECTS OF DROUGHT STRESS ON PURSLANE (<i>PORTULACA OLERACEA</i>)	
Cenk Ceyhun KILIÇ, Bihter ÇOLAK ESETLILI, Özlem AKAT SARAÇOĞLU, Tolga ESETLILI, Yusuf KURUCU	427
EFFECTS OF GIBBERELIC ACID (GA₃) APPLICATION ON SEED EMERGENCE OF F1 HYBRID FIGS	
Derya KILIÇ, Oğuzhan ÇALIŞKAN.....	434
APPLICATION TECHNIQUES PESTICIDE IN IRAQ	
Rawa Nawroz MOHAMMED, Hüseyin DURAN, Alper TANER	439
RECENT ADVANCES IN DIRECT DRILLING TECHNOLOGY FOR SOYBEAN (<i>GLYCINE MAX</i> L.) PRODUCTION	
Boglárka BOZÓKI, Gergő Péter KOVÁCS, Csaba GYURICZA	447
INFLUENCE OF AQUEOUS EXTRACTS FROM BANANA PEEL AND SOYBEAN PLANTS ON SOYBEAN GRAIN YIELD	
Gordana DOZET, Vojin ĐUKIĆ, Zlatica MAMLIĆ, Marija BAJAGIĆ, Gorica CVIJANOVIĆ, Nenad ĐURIĆ, Marijana JOVANOVIĆ TODOROVIĆ	453
NUTRITIONAL VALUE OF WILD BERRY SPECIES FROM MOUNTAIN KOPAONIK (SERBIA)	

Jelena TOMIĆ, Boris RILAK, Marijana PEŠAKOVIĆ, Žaklina KARAKLAJIĆ STAJIĆ, Svetlana PAUNOVIĆ, Mira MILINKOVIĆ	460
FERTILITY PARAMETERS AND GRAIN QUALITY OF WINTER BARLEY Snežana JANKOVIĆ, Sveto RAKIĆ, Vera RAJIČIĆ, Radojica RAKIĆ, Divna SIMIĆ, Marijenka TABAKOVIĆ, Mile SEČANSKI.....	467
FRUIT CHARACTERISTICS OF OF OLD AUTOCHTHONOUS CULTIVARS OF MELONS (<i>Cucumis melo L.</i>) AND WATERMELONS (<i>Citrullus lanatus L.</i>) Vladimir SABADOŠ, Danijela ŽUNIĆ, Nataša PRODANOVIĆ	474
PLANT PROTECTION AND FOOD SAFETY	482
THE HARMFULNESS OF APPLE BLOSSOM WEEVIL (<i>Anthonomus pomorum</i> Linne) ON DIFFERENT APPLE VARIETIES IN THE REGION OF EAST SARAJEVO IN BOSNIA AND HERZEGOVINA Dejana STANIĆ	483
EFFECT OF VARIOUS SUBSTRATES ON GROWTH AND SPORULATION OF SELECTED ISOLATES <i>ALTERNARIA</i> SPP Mehira PERVIZ, Vojislav TRKULJA, Fatima MUHAMEDAGIĆ, Osman PERVIZ.....	491
ANALYSIS OF FATTY ACIDS IN SELECTED SAMPLES OF COCONUT OIL Zoranka MALEŠEVIĆ, Selena ČEVRIZ, Mirjana JOVOVIĆ, Jelena LAZAREVIĆ, Milan ŠEVIĆ	497
EFFECTS OF INSECTICIDES APPLICATION, FUNGAL AND ECB INFECTION ON CAROTENOIDS CONTENTS IN MAIZE LEAVES Danijela RISTIĆ, Snežana GOŠIĆ DONDO, Marija KOSTADINOVIĆ, Milica NIKOLIĆ, Vesna PERIĆ, Jelena VUKADINOVIĆ.....	503
MODERN TECHNOLOGY OF GROWING LATERAL WALNUT VARIETIES IN REPUBLIC SERBIA Darko STOJICEVIĆ*, Zlata ŽIVKOVIĆ, Vladanka STUPAR, Markola SAULIĆ	507
EXTRACTION METHODS OF RESVERATROL FROM GRAPES Aleksandra ŠUŠNJAR, Dragana ŠUNJKA, Sanja LAZIĆ, Dragana BOŠKOVIĆ, Slavica VUKOVIĆ	517
EFFECTS OF PHYTOPATHOGENS ON THE QUALITY PARAMETERS OF CARROTS SEEDS (<i>DAUCUS CAROTA L.</i>) IN A THREE-YEAR PERIOD Ivana ŽIVKOVIĆ, Dobrivoj POŠTIĆ, Slađan ADŽIĆ, Dejan CVIKIĆ, Ratibor ŠTRBANOVIĆ, Vesna PERIĆ, Jelena DAMNJANOVIĆ.....	524
MICROBIOLOGICAL QUALITY OF COLD PRESSED PUMPKIN AND WALNUT OILS Vesna ĐUROVIĆ, Leka MANDIĆ, Dalibor TOMIĆ, Miloš MARJANOVIĆ, Dragutin ĐUKIĆ, Mirjana RADOVANOVIĆ.....	530
STRONTIUM-90 IN MILK AND SOME DAIRY PRODUCTS IN THE REPUBLIC OF SERBIA Nataša B. SARAP, Marija M. JANKOVIĆ, Jelena D. KRNETA NIKOLIĆ, Milica M. RAJAČIĆ, Dragana J. TODOROVIĆ, Ivana S. VUKANAC	536

COMPARISON OF DIFFERENT EXTRACTION METHODS FOR QUANTIFICATION OF INDIVIDUAL PHENOLIC COMPOUNDS IN WINE BY LIQUID CHROMATOGRAPHY

Ivana PLAVŠIĆ, Nikolina LIŠOV, Sandra GAJEVIĆ, Ivana SREDOVIĆ IGNJATOVIĆ, Aleksandar PETROVIĆ541

***PENICILLIUM EXPANSUM* AS A POSTHARVEST PATHOGEN OF TOMATO FRUIT IN SERBIA**

Svetlana ŽIVKOVIĆ, Danijela RISTIĆ, Mira STAROVIĆ, Goran ALEKSIĆ, Stefan STOŠIĆ545

APPLICATION OF MEDICAL AND SPICE HERBS IN FOOD PRODUCTS IN ORDER TO ACHIEVE GREATER MICROBIOLOGICAL SAFETY AND QUALITY

Višnja SIKIMIĆ, Vladanka STUPAR, Slavica ČABRILO, Tatjana SEKULIĆ552

16S rRNA VS BIOCHEMICAL TESTS: CHALLENGE TO IDENTIFY PINK PIGMENTED *ERWINIA* SPECIES

Didem CANIK OREL562

DRY STRAWBERRY SNACK

Günce KÖSE, Duygu BÜYÜKTAŞ, Figen KOREL566

UTILIZATION OF GELLED EMULSION BASED ON CHIA FLOUR WITH PEANUT OIL IN BEEF PATTIES

Özlem BOYACI, Hülya Serpil KAVUSAN, Meltem SERDAROĞLU571

THE PRESENCE OF PROTISTAN PATHOGENS IN SOME COLEOPTERAN STORED PESTS

Mustafa YAMAN, Tuğba SAĞLAM578

EFFECTS OF OXALIC ACID TREATMENTS ON POSTHARVEST QUALITY AND STORAGE LIFE OF APPLE CV. GRANNY SMITH

Sevil UNAL, Ferhan K. SABIR583

EFFECTIVENESS OF PULSED ELECTRIC FIELD TREATMENT AND PLANT ESSENTIAL OILS ON QUALITY AND SHELF-LIFE EXTENSION OF LICORICE ROOT DRINK

Irem DEMİR, Bahar ATMACA, Gulsun AKDEMİR EVRENDİLEK, Sibel UZUNER589

IN-VITRO AND IN-VIVO ANTIFUNGAL ACTIVITY OF FERMENTED COCOA'S RESIDUAL HONEY AGAINST WITCHES' BROOM DISEASE

Susan PINHEIRO DE ALMEIDA, Evelyn Mayumi Hanawa KONAGANO, Christelle Anne Nicole Paule HERMAN596

STUDY OF THE EFFECTS OF AN INSECTICIDE (CHLORPYRIFOS) AND A FUNGICIDE (TEBUCONAZOLE) ON CHICKEN EMBRYOS

Rita SZABÓ, László MAJOR, József LEHEL, Nadhirah Binti SAIDON, Péter BUDAI601

CHANGES IN CHEMICAL AND MICROBIOLOGICAL INDICATORS OF UNSTERILIZED CONCENTRATED CARROT JUICE DURING STORAGE

Zinaida YEGOROVA, Tatiana SHACHEK, Elena ZELENKOVA607

OCCURRENCE OF RADIONUCLIDES AND TOXIC ELEMENTS IN FEED STUFF FROM NORTH MACEDONIA

Aleksandra ANGELESKA, Radmila CRCEVA NIKOLOVSKA, Elizabeta DIMITRIESKA STOJKOVIK, Biljana DIMZOSKA STOJANOVSKA, Ana ANGELOVSKA, Dusica KOCEVA.....615

THE INFLUENCE OF THE WAR IN UKRAINE ON THE IMPORT OF WHEAT, CORN AND SUNFLOWER OIL IN THE REPUBLIC OF NORTH MACEDONIA

Aleksandra ANGELESKA, Radmila CRCEVA NIKOLOVSKA, Elizabeta DIMITRIESKA STOJKOVIK, Igor ESMEROV, Biljana DIMZOSKA STOJANOVSKA, Blagica SEKOVSKA622

RESEARCH ON THE EXTENSION OF THE VALIDITY PERIOD FOR BOILED - SLICED MEATS, MANUFACTURED BY THE NATIONAL MANUFACTURER IN ACCORDANCE WITH THE NORMATIVE ACTS IN FORCE

Alisa PIRLOG, Diana CURCHI, Natalia PAVLICENCO630

ESTIMATING THE MAGNITUDE OF FOOD LOSSES AND WASTE GENERATED IN PERU

Noelia S. BEDOYA-PERALES, Glenio Piran DAL' MAGRO637

ANTIFUNGAL ACTIVITY OF PLANT ESSENTIAL OILS TO THE FUSARIUM VERTICILLIOIDES ORIGINATED FROM GARLIC

Mira STAROVIĆ, Danijela RISTIĆ, Ivan VUČUROVIĆ, Jovana BLAGOJEVIĆ, Stefan STOŠIĆ, Svetlana ŽIVKOVIĆ, Goran ALEKSIĆ645

EFFECTS OF ANTI-BROWNING SUBSTANCES WITH HONEY ON QUALITY OF APPLE SLICES DURING STORAGE

Sevil UNAL, Ferhan K. SABIR, Tugba Nur ACAR651

SPECIES OF THE GENUS *PYRENOPHORA* - BARLEY PATHOGENS IN THE REPUBLIC OF SRPSKA AND THE WORLD

Andrija TOMIĆ, Vojislav TRKULJA658

ANTIMICROBIAL RESISTANCE OF *Salmonella Enteritidis* & *Salmonella Typhimurium* ISOLATED FROM FOODS OF ANIMAL ORIGIN

Vesna KALABA, Tanja ZENIĆ667

***ALLIUM URSINUM*: MICROBIOLOGICAL AND ANTIBACTERIAL PROPERTIES**

Vesna KALABA, Tanja ZENIĆ674

THE TOMATO LEAFMINER, *TUTA ABSOLUTA* MEYRICK (LEPIDOPTERA: GELECHIIDAE) IN TURKEY: CURRENT STATUS

Ekrem ÖGÜR.....680

PESTICIDE APPLICATION TECHNIQUES IN PRECISION AGRICULTURE

Meltem ÇETİN, Hüseyin DURAN, Alper TANER.....687

THE USE OF RGB AND HYPERSPECTRAL IMAGING IN DETECTION OF CODLING MOTH AND ITS DAMAGES ON APPLE

Dana ČIRJAK, Ivana MIKLEČIĆ, Darija LEMIĆ, Tomislav KOS, Ivana PAJAČ ŽIVKOVIĆ696

¹Department of Agricultural Zoology,	696
APPLICATION OF MODIFIED QUECHERS METHOD FOR THE DETERMINATION OF NEW GENERATION PESTICIDES IN BLACKBERRIES Aleksandra TASIĆ, Ivan PAVLOVIĆ	702
APPLICATION OF INSECTICIDES IN THE CONTROL OF COLORADO POTATO BEETLE (<i>Leptinotarsa decemlineata</i> Say) Slavica VUKOVIĆ, Dragana ŠUNJKA, Sanja LAZIĆ, Antonije ŽUNIĆ, Aleksandra ŠUŠNJAR	708
IN VITRO ANTAGONISTIC ACTIVITY OF TRICHODERMA SPP. TO FUSARIUM OXYSPORUM AND FUSARIUM GRAMINEARUM Vera KARLIČIĆ, Tatjana GUDALOVIĆ, Jelena JOVIČIĆ-PETROVIĆ, Blažo LALEVIĆ, Vera RAIČEVIĆ, Igor KLJUJEV	714
UTILIZATION OF EDIBLE NANOEMULSION COATINGS IN MEAT AND MEAT PRODUCTS Elnaz SHAREFIABADI, Meltem SERDAROĞLU	721
NATURAL ALTERNATIVE TO SYNTHETIC NITRITE: THE USE OF PRE-CONVERTED NITRITE IN MEAT PRODUCTS Hilal CAN, Meltem SERDAROĞLU	729
TECHNOLOGICAL PROPERTIES OF MEATBALLS FORMULATED WITH DIFFERENT LEVELS OF DRIED TOMATO POWDER Kyialbek ABDRAIMOV, Meltem SERDAROĞLU	736
ORGANIC AGRICULTURE	742
CONTENT OF MINERALS IN APRICOT FRUITS FROM THE URBAN AREA OF THE CITY OF MOSTAR, BOSNIA AND HERZEGOVINA Alma LETO, Amela ZEREM, Alma MIČIJEVIĆ, Dženan VUKOTIĆ	743
THE INFLUENCE OF SOME BIO-PRODUCTS ON GERMINATION AND PROTECTION OF BASIL SEEDS Sara MIKIĆ, Vladimir FILIPOVIĆ, Željana PRIJIĆ, Vladan UGRENOVIĆ, Vera POPOVIĆ, Snežana DIMITRIJEVIĆ, Tatjana MARKOVIĆ, Snežana MRĐAN, Stefan GORDANIĆ	749
EFFECTS OF ORGANIC FERTILIZERS APPLICATION ON FRUIT QUALITY IN MELONS Zdenka GIREK, Milan UGRINOVIĆ, Suzana PAVLOVIĆ, Jelena DAMNJANOVIĆ, Milka BRDAR-JOKANOVIĆ, Veselinka ZEČEVIĆ, Nenad ĐURIĆ	755
THE EFFECT OF DEHYDRATION PROCESSES ON TOTAL PHENOL, ANTIOXIDANT ACTIVITY, FATTY ACID COMPOSITIONS AND POLYPHENOLICS OF WHITE MULBERRY FRUITS Mehmet Musa ÖZCAN, Nurhan USLU	762
BLACK RASBERRY (<i>Rubus occidentalis</i> L), A NEGLECTED MINOR FRUIT CROP Ladislav VASILIŠIN, Goran VUČIĆ, Srdjan LJUBOJEVIĆ, Ana VELEMIR, Nataša LAKIĆ-KARALIĆ	775

GINKGO LEAVES AND YEW ARILS – USABLE PARTS OF OLD PLANT SPECIES (*Ginkgo biloba* L. et *Taxus baccata* L.)

Ladislav VASILJIŠIN, Goran VUČIĆ, Srdjan LJUBOJEVIĆ, Ana VELEMIR, Nataša LAKIĆ-KARALIĆ 786

BIOACTIVITY OF Silylated LIGNOCELLULOSIC BIOMASS OF SEA BUCKTHORN

Anna ANDERSONE, Sarmite JANCEVA, Natalija ZAHAROVA, Gints RIEKSTS, Galina TELYSHEVA† 796

SOIL FUNCTIONAL-ECOLOGICAL ASSESSMENT IN TRADITIONAL AND ORGANIC VINEYARDS ACCORDING TO SOIL RESPIRATION AND MICROBIAL BIOMASS

Irina ANDREEVA, Valeria GABECHAYA, Andrey KUZMIN, Ivan VASENEV..... 803

CHITOSAN AND OTHER ANTITRANSPIRANTS – THEIR INFLUENCE ON ASPECTS OF ORGANIC AND CONVENTIONAL PLANT PRODUCTION

Bogdan NIKOLIĆ, Hadi WAISI, Vesna DRAGIČEVIĆ, Sanja ĐUROVIĆ, Violeta ORO, Vladan JOVANOVIĆ, Miloš DUGALIĆ 811

ENVIRONMENT PROTECTION AND NATURAL RESOURCES MANAGEMENT 816

RIVER NETWORK DENSITY BY LARGE NATURAL REGIONS IN BOSNIA AND HERZEGOVINA

Branislav DRAŠKOVIĆ, Aleksandar PONOSOV, Natalia ZHERNAKOVA..... 817

MONITORING OF SENSORY DYNAMICS OF *AMBROSIA ARTEMISIIFOLIA* L. POLLEN AS AN AEROPOLUTANT IN THE UNA-SANA CANTON DURING 2012-2021

Fatima MUHAMEDAGIĆ, Igor MILUNOVIĆ, Mehira PERVIZ, Osman PERVIZ, Merjem HUSKIĆ 822

MELISOPALINOLOGICAL ANALYSIS OF HONEY SAMPLES FROM BOSNIA AND HERZEGOVINA

Helena BREKALO, Antonela MUSA, Mate BOBAN, Danijela PETROVIĆ 829

GREEN ALTERNATIVES IN ENVIRONMENTAL PROTECTION- PLANTS AS HYPERACCUMULATORS OF HEAVY METALS IN PHYTOREMEDIATION

Tatjana SEKULIĆ, Jasminka ĐORĐEVIĆ-MILORADOVIĆ, Milica BLAŽIĆ, Vladanka STUPAR, Zlata ŽIVKOVIĆ, Markola SAULIĆ 835

SUBSTITUTION ACIDITY, PHOSPHORUS AND POTASSIUM CONTENT IN THE LAND OF THE BRANIČEVO DISTRICT IN THE REPUBLIC OF SERBIA

Marko STOKIĆ, Zlata ŽIVKOVIĆ, Darko STOJICEVIĆ, Markola SAULIĆ, Tatjana SEKULIĆ, Vladanka STUPAR, 841

A NOVEL APPROACH TO THE ENCAPSULATION OF THYME ESSENTIAL OIL

Dilhun Keriman ARSERİM-UÇAR 847

EVALUATION OF BEST MANAGEMENT PRACTICES FOR CONTROLLING SEDIMENT AND NUTRIENT TRANSPORT AT THE DEVELI BASIN, TURKEY

Filiz DADASER-CELIK 855

PESTICIDES POLLUTION FROM AGRICULTURE ACTIVITIES IN THE ALTINAPA RESERVOIR WATERSHED, TURKEY

Nuray ATES, Filiz DADASER-CELIK, S. Sule KAPLAN-BEKAROGLU862

EFFECT OF SOIL PROTECTION TILLAGE ON SOME MICROBIAL PARAMETERS OF MODERATELY ERODED CALCAREOUS CHERNOZEM

Galina PETKOVA, Kostadinka NEDYALKOVA, Jonita PERFANOVA, Gergana KUNCHEVA868

SOIL AND CLIMATIC CAPACITY OF THE SILISTRA REGION (BULGARIA) FOR AGRICULTURE

Veneta KRASTEVA, Zornica MITREVA874

MULTIFACETED APPLICATION OF SUPERWORM (ZOPHOBAS MORIO F.) IN THE ZERO-WASTE CIRCULAR ECONOMY APPROACH

Olga KOSEWSKA, Bartłomiej PORZUC, Sebastian Wojciech PRZEMIENIECKI.....881

DEVELOPMENT OF AGRICULTURAL WATER QUALITY INDICES FOR UKRAINE

Larysa VOITENKO, Elisabet ZALENSKA, Anastasiia HATS, Olga KORNIYCHUK, Bogdan SKRYPETS, Andrii VOITENKO889

APPLICATION OF HIGH SALT-TOLERANT MICROORGANISMS IN ORDER TO IMPROVE THE QUALITY OF WASTEWATER FROM AQUACULTURE IN TIEN GIANG, VIETNAM

Huong Thi Thu TRUONG, My Hoang NGUYEN, Anh Hung LE898

IRRIGATION NETWORK DIAGNOSIS: CASE OF KARFIGUELA PADDY FIELD IN BURKINA FASO

Élie Serge Gaëtan SAURET, Hillary Marie Michelle COMPAORE , Louis YAMEOGO, Jacques KISSOU O., P. BAZONGO, Idriss SERME905

RECOVERY AND UTILIZATION ANALYSIS OF PAPER AND PAPERBOARD BY YEARS IN TURKEY

Gülnur MERTOĞLU ELMAS, Alper ERTÜRK.....915

WETNESS OF KARST FIELDS AT EAST HERZEGOVINA REGION (BOSNIA AND HERZEGOVINA)

Branislav DRAŠKOVIĆ920

EFFECT OF PHYSICAL SOIL PROPERTIES ON POTATO YIELD IN DIFFERENT AGRO-ECOLOGICAL CONDITIONS

Tanja JAKIŠIĆ, Vesna MILIĆ, Mihajlo MARKOVIĆ, Branka GOVEDARICA, Milan JUGOVIĆ, Igor ĐURĐIĆ.....924

MATHEMATICAL MODELING OF PHOTOSYNTHETICALLY ACTIVE RADIATION IN BURGOS, SPAIN, AND THEIR APPLICATION TO OTHER CLIMATES

Ana GARCIA-RODRIGUEZ, Sol GARCIA-RODRIGUEZ, Elena GARRACHÓN-GÓMEZ, Ignacio GARCÍA, Diego GRANADOS-LÓPEZ930

CALCULATION OF INTERCEPTED PHOTOSYNTHETICALLY ACTIVE RADIATION (IPAR) FOR INDUSTRIAL CROPS IN CASTILLA Y LEÓN, SPAIN

Elena GARRACHÓN-GÓMEZ, Ana GARCÍA-RODRÍGUEZ, Sol GARCÍA-RODRÍGUEZ, Ignacio GARCÍA, David GONZÁLEZ-PEÑA	937
CHARACTERIZATION OF GLOBAL IRRADIANCE, ULTRAVIOLET RADIATION AND PHOTOSYNTHETICALLY ACTIVE RADIATION IN BURGOS, SPAIN	
Sol GARCIA-RODRIGUEZ, Ana GARCIA-RODRIGUEZ, Elena GARRACHON-GOMEZ, Ignacio GARCIA, Manuel GARCIA-FUENTE	943
OVERVIEW AND USE VALUE OF VINEYARD WEEDS IN BOSNIA AND HERZEGOVINA	
Antonela MUSA, Helena BREKALO, Sandra MEDIĆ, Danijela PETROVIĆ, Ivan OSTOJIĆ	950
FERTILISATION POTENTIAL OF DIGESTATE OBTAINED FROM ZOPHOBAS MORIO FRASS	
Bartłomiej PORZUC, Olga KOSEWSKA, Sebastian PRZEMIENIECKI.....	956
AMBIGUITY IN THE RESULTS OF USLE K-FACTOR OBTAINED BY NOMOGRAPH AND ERODIBILITY EQUATION	
Ljubomir ŽIVOTIĆ, Boško GAJIĆ, Lazar KALUĐEROVIĆ, Marija ČOSIĆ, Vojislav LAZOVIĆ	962
SUITABILITY OF SOME OAK SPECIES FOR PAPERMAKING	
Gülnur Mertoğlu ELMAS, Defne Zekiye ÖZTÜRK.....	969
RAW MATERIAL CHARACTERIZATION OF WASTE PAPER	
Gülnur MERTOĞLU ELMAS, Beyza KARABULUT	975
USE OF LEMNA MINOR IN PHYTOREMEDIATION PROCESS FOR REMOVAL OF HEAVY METALS IN SECONDARY PULP	
Gülnur MERTOĞLU-ELMAS, Dilek ORAL, Serdar AKBURAK, Sultan Bekiroğlu ÖZTÜRK.....	981
ANIMAL HUSBANDRY.....	987
COAT COLOR AS INDICATOR OF FERTILITY IN DAIRY COWS IN ALGERIA	
Sara LAMARI.....	988
INFLUENCE OF ENVIRONMENTAL FACTORS ON SOME SERUM BIOCHEMICAL PARAMETERS IN SHEEP	
Amina HRKOVIC-POROBIJA, Maja VARATANOVIC, Almira SOFTIC, Maja MITRAŠINOVIC-BRULIC, Irena CELESKA	993
QUALITY OF RAM SPERM AS A CONDITION FOR SUCCESSFUL CONCEPTION OF SHEEP, DURING MATING SEASON AND LATE ANESTRUS SEASON	
Husein VILIĆ, Jelena NIKITOVIC, Refik ŠAHINOVIC, Emir MUJIC, Asmir HUSAK	1000
EXTERIOR MEASURES AND WOOL QUALITY IN SHEEP BREDED IN THREE LOCATIONS IN BOSNIA AND HERZEGOVINA	

Husein VILIĆ, Jelena NIKITOVIĆ, Emir MUJIĆ, Amir HASIĆ, Amir ZENUNOVIĆ, Refik ŠAHINOVIĆ	1010
THE EFFECT OF AMBIENT TEMPERATURE ON EATING TIME AND RUMINATION TIME AND MILK YIELD AND CHEMICAL COMPOSITION OF MILK IN LACTATING COWS	
Blagoje STOJKOVIĆ, Bojan STOJANOVIĆ, Nenad ĐORĐEVIĆ, Vesna DAVIDOVIĆ	1017
INFLUENCE OF STIMULATIVE FEEDING MEASURES ON SPRING DEVELOPMENT OF BEE SOCIETIES IN DB AND LR HONEYCOMBS	
Goran JEVTIĆ, Snežana BABIĆ, Snežana ANĐELKOVIĆ, Vladimir ZORNIĆ, Đorđe LAZAREVIĆ, Kazimir MATOVIĆ, Nebojša NEDIĆ	1023
HUMAN-ANIMAL RELATIONSHIP AS A FACTOR OF CALF WELFARE IN THE FIRST MONTH OF LIFE	
Ljiljana SAMOLOVAC, Slavča HRISTOV, Dušica OSTOJIĆ-ANDRIĆ, Dragan NIKŠIĆ, Tamara STAMENIĆ, Maja PETRIČEVIĆ, Marina LAZAREVIĆ	1029
NUTRITIVE VALUE AND THE POSSIBILITY OF USING APPLE POMACE IN THE NUTRITION OF DAIRY COWS	
Marijana MASLOVARIĆ, Rade JOVANOVIĆ, Nataša TOLIMIR, Vojislav BANJAC, Nikola POPOVIĆ, Radmila BESKOROVAJNI	1035
INFLUENCE OF PROTEOLYSIS AND LIPOLYSIS IN SILAGE ON MILK PRODUCTION AND MILK FAT COMPOSITION IN RUMINANTS	
Nenad DJORDJEVIĆ, Bojan STOJANOVIĆ, Aleksa BOŽIČKOVIĆ, Blagoje STOJKOVIĆ, Dušica RADONJIĆ	1045
EFFECTS OF PROTEASE, DURATION OF FATTENING PERIOD AND SEX OF BROILERS ON CARCASS CONFORMATION MEASURES	
Vladimir DOSKOVIĆ, Snežana BOGOSAVLJEVIĆ-BOŠKOVIĆ, Zdenka ŠKRBIĆ, Božidar MILOŠEVIĆ, Miloš LUKIĆ, Simeon RAKONJAC, Veselin PETRIČEVIĆ ..	1051
COMPARING THE EGG QUALITY TRAITS OF DIFFERENT LAYER GENOTYPES RAISED IN A FREE-RANGE SYSTEM	
Ali AYGUN, Fatma Özlem CALIK, Dogan NARINC	1057
INVESTIGATION OF THE EFFECT OF INTRANASAL LTA AND LPS IMPLEMENTATION ON GENE EXPRESSION IN THE IMMUNE SYSTEM PATHWAY WITH CORRELATION ANALYSIS IN SHEEP	
Esmā Gamze AKSEL, Bilal AKYÜZ	1062
POULTRY BEHAVIOUR AND WELFARE	
Esra KARADUMAN, Doğan NARİNÇ	1068
BEHAVIORAL CHARACTERISTICS IN JAPANESE QUAILS APPLIED TO DIFFERENT MONOCHROMATIC LIGHTING	
Esra KARADUMAN, Sezgi KARAL, Doğan NARİNÇ	1076
FIRST RESULTS ON THE HONEY BEE DISEASES IN BOLU PROVINCE, TURKEY	
Mustafa YAMAN, Tuğba SAĞLAM	1082

BREEDING POSSIBILITIES AND CURRENT SITUATION OF ANATOLIAN BUFFALO HUSBANDRY IN BİNGÖL PROVINCE OF TÜRKİYE	
Turgut AYGÜN	1086
OVERVIEW OF BREEDERS REGARDING OCCUPATIONAL HEALTH AND SAFETY IN ANIMAL HUSBANDRY IN TÜRKİYE	
Turgut AYGÜN	1094
TRANSHUMANCE ACTIVITIES AND PROBLEMS IN SMALL RUMINANT HUSBANDRY IN BİNGÖL PROVINCE OF TÜRKİYE	
Turgut AYGÜN	1102
GRANULATED ANIMAL FEED ADDITIVES ON THE BASIS OF SEA BUCKTHORN BIOMASS	
Anna ANDERSONE, Sarmite JANCEVA, Natalija ZAHAROVA, Gints RIEKSTS, Galina TELYSHEVA†	1109
INFLUENCE OF BIOR PREPARATION ON BOAR SPERMOGRAM	
Elena CIBOTARU , Grigori DARIE , Alisa PIRLOG, Doina ROTARI	1116
PRESENCE OF SEXUAL DIMORPHISM BUT NO ECOTYPES AMONG FREE-RANGING MUSCOVY DUCKS IN GUATEMALA	
R. JÁUREGUI, P.M. PARÉS-CASANOVA.....	1123
ENVIRONMENTAL SUSTAINABILITY FOR POULTRY PRODUCTION	
Esra KARADUMAN, Doğan NARİNÇ	1132
ORGANIC WAY OF GOAT BREEDING AND GOAT PRODUCTION	
Ivan PAVLOVIĆ, Snežana IVANOVIĆ, Ksenija NEŠIĆ, Marija PAVLOVIĆ, Aleksandra TASIĆ, Jovan BOJKOVSKI, Violeta CARO PETROVIĆ	1137
OCCURRENCE OF CHEMICAL ELEMENTS IN EWE TISSUES FROM UNDISTURBED AND SLIGHTLY DISTURBED AREAS IN SLOVAKIA	
Simona ALMÁŠIOVÁ, Róbert TOMAN, Martina PŠENKOVÁ, Vladimír TANČIN, Šimon MIKLÁŠ	1143
COMPARISON OF FEAR RESPONSES AND GROWTH CHARACTERISTICS OF QUAILS REARED IN DIFFERENT CAGES AND STOCKING DENSITIES	
Dost Mohammad HAQYAR, Ali AYGÜN, Doğan NARİNÇ	1151
IS THE JAPANESE QUAIL A PRODUCTION MATERIAL OR A MODEL ANIMAL?	
Dost Mohammad HAQYAR, Ali AYGÜN, Doğan NARİNÇ	1157
RURAL DEVELOPMENT AND AGRO-ECONOMY	1162
CALCULATION PRICE OF TRACTOR OPERATION BASED ON COSTS	
Biljana VELJKOVIĆ, Ranko KOPRIVICA, Marija GAVRILOVIĆ, Dragoslav ĐOKIĆ, Almir MUHOVIĆ, Dragan TERZIĆ	1163
STRUCTURAL AND NON-STRUCTURAL CARBOHYDRATES CONTENT OF APPLE POMACE SILAGES	

Jordan MARKOVIĆ, Tanja VASIĆ, Marija STEPIĆ, Nedeljko RACIĆ, Filip BEKČIĆ, Đorđe LAZAREVIĆ, Ivica KOSTIĆ.....	1169
TENDENCIES AND PREDICTION OF MAIN ANIMAL PRODUCT PRICES AND PRICE PARITY IN SERBIA	
Nebojša NOVKOVIĆ, Ljiljana DRINIĆ, Beba MUTAVDŽIĆ, Blagoje PAUNOVIĆ.	1175
DEVELOPMENT OF BEEKEEPING AND HONEY PRODUCTION AS A RESULT OF THE POLICY MEASURES APPLIED IN BULGARIA AFTER THE MEMBERSHIP TO THE EUROPEAN UNION	
Monika SABEVA.....	1183
ATTITUDES ON SOCIAL SOLIDARITY ECONOMY IN A REGIONAL CONTEXT: CASE OF THE REGION OF WESTERN MACEDONIA IN GREECE	
Effrosyni SAPARDANI, Prodromos TOKMAKIDIS, Katerina MELFOU, Fotios CHATZITHEODORIDIS	1190
VEGETABLE GARDENS EFFECTS ON HOUSHOLDS’ SUSTAINABILITY IN THE GERT SIBANDE DISTRICT, SOUTH AFRICA: A MESMIS MODEL APPROACH	
Mmakhashu P. SECHUBE, Erika VAN DEN HEEVER, Phokele MAPONYA, Sonja L. VENTER	1197
SOCIO-ECONOMIC AND FOOD SECURITY STATUS: A CASE STUDY OF THE SELECTED HOUSEHOLDS IN THE GERT SIBANDE DISTRICT, SOUTH AFRICA	
Mmakhashu P. SECHUBE, Erika VAN DEN HEEVER, Phokele MAPONYA, Sonja L. VENTER, Christiaan P. DU PLOOY	1211
FACTORS AFFECTING THE PRODUCTION STATUS OF SMALLHOLDER CROP FARMERS IN THE UNION OF COMOROS, SUB-SAHARAN AFRICA	
Mmakhashu P. SECHUBE, Erika VAN DEN HEEVER, Versity KEKANA, Phokele MAPONYA, Sonja L. VENTER, Christiaan P. DUPLOOY, Youssouf A.A. SAAND.	1224
GREEN CONSUMPTION IN VIETNAM A CASE STUDY OF YOUNG PEOPLE IN HANOI	
Nguyen Thi HAI NINH	1237
OBSTACLES FOR SOCIETAL PARTICIPATION OF RURAL WOMEN IN DUHOK GOVERNORATE IN KURDISTAN REGION OF IRAQ AND ITS RELATION WITH SOME VARIABLES	
Hashim Saeed MURAD, Abid Ali Hasan AL-DOSKI, Aamel F. Khalil AL-ABBASSI	1248
INFLUENCE OF THE ECONOMIC CRISIS TO THE PRODUCTION PRICE OF WINE GRAPES IN THE REPUBLIC OF NORTH MACEDONIA	
Lazo DIMITROV, Marija GJOSHEVA KOVACHEVIKJ, Despina POPOVSKA STOJANOV, Dushko NEDELKOVSKI	1258
PREDICTION OF SUNFLOWER PRODUCTION IN THE REPUBLIC OF SERBIA	
Miroslav NEDELJKOVIĆ, Jonel SUBIĆ, Radivoj PRODANOVIĆ	1265

FORECASTING TOMATO PRICES ON MARKETS IN THE REPUBLIC OF SERBIA USING THE ARIMA MODEL

Mladen PETROVIĆ, Svjetlana JANKOVIĆ ŠOJA, Bojan SAVIĆ, Vedran TOMIĆ, Vojin CVIJANOVIĆ, Nataša PEROVIĆ 1271

THE EFFECT OF DEMOGRAPHIC FACTORS AND CONSUMER BEHAVIOURS ON RED MEAT CONSUMPTION EXPENDITURES

Nilgün DOĞAN, Hakan ADANACIOGLU 1277

MARKETING CHANNEL PREFERENCES OF DAIRY PRODUCERS AND THEIR PRICES: THE CASE OF GUMUSHANE PROVINCE IN TÜRKIYE

Nilgün DOGAN, Hakan ADANACIOGLU 1285

EXPLANATION OF THE REASONS FOR PRICE CHANGES IN THE SUPPLY CHAIN OF SELECTED AGRICULTURAL PRODUCTS

Zeki BAYRAMOĞLU, Kemalettin AĞIZAN, Suheyla AĞIZAN, Merve BOZDEMİR AKÇİL..... 1294

COMPARISON OF FOOD SAFETY BY COUNTRY

Zeki BAYRAMOĞLU, Merve BOZDEMİR AKÇİL, Kemalettin AĞIZAN, Suheyla AĞIZAN 1300

THE EFFECT OF AGRICULTURAL INPUT PRICES ON FARMERS' PURCHASE POWER

Zeki BAYRAMOĞLU, Suheyla AĞIZAN, Merve BOZDEMİR AKÇİL, Kemalettin AĞIZAN 1307

RAINFED CROP PROJECTIONS IN THE SEMI-ARID UNDER SCENARIOS OF PLUVIOMETRIC INSTABILITY IN CEARÁ STATE IN BRAZIL

José de Jesus Sousa LEMOS, Filomena Nádia Rodrigues BEZERRA, Elizama Cavalcante de PAIVA, Antonia Leudiane Mariano IPOLITO 1313

FORESTRY AND AGRO-FORESTRY.....1323

DEEP-PLANTED WHIPS ARE GOOD ALTERNATIVE TO ROOTED CUTTINGS IN THE ESTABLISHMENT OF WHITE POPLAR CLONAL PLANTATIONS

Branislav KOVAČEVIĆ, Marina MILOVIĆ, Milan DREKIĆ, Andrej PILIPOVIĆ, Zoran NOVČIĆ, Zoran GALIĆ, Vanja VUKSANOVIĆ, Leopold POLJAKOVIĆ-PAJNIK.. 1324

ECOLOGICAL CHARACTERISTICS OF GREEK MAPLE (*ACER HELDREICHII* ORPH.) IN PRIMEVAL FORESTS „PERUĆICA“ AND „BIOGRADSKA GORA“

Marko PEROVIĆ, Olivera KOŠANIN, Rade CVJETIĆANIN 1331

SUPPRESSION OF DUSKY CLEARWING (*PARANTHRENE TABANIFORMIS* ROTT.)

Milan DREKIĆ, Leopold POLJAKOVIĆ - PAJNIK, Predrag PAP, Marina MILOVIĆ, Andrej PILIPOVIĆ, Branislav KOVAČEVIĆ 1342

POPULATION DYNAMICS OF EARLY OAK DEFOLIATORS IN CORRELATION WITH MICRO-CLIMATIC TEMPERATURE CONDITIONS IN KRAGUJEVAC AREA IN SERBIA

Miroslava MARKOVIĆ, Mara TABAKOVIĆ-TOŠIĆ, Renata GAGIĆ-SERDAR 1348

BIOPOTENTIAL OF INTRODUCED FALSE INDIGO AND ALBIZIA WEEVIL IN HOST PLANT CONTROL AND DURATION OF ITS DEVELOPMENT STAGES IN SOUTHERN REGIONS OF PANONIAN BASIN	
Renata GAGIĆ-SERDAR, Miroslava MARKOVIĆ, Ljubinko RAKONJAC, Aleksandar LUČIĆ, Suzana MITROVIĆ	1357
PROPERTIES AND POSSIBILITIES OF FORESTATION OF NON-AGRICULTURAL SOIL IN THE AREA OF SREM IN SERBIA	
Saša PEKEČ, Dejan B. STOJANOVIĆ, Marina MILOVIĆ, Milutin ĐILAS	1363
CHANGES IN THE FLORISTIC COMPOSITION OF BEECH FORESTS (<i>FAGUS SYLVATICA</i> L.) AT TWO SITES IN SOUTHEASTERN SERBIA OVER A PERIOD OF 14 YEARS	
Snežana STAJIĆ, Vlado ČOKEŠA, Zoran MILETIĆ, Saša EREMIJA, Violeta BABIĆ, Zoran PODUŠKA	1368
THE VIABILITY OF BEECH SEEDS (<i>FAGUS SYLVATICA</i>) ORIGINATING FROM THE REPUBLIC OF MOLDOVA UNDER HIGH POSITIVE TEMPERATURES	
Dina ELISOVETCAIA, Raisa IVANOVA, Elena LUTCAN, Alexandru CHETREAN, Victor SFECLA.....	1375
AGROFORESTRY AND PUBLIC PRIVATE PARTNERSHIP: A CASE STUDY OF AGROSILVICULTURE COMMUNITY GROWERS IN MPUMALANGA PROVINCE, SOUTH AFRICA	
Phokele MAPONYA, Kalashe NWABISA, Thabo NKUNA, Meshack MAKHWEDZHANA, Mmakhashu Patience SECHUBE.....	1381
PUPA MORTALITY OF <i>THAUMETOPOEA PITYOCAMPA</i> DENIS & SCHIFFERMÜLLER, 1775 (LEPIDOPTERA: NOTODONTIDAE) IN ALGERIA	
Noureddine RAHIM, Gahdab CHAKALI	1389
ECOLOGICAL ASSESSMENT OF SOIL CO₂ EMISSIONS IN POST-AGROGENIC SUCCESSION OF FALLOW OVERGROWTH BY FOREST ON PODZOLUVISOLS	
Ivan VASENEV, Tatyana KOMAROVA, Ade ELVIRA	1399
SESSILE OAK (<i>QUERCUS PETRAEA</i> (MATT.) LIEBL) VARIABILITY IN THE AREA OF EASTERN SERBIA ACCORDING TO LEAF MORPHOLOGICAL TRAITS	
Vladan POPOVIĆ, Aleksandar LUČIĆ, Sanja JOVANOVIĆ, Ljubinko RAKONJAC	1406
ECOSYSTEM SERVICES AND EUROPEAN GREEN INFRASTRUCTURE STRATEGY: THE ROLE OF THE URBAN AND PERI-URBAN FORESTS	
Ignacio J. DIAZ-MAROTO	1413
CONSERVATION OF BIODIVERSITY IN URBAN FORESTS AND ITS LANDSCAPE BOUNDARIES	
Ignacio J. DIAZ-MAROTO	1420
AUTHOR INDEX	1427

EFFECTS OF PROTEASE, DURATION OF FATTENING PERIOD AND SEX OF BROILERS ON CARCASS CONFORMATION MEASURES

Vladimir DOSKOVIĆ^{1*}, Snežana BOGOSAVLJEVIĆ-BOŠKOVIĆ¹, Zdenka ŠKRBIĆ², Božidar MILOŠEVIĆ³, Miloš LUKIĆ², Simeon RAKONJAC¹, Veselin PETRIČEVIĆ²

¹University of Kragujevac, Faculty of Agronomy Čačak, Cara Dušana 34, Čačak, Serbia

²Institute for Animal Husbandry, Autoput 16, Poštanski fah 23, 11 080 Belgrade-Zemun, Serbia

³Faculty of Agriculture, University of Pristina, Kosovska Mitrovica-Zubin Potok-Lešak, 38219 Lešak, Serbia

*Corresponding author: vladosko@kg.ac.rs

Abstract

This study analyses the effect of different protein levels in broiler feeds (supplemented with protease), different lengths of fattening period and sex on body conformation in fast-growing Cobb 500 broilers. Complete feeds for broilers in experimental groups E-I and E-II contained 4 and 6% less crude protein than the control (C) and were supplemented with protease (Ronozyme Pro Act) at a concentration of 200mg/kg feed and 300mg/kg feed respectively. At 49 and 63 days of age, 10 male and 10 female broilers were randomly selected from each experimental group and slaughtered. Body conformation measurement included absolute carcass conformation measures (metatarsus length, keel length, breast depth, breast angle, thigh girth) and relative body conformation measures - conformation indices (body weight/metatarsus length, body weight/keel length, body weight/breast depth, body weight/thigh girth). The results showed that dietary treatment did not affect conformation measures, as well as that the time of slaughter and sex of chickens had a significant effect on the examined carcass quality parameters. Namely, the length of the fattening period affected all conformation indices, as well as some absolute measures of carcass conformation - metatarsus length, keel length and thigh girth, while sex had a significant effect on the values of the all absolute values of carcass conformation (except for breast angle) and indices body weight/keel length and body weight/breast depth.

Keywords: *broilers, body conformation, feeds, lengths of fattening period, sex.*

Introduction

For decades, those involved in the production chain of broiler chickens have been concerned with the potential for growth and body conformation of poultry, since these characteristics are related to the efficiency and profitability of the poultry sector. Genetic enhancements have resulted in the current broiler chicken strains, which are characterized by faster weight gain and better feed conversion (Nascimento *et al.* 2018). The feed efficiency, live and carcass weight and percentages of some carcass parts are significantly affected by age and production system (Castelini *et al.* 2002).

Dietary protein plays a significant role in digestive system development and growth performance. Modern poultry primarily focuses on reducing the feed cost to optimize economic benefits since feed is the main factor determining the total production cost, and crude protein are one of the fundamental cost constituents of poultry feed (Kamran *et al.* 2004). As one of the methods to improve the utilization of proteins and amino acids from the feed is proposed protease supplementation. Protease enzyme have several benefits including positive effects on

growth performance, nutrient utilization, lipid peroxidation and modified plasma lipids profile in broiler chickens (Sorbara, 2009; Saleh *et al.* 2018; Moreira *et al.* 2020; Saleh *et al.* 2020).

Therefore, the objective of the present study was to evaluate some carcass characteristics - body conformation of broiler chickens from different dietary treatments (with or without protease enzymes), different lengths of fattening period (49 and 63 days of age) and sexes.

Material and methods

A total of 300 day-old broiler chicks (Cobb 500) of mixed sex were randomly assigned to 3 nutritionally corn-soybean based experimental diets (C, E-I and E-II) comprising 3 levels of protease supplementation (C - control group, without protease enzyme; E-I group - 200 mg Ronozyme ProAct/kg feed and 4% less crude protein than the control group and E-II group - 300mg/kg feed and 6% less crude protein than the control respectively). The nutrient composition of feeds are presented in Table 1.

Broilers were fed *ad-libitum* starter (day 1-21 of age), grower (day 22-35 of age) and finisher mash diets (day 36-63 of age) and water was available freely and were placed within the identical environmental conditions.

Table 1. Nutrient composition of experimental diets for broilers

Calculated composition	Starter stage (1 to 21 d)			Grower stage (22 to 35 d)			Finisher stage (36 to 63 d)		
	C	E-1	E-2	C	E-1	E-2	C	E-1	E-2
ME, kcal/kg	3.081	3.100	3.112	3.157	3.174	3.183	3.181	3.198	3.207
Crude proteins, %	22.59	21.72	21.24	18.99	18.22	17.84	17.16	16.45	16.09
Total lysine, %	1.33	1.27	1.24	1.15	1.10	1.08	1.05	1.00	0.98
Methionine+cystine, %	0.92	0.90	0.89	0.91	0.89	0.88	0.86	0.84	0.83

On day 49 and 63, ten male and ten female birds from each dietary treatment were weighed and after were fasted for 6 h and slaughtered to determine eviscerated absolute carcass conformation measures (metatarsus length, keel length, breast depth, breast angle, thigh girth). Based on body weight at slaughter data and absolute conformation measurements, relative conformation measurements were calculated (body weight/metatarsus length, body weight/keel length, body weight/breast depth and body weight/thigh girth).

The data thus obtained on various parameters were subjected to statistical analysis according to using analysis of variance technique (for three factors - diet, fattening period and sex of chickens) and Tukey’s test (for individual comparisons, $P < 0.05$) (Statsoft Inc. Statistica for Windows, 2006).

Results and discussion

The measured parameters of the absolute values of carcass conformation (metatarsus length, keel length, breast depth, breast angle and thigh girth) of Cobb 500 broiler chickens at the age of 49 and 63 days, are presented in Table 2.

Table 2. Body conformation (absolute values) of broilers across experimental groups

Treatment				ML mm	KL mm	BD mm	BA degrees	TG mm
Protease	Fattening period, days	Sex						
C	49	♂	\bar{x}	83.1 ^{bc}	123.2 ^{cd}	114.0 ^{ab}	153.6 ^{ab} _c	165.5 ^{ab}
			Sd	3.14	3.26	3.20	5.17	6.48
		♀	\bar{x}	74.3 ^d	117.2 ^{ef}	107.7 ^{cd}	145.7 ^c	148.2 ^e
			Sd	2.50	3.79	2.79	6.81	5.47
	63	♂	\bar{x}	91.3 ^a	130.2 ^a	118.8 ^a	161.7 ^a	173.1 ^a
			Sd	2.75	1.55	4.08	5.64	6.84
		♀	\bar{x}	80.8 ^{bc}	126.8 ^{ab} _c	108.4 ^{bc} _d	154.1 ^{ab} _c	158.4 ^{bc} _d
			Sd	3.76	1.81	3.78	6.81	7.44
E-I	49	♂	\bar{x}	82.1 ^{bc}	121.3 ^{de}	113.4 ^{ab} _c	152.6 ^{ab} _c	159.6 ^{bc}
			Sd	2.18	4.08	3.75	4.14	2.76
		♀	\bar{x}	75.1 ^d	116.4 ^f	105.2 ^d	148.9 ^{bc}	150.4 ^{de}
			Sd	3.25	3.31	3.12	6.62	4.55
	63	♂	\bar{x}	93.6 ^a	130.6 ^a	116.4 ^a	159.2 ^a	171.4 ^a
			Sd	2.37	1.07	6.67	7.15	5.29
		♀	\bar{x}	80.4 ^c	126.3 ^{ab} _c	110.5 ^{bc} _d	147.9 ^{bc}	154.8 ^{cd} _e
			Sd	2.76	3.59	4.50	7.61	7.27
E-II	49	♂	\bar{x}	85.1 ^b	124.3 ^{bc} _d	113.3 ^{ab} _c	155.2 ^{ab}	161.5 ^{bc}
			Sd	3.93	2.16	4.29	5.63	5.40
		♀	\bar{x}	75.6 ^d	117.6 ^{ef}	105.1 ^d	147.0 ^{bc}	150.9 ^{de}
			Sd	2.63	4.09	3.18	5.12	7.49
	63	♂	\bar{x}	90.3 ^a	129.7 ^a	116.3 ^a	154.5 ^{ab} _c	167.1 ^{ab}
			Sd	4.19	1.89	3.16	6.79	6.71
		♀	\bar{x}	81.0 ^{bc}	128.3 ^{ab}	109.4 ^{bc} _d	148.5 ^{bc}	159.4 ^{bc} _d
			Sd	2.36	2.06	1.78	6.62	7.46

ML-metatarsus length, KL-keel length, BD-breast depth, BA-breast angle, TG-thigh girth

^{a-e} Means followed by different superscript letters within columns differ significantly (P<0.05)

The addition of protease enzyme (200 or 300 mg/kg of protease) had no significant influence (P>0.05) on the absolute carcass conformation measures compared to the control group.

The prolongation of duration fattening period for two weeks (both at 7 and 9 weeks of age) significantly increased the metatarsus length, keel length and thigh girth (E-I group in female and E-II group in male chickens) (P<0.05), with a slight increase in breast depth and breast angle (P>0.05). The obtained results are consistent with the results of Dosković *et al.* (2017) who reported that the length of the fattening period affected almost all studied parameters, except breast angle.

Males had higher values for all absolute carcass conformation measures than females (P<0.05), with only breast angle (both 49 and 63 days), keel length (63 day) and thigh girth (49 day, E-I group and 63 day, E-II group) showing no significance (P>0.05). Similar results on the better conformation of male chicken carcasses compared to females, with no significant difference only

for breast angle, were obtained by Pavlovski *et al.* (2007) and Dosković *et al.* (2018), while Blagojević *et al.* (2009) determined a significant effect of sex on all absolute measures of conformation.

Table 3. Body conformation indices in broilers across experimental groups

Treatment				BW/ML g/mm	BW/KL g/mm	BW/BD g/mm	BW/TG g/mm
Protease	Fattening period, days	Sex					
C	49	♂	\bar{x}	41.73 ^{cde}	28.13 ^b	30.40 ^{cd}	20.95 ^{cde}
			Sd	1.89	1.05	1.22	0.83
		♀	\bar{x}	39.01 ^{ef}	24.76 ^c	26.90 ^e	19.56 ^{def}
			Sd	1.79	1.63	0.99	0.83
	63	♂	\bar{x}	48.50 ^a	33.40 ^a	37.28 ^a	25.59 ^a
			Sd	2.61	1.74	1.96	1.45
		♀	\bar{x}	44.33 ^{abc}	28.19 ^b	32.94 ^b	22.54 ^{bc}
			Sd	4.20	2.30	1.94	1.06
E-I	49	♂	\bar{x}	41.36 ^{c-f}	28.01 ^b	29.97 ^d	21.26 ^{cd}
			Sd	1.88	1.56	1.71	0.63
		♀	\bar{x}	38.40 ^{ef}	24.74 ^c	27.36 ^e	19.15 ^{ef}
			Sd	2.45	1.15	1.14	1.00
	63	♂	\bar{x}	46.94 ^{ab}	33.62 ^a	37.73 ^a	25.64 ^a
			Sd	3.54	2.37	1.69	1.93
		♀	\bar{x}	44.57 ^{abc}	28.35 ^b	32.40 ^{bc}	23.15 ^b
			Sd	3.21	1.70	1.57	1.43
E-II	49	♂	\bar{x}	39.94 ^{def}	27.26 ^b	29.90 ^d	20.98 ^{cde}
			Sd	3.67	1.64	1.22	1.13
		♀	\bar{x}	37.29 ^f	23.97 ^c	26.82 ^e	18.69 ^f
			Sd	1.52	1.02	1.21	0.67
	63	♂	\bar{x}	47.21 ^{ab}	32.78 ^a	36.56 ^a	25.51 ^a
			Sd	3.67	1.47	1.62	2.06
		♀	\bar{x}	43.63 ^{bcd}	27.54 ^b	32.28 ^{bc}	22.17 ^{bc}
			Sd	2.52	1.51	1.56	0.99

BW – body weight at slaughter, ML-metatarsus length, KL – keel length, BD – breast depth, TG – thigh girth
a-f Means followed by different superscript letters within columns differ significantly (P<0.05)

Results from this study clearly show non-significant differences in body conformation indices between applied dietary treatments (P>0.05). Similar results on the effect of different concentrations of protease enzymes on carcass quality parameters and conformation measures (both relative and absolute) of chicken carcasses, with a decrease in crude protein content, were published by Dosković *et al.* (2012, 2016), examining the same hybrid - Cobb 500.

With the extension of the duration of fattening (for 14 days), the value of all relative conformation measurements increased (P<0.05). The relative conformation traits were significantly affected by the length of the fattening period in similar growing conditions, according to Dosković *et al.* (2017).

There was a significant effect (P<0.05) between male and females chicks in body weight/keel length and body weight/breast depth, while at the same time there was no difference in indices of body weight/metatarsus length and body weight/thigh girth (P>0.05). Dosković *et al.* (2016)

reported that male chickens had significantly ($P < 0.01$) higher relative conformation measures compared to female chickens, while Blagojević (2011) found that the effect of sex on carcass conformation index value was significant for BW/ML.

Conclusion

Based on the data presented above, it could be concluded that:

- dietary treatments (standard diet without enzyme protease; 4 % less crude protein than the control and enzyme protease (Ronozyme Pro Act) at a concentration of 200mg/kg feed and 6 % less crude protein than the control and with enzyme protease at a concentration of 300mg/kg feed) did not affect carcass conformation measures,
- prolonging the fattening period of Cobb 500 chickens (from 49 to 63 day of age) significantly increased some absolute carcass conformation measures (metatarsus length, keel length and thigh girth), as well as all body conformation indices ($P < 0.05$),
- male chickens had better conformation compared to females, and sex had a non-significant effect on the values of the breast angle and indices of body weight/metatarsus length and body weight/thigh girth ($P > 0.05$).

Acknowledgement

The research was financed by the Ministry of Education, Science and Technological Development, Republic of Serbia, project ref. number 451-03-68/2022-14 and 451-03-68/2022-14/200022.

Reference

- Blagojević M., Pavlovski Z., Škrbić Z., Lukić M., Milošević N., Perić L. (2009). The effect of genotype of broiler chickens on carcass quality in extensive rearing system. *Acta veterinaria (Beograd)*, 59(1), 91-97.
- Blagojević M. (2011). Effect of genotype on the intensity of growth and quality of carcass and meat of broiler chickens in extensive rearing system. PhD thesis. University of Novi Sad, Faculty of Agriculture, Novi Sad, 1-116.
- Castellini C., Mugnai C., Dal Bosco A. (2002). Effect of conventional versus organic method of production on the broiler carcass and meat quality. *Meat Science*, 60(3), 219-225.
- Dosković V., Bogosavljević-Bošković S., Pavlovski Z., Milošević B., Škrbić Z., Radonjac S., Petričević V. (2012). Effect of protease on productive and slaughter traits in broiler chickens. *Biotechnology in Animal Husbandry*, 28(4), 817-826.
- Dosković V., Bogosavljević-Bošković S., Lukić M., Škrbić Z., Rakonjac S., Petričević V. (2016). Effect of dietary protease supplementation and sex on dressing percentage and body conformation in broilers. *Biotechnology in Animal Husbandry*, 32(2), 185-193.
- Dosković V., Bogosavljević-Bošković S., Škrbić Z., Đoković R., Rakonjac S., Petričević V. (2017). Effect of dietary protein level and length of fattening period on dressing percentage and carcass conformation in broiler chickens. *Biotechnology in Animal Husbandry*, 33(2), 211-219.

- Dosković V., Bogosavljević-Bošković, S., Škrbić Z., Jašović B., Rakonjac S., Petričević V., Petrović M.D. (2018). Carcass conformation of Master Gris broiler chickens as an indicator of carcass quality. *Acta Agriculturae Serbica*, 23(46), 247-255.
- Kamran Z., Mirza M.A., Mahmood S. (2004). Effect of decreasing dietary protein levels with optimum amino acids profile on the performance of broilers. *Pakistan Veterinary Journal*, 24(4), 165-168.
- Moreira E.M.S.C., Dourado L.R.B., Bastos H.P.A., Ribeiro M.N., da Silva S.R.G., J.B. Lopes, M.A.M. Filho, S.B.P. de Lima (2020). Protease and sugarcane yeast in diets for broiler chicks. *Acta Scientiarum Animal Sciences*, 42, e50436.
- Nascimento do D.C.N., Dourado L.R.B., de Siqueira J.C., de Lima S.B.P., da Silva M.C.M., da Silva G.G., Sakomura N.K., Ferreira G.J.B.C., Biagiotti D. (2018). Productive features of broiler chickens in hot weather: effects of strain and sex. *Semina: Ciências Agrárias*, 39(2), 731-746.
- Pavlovski Z., Škrbić Z., Cmiljanić R., Lukić M., Tomašević D. (2007). The effect of the rearing system and biological factors on carcass conformation and slaughter traits of fattening chickens. *Biotechnology in Animal Husbandry*, 23(3-4), 59-66.
- Saleh A.A., El-Far A.H., Abdel-Latif M.A., Emam M.A., Ghanem R. (2018). Exogenous dietary enzyme formulations improve growth performance of broiler chickens fed a low-energy diet targeting the intestinal nutrient transporter genes. *PLoS ONE*, 13(5), e0198085.
- Saleh A.A., Dawood M.M., Badawi N.A., Ebeid T.A., Amber K.A., Azzam M.M. (2020). Effect of supplemental serine-protease from *Bacillus licheniformis* on growth performance and physiological change of broiler chickens. *Journal of Applied Animal Research*, 48(1), 86-92.
- Sorbara J.O.B. (2009). Use of a protease to enhance the utilisation of soybean meal amino acids by broilers. *Poultry. Sci. Assoc. 98th Annual Meeting*, Raleigh, North Carolina. *Poultry Science Abstract* 88: 221, p. 68.