



INSTITUTE OF AGRICULTURAL ECONOMICS, BELGRADE, SERBIA

SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT IV

Proceedings



Belgrade, February 2024

INSTITUTE OF AGRICULTURAL ECONOMICS BELGRADE

Volgina Street no. 15, 11060 Belgrade, Serbia

Phone/Fax: +381 (0) 11 69 72 858

Phone: +381 (0) 11 69 72 848



E-mail:

office@iep.bg.ac.rs

Internet address:

www.iep.bg.ac.rs



International Scientific Conference

SUSTAINABLE AGRICULTURE AND RURAL DEVELOPMENT IV

PROCEEDINGS

February, 2024

Belgrade, Serbia

Publisher:

Institute of Agricultural Economics, Belgrade, Serbia

Editors:

Jonel Subić, Ph.D.

Miroslav Nedeljković, Ph.D.

Marijana Jovanović Todorović, Ph.D.

Jean Vasile Andrei, Ph.D.

Technical arrangement and printing:

SZR NS MALA KNJIGA +

Zetska Street no. 15,

21000 Novi Sad, Republic of Serbia,

Phone: +381 21 64 00 578

Technical preparation and typesetting:

Vladimir Sokolović

Printing: 200

ISBN 978-86-6269-134-7

ISBN (e-book) 978-86-6269-135-4

The publisher is not responsible for the content of the scientific papers and opinions published in the Proceedings.

They represent the authors' point of view.

Publication of Proceedings was financially supported by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia.

Organizers

INSTITUTE OF AGRICULTURAL ECONOMICS, BELGRADE - SERBIA

Co-organizers

NATIONAL TEAM FOR THE REVIVAL OF SERBIAN VILLAGES, BELGRADE - SERBIA

CHAMBER OF COMMERCE AND INDUSTRY OF SERBIA, BELGRADE - SERBIA

COUNCIL FOR SMART AGRICULTURE - CHAMBER OF COMMERCE AND INDUSTRY OF BELGRADE, BELGRADE - SERBIA

ACADEMY OF ENGINEERING SCIENCES OF SERBIA, DEPARTMENT OF BIOTECHNOLOGICAL SCIENCES, BELGRADE - SERBIA

FACULTY OF AGRICULTURE, BELGRADE - SERBIA

FACULTY OF AGRICULTURE, NOVI SAD - SERBIA

FACULTY OF AGRICULTURE, KRUŠEVAC - SERBIA

FACULTY OF ECONOMICS, BELGRADE - SERBIA

FACULTY OF ECONOMICS, SUBOTICA - SERBIA

FACULTY OF ECONOMICS, KRAGUJEVAC - SERBIA

FACULTY OF ECONOMICS, KOSOVSKA MITROVICA - SERBIA

FACULTY OF HOTEL MANAGEMENT AND TOURISM, UNIVERSITY OF KRAGUJEVAC, VRNJAČKA BANJA - SERBIA

FACULTY OF APPLIED MANAGEMENT, ECONOMICS AND FINANCE (MEF), BELGRADE - SERBIA

FACULTY OF ECONOMICS AND ENGINEERING MANAGEMENT, UNIVERSITY BUSINESS ACADEMY, NOVI SAD - SERBIA

FACULTY FOR BIOFARMING, MEGATREND UNIVERSITY, BAČKA TOPOLA - SERBIA

FACULTY OF AGRONOMY IN ČAČAK, UNIVERSITY OF KRAGUJEVAC, ČAČAK - SERBIA

EUROPEAN UNIVERSITY, BELGRADE - SERBIA

UNIVERSITY "ALFA BK", BELGRADE - SERBIA

UNIVERSITY "SINGIDUNUM", BELGRADE - SERBIA

UNIVERSITY "UNION - NIKOLA TESLA", BELGRADE - SERBIA

UNIVERSITY "EDUCONS", NOVI SAD - SERBIA

INSTITUTE "MIHAJLO PUPIN", BELGRADE - SERBIA

INSTITUTE OF ECONOMIC SCIENCES, BELGRADE - SERBIA

INSTITUTE FOR SCIENCE APPLICATION IN AGRICULTURE, BELGRADE - SERBIA

INSTITUTE OF FORESTRY, BELGRADE - SERBIA

INSTITUTE OF FIELD AND VEGETABLE CROPS, NOVI SAD - SERBIA

INSTITUTE FOR BIOLOGICAL RESEARCH "SINIŠA STANKOVIĆ", BELGRADE - SERBIA

INSTITUTE FOR PLANT AND ENVIRONMENT PROTECTION, BELGRADE - SERBIA

MAIZE RESEARCH INSTITUTE ZEMUN POLJE, BELGRADE - SERBIA

FRUIT RESEARCH INSTITUTE, ČAČAK - SERBIA

INSTITUTE FOR VEGETABLE CROPS, SMEDEREVSKA PALANKA - SERBIA

INSTITUTE OF INFORMATION TECHNOLOGIES, KRAGUJEVAC - SERBIA
INSTITUTE FOR SOIL SCIENCE, BELGRADE - SERBIA
INSTITUTE FOR FORAGE CROPS, KRUŠEVAC - SERBIA
NOVI SAD BUSINESS SCHOOL, NOVI SAD - SERBIA
ACADEMY OF VOCATIONAL STUDIES IN ŠUMADIJA, ARANĐELOVAC DEPARTMENT,
ARANĐELOVAC - SERBIA
ASSOCIATION OF THE ECONOMIST OF BELGRADE, BELGRADE - SERBIA
DEVELOPMENT ACADEMY OF SERBIAN AGRICULTURE (RAPS), BELGRADE - SERBIA
BALKAN SCIENTIFIC ASSOCIATION OF AGRICULTURAL ECONOMISTS, BELGRADE
- SERBIA
SERBIAN ASSOCIATION OF AGRICULTURAL ECONOMISTS (DAES), BELGRADE -
SERBIA
COOPERATIVE UNION OF SERBIA, BELGRADE - SERBIA
COOPERATIVE UNION OF VOJVODINA, NOVI SAD - SERBIA
AGRICULTURAL CHEMICAL HIGH SCHOOL IN OBRENOVAC, BELGRADE - SERBIA
FACULTY OF AGRO-FOOD AND ENVIRONMENTAL ECONOMICS, BUCHAREST
UNIVERSITY OF ECONOMIC STUDIES, BUCHAREST - ROMANIA
CENTER FOR STUDY AND RESEARCH FOR AGROFORESTRY BIODIVERSITY,
BUCHAREST - ROMANIA
NATIONAL INSTITUTE FOR ECONOMIC RESEARCH “COSTIN C. KIRITESCU”,
ROMANIAN ACADEMY, BUCHAREST - ROMANIA
UNIVERSITY OF AGRONOMIC SCIENCES AND VETERINARY MEDICINE OF
BUCHAREST (USAMV), BUCHAREST - ROMANIA
RESEARCH CENTRE FOR SUSTAINABLE RURAL DEVELOPMENT OF ROMANIA,
ROMANIAN ACADEMY, TIMISOARA - ROMANIA
FACULTY OF MANAGEMENT AND RURAL TOURISM, UNIVERSITY OF LIFE SCIENCES
“KING MIHAI I”, TIMISOARA - ROMANIA
UNIVERSITY OF BJELJINA, BJELJINA - BOSNIA AND HERZEGOVINA
FEDERAL INSTITUTE OF AGRICULTURAL ECONOMICS, RURAL AND MOUNTAIN
RESEARCH, VIENNA - AUSTRIA
INSTITUTE OF AGRICULTURAL ECONOMICS, SOFIA - BULGARIA
NATIONAL INSTITUTE FOR ECONOMIC RESEARCH, CHISINAU - MOLDOVA
INSTITUTE OF AGRICULTURAL ECONOMICS, BUCHAREST - ROMANIA
THE RESEARCH INSTITUTE FOR AGRICULTURE ECONOMY AND RURAL
DEVELOPMENT (ICEADR), BUCHAREST - ROMANIA
BALKAN ENVIRONMENTAL ASSOCIATION (B.EN.A.), THESSALONIKI - GREECE
RESEARCH NETWORK ON RESOURCES ECONOMICS AND BIOECONOMY (RebResNet),
PLOIESTI – ROMANIA
DIGITAL ECONOMY RESEARCH CENTER, CHONGQING INSTITUTE OF HIT,
CHONGQING - CHINA
STAVROPOL STATE AGRARIAN UNIVERSITY, STAVROPOL – RUSSIAN FEDERATION
CENTER FOR RESEARCH, INNOVATION, EXTENSION AND TECHNOLOGICAL
TRANSFER - AGRIDATA, BUCHAREST - ROMANIA

HONORARY BOARD

- *Jelena Begović*, Ph.D., Minister of Science, Technological Development and Innovation of the Republic of Serbia.
- *Jelena Tanasković*, Minister of Agriculture, Forestry and Water Management of the Republic of Serbia.
- *Milan Krkobabić*, Minister of Rural Welfare, Co-president of the National Team for the Survival of Serbian Villages.
- Academician *Dragan Škorić*, Ph.D., President of the Academic Committee for the Village of the Serbian Academy of Sciences and Arts (SANU), Co-president of the National Team for the Revival of Serbian Villages, Belgrade - Serbia.
- Academician *Ion Paun Otiman*, Ph.D., Honorary President of the Romanian Academy, Timisoara Branch, Timisoara - Romania.
- Prof. *Nicolae Istudor*, Ph.D., Rector of the Bucharest University of Economic Studies, Bucharest - Romania.
- Prof. *Alexandru Stratan*, Ph.D., Rector, National Institute for Economic Research, Chisinau - Moldova.
- Prof. *Vladimir Sitnikov*, Ph.D., Rector of the Stavropol State Agrarian University, Stavropol - Russian Federation.
- *Marko Čadež*, President of the Chamber of Commerce and Industry of Serbia, Belgrade - Serbia.
- Prof. *Miroslav Trajanović*, Ph.D., State Secretary in the Ministry of Science, Technological Development and Innovation of Republic Serbia.
- *Vukašin Grozdić*, Ph.Ds., State Secretary in the Ministry of Science, Technological Development and Innovation of Republic Serbia.
- *Marina Soković*, Ph.D., Assistant Minister in the Ministry of Science, Technological Development and Innovation of the Republic of Serbia.
- *Vladimir Radovanović*, M.Sc., Assistant Minister in the Ministry of Science, Technological Development and Innovation of the Republic of Serbia.
- *Vedrana Ilić*, Assistant Minister in the Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia.
- *Aleksandar Bogičević*, Assistant Minister in the Ministry of Agriculture, Forestry and Water Management of the Republic of Serbia.
- Prof. *Zorica Vasiljević*, Ph.D., President of Steering committee of IAE, Belgrade - Serbia.
- Prof. *Aleksandar Rodić*, Ph.D., Member of Steering committee of IAE and Head of Robotics Department, Institute „Mihailo Pupin“, Belgrade - Serbia.
- Prof. *Zora Dajić Stevanović*, Ph.D., Member of Steering committee of IAE and Professor at the Faculty of Agriculture, Belgrade – Serbia.
- *Maja Ignjatov*, Ph.D., Member of Steering committee of IAE and Researcher at the Institute of Field and Vegetable Crops, Novi Sad - Serbia.
- Prof. *Snežana Janković*, Ph.D., Council for Smart Agriculture - Chamber of Commerce and Industry of Belgrade, Belgrade - Serbia.
- Prof. *Mirjana Šijačić Nikolić*, Ph.D., Head of Department of Biotechnological Sciences, Academy of Engineering Sciences of Serbia, Belgrade - Serbia.
- Prof. *Tomo Milošević*, Ph.D., Dean of Faculty of Agronomy, Čačak - Serbia.
- Prof. *Snežana Bogosavljević Bošković*, Ph.D., Faculty of Agronomy, Čačak - Serbia.

- Prof. *Nedeljko Tica*, Ph.D., Dean of the Faculty of Agriculture, Novi Sad - Serbia.
- Prof. *Dušan Živković*, Ph.D., Dean of the Faculty of Agriculture, Belgrade - Serbia.
- Prof. *Ivan Filipović*, Ph.D., Dean of the Faculty of Agriculture, Kruševac - Serbia.
- Prof. *Žaklina Stojanović*, Ph.D., Dean of the Faculty of Economics, Belgrade - Serbia.
- Prof. *Milena Jakšić*, Ph.D., Dean of the Faculty of Economics, Kragujevac - Serbia.
- Prof. *Nebojša Gvozdrenović*, Ph.D., Dean of the Faculty of Economics, Subotica - Serbia.
- Prof. *Drago Cvijanović*, Ph.D., Dean of the Faculty of Hotel Management and Tourism, University of Kragujevac, Vrnjačka Banja - Serbia.
- Prof. *Aleksandar Andrejević*, Ph.D., Rector of the University „EDUCONS“, Novi Sad - Serbia.
- Prof. *Gorica Cvijanović*, Ph.D., Dean of the Faculty for Bio-farming, Megatrend University, Bačka Topola - Serbia.
- Prof. *Tatjana Brankov*, Ph.D., President of Serbian Association of Agricultural Economists, Belgrade - Serbia.
- Prof. *Dragan Soleša*, Ph.D., Rector of the University Business Academy, Novi Sad - Serbia.
- Prof. *Maja Ćuk*, Ph.D., Rector of the University ”Alfa BK”, Belgrade - Serbia.
- Prof. *Goranka Knežević*, Ph.D., Rector of the University “Singidunum”, Belgrade - Serbia.
- Prof. *Nebojša Zakić*, Ph.D., Rector of the University „Union - Nikola Tesla“, Belgrade - Serbia.
- Prof. *Tomislav Brzaković*, Ph.D., Dean of the Faculty of Applied Management, Economics and Finance, Belgrade - Serbia.
- Prof. *Marko Carić*, Ph.D., Dean, Faculty of Economics and Engineering Management, University Business Academy, Novi Sad - Serbia.
- Prof. *Milija Zečević*, Ph.D., Rector, European University, Belgrade - Serbia.
- Prof. *Nikola Milićević*, Ph.D., Faculty of Economics, Subotica - Serbia.
- Prof. *Nikola Tomašević*, Ph.D., Director, Institute Mihajlo Pupin, Belgrade - Serbia.
- *Jovan Zubović*, Ph.D., Director, Institute of Economic Sciences, Belgrade - Serbia.
- *Rade Jovanović*, Ph.D., Director, Institute for Appliance of Science in Agriculture, Belgrade - Serbia.
- *Miodrag Tolimir*, Ph.D., Director, Maize Institute “Zemun Polje”, Belgrade - Serbia.
- *Mirjana Mihailović*, Ph.D., Director of Institute for Biological Research “Siniša Stanković”, Belgrade - Serbia
- *Ljubinko Rakonjac*, Ph.D., Director, Institute of Forestry, Belgrade - Serbia.
- Prof. *Jegor Miladinović*, Ph.D., Director, Institute of Field and Vegetable Crops, Novi Sad - Serbia.
- *Darko Jevremović*, Ph.D., Director, Fruit Research Institute, Čačak - Serbia.
- Prof. *Nenad Đurić*, Ph.D., Director, Institute for Vegetable Crops, Smederevska Palanka - Serbia.
- *Nenad Trkulja*, Ph.D., Director, Institute for Plant and Environmental Protection, Belgrade - Serbia.
- Prof. *Đorđe Mihailović*, Ph.D., Academy of Vocational Studies in Šumadija, Aranđelovac - Serbia.
- *Igor Saveljić*, Ph.D., Director, Institute of Information Technologies, Kragujevac - Serbia.
- *Mira Milinković*, Ph.D., Director, Institute for Soil, Belgrade - Serbia.
- *Dejan Sokolović*, Ph.D., Acting Director, Institute for Forage Crops, Kruševac - Serbia.
- *Milan Beslač*, Ph.D., Serbia, Faculty of Business Economics and Entrepreneurship, Belgrade - Serbia.
- Prof. *Jelena Damjanović*, Ph.D., Director, Novi Sad Business School, Novi Sad - Serbia.
- Prof. *Gojko Rikalović*, Ph.D., President, Association of the Economists of Belgrade, Belgrade - Serbia.

- Prof. *Mihailo Ostojić*, Ph.D., President, Council of Development Academy of Serbian Agriculture (RAPS), Belgrade - Serbia.
- Prof. *Radovan Pejanović*, Ph.D., Honorary President of Balkan Scientific Association of Agricultural Economist, Belgrade - Serbia.
- Prof. *Goran Maksimović*, Ph.D., President of Balkan Scientific Association of Agricultural Economist, Belgrade - Serbia.
- *Aleksandar Bogunović*, Secretary of the Association for Plant Production and Food Industry - Chamber of Commerce and Industry of Serbia, Belgrade - Serbia.
- *Miodrag Veseli*, Council for Smart Agriculture - Chamber of Commerce and Industry of Belgrade, Belgrade - Serbia.
- *Željko Ilić*, Director, Agricultural-Chemical High School in Obrenovac, Belgrade - Serbia.
- *Nikola Mihailović*, President, Cooperative Union of Serbia, Belgrade - Serbia.
- *Jelena Nestorov Bizanj*, President of the Cooperative Union of Vojvodina, Novi Sad - Serbia.
- *Mariana Golumbeanu*, Ph.D., Vice president of the Balkan Environmental Association (B.EN.A.), Thessaloniki - Greece.
- Prof. *Klaus Wagner*, Ph.D., Director of the Federal Institute of Agricultural Economics, Rural and Mountain Research, Vienna - Austria.
- Prof. *Luminita Chivu*, Ph.D., Director, National Institute for Economic Research “Costin C. Kiritescu”, Romanian Academy, Bucharest - Romania.
- Prof. *Gabriel Popescu*, Ph.D., Director of the Center for Study and Research for Agroforestry Biodiversity (CSCBAS), Bucharest - Romania.
- Prof. *Mirela Stoian*, Ph.D., Dean, Faculty of Agro-Food and Environmental Economics, Bucharest University of Economic Studies, Bucharest - Romania.
- Prof. *Ioan Brad*, PhD, Dean, Faculty of Management and Rural Tourism, University of Life Sciences “King Mihai I”, Timisoara - Romania.
- Prof. *Nicoleta Mateoc Sirb*, Ph.D., Director, Research Centre for Sustainable Rural Development of Romania, Romanian Academy, Timisoara - Romania.
- Prof. *Andrei Jean Vasile*, Ph.D., President of the Research Network on Resources Economics and Bioeconomy (RebResNet), Ploiesti - Romania.
- Prof. *Razvan Papuc*, Ph.D., Dean, Faculty of Administration and Business, University of Bucharest, Bucharest - Romania.
- Prof. *Sorin Mihai Cimpeanu*, Ph.D., Rector, University of Agronomic Sciences and Veterinary Medicine of Bucharest (USAMV), Bucharest - Romania.
- *Cecilia Alexandri*, Ph.D., Director, Institute of Agricultural Economics, Bucharest - Romania.
- Prof. *Božidar Ivanov*, Ph.D., Director, Institute of Agricultural Economics, Sofia - Bulgaria.
- *Vili Dragomir*, Ph.D., Director, Institute for Agriculture Economics and Rural Development (ICEADR), Bucharest - Romania.
- Prof. *Agatha Popescu*, Ph.D., University of Agricultural Sciences and Veterinary Medicine of Bucharest, Bucharest - Romania.
- Prof. *Ljiljana Tomić*, Ph.D., Founder of the University of Bijeljina, Bijeljina - Bosnia and Herzegovina.
- Prof. *Boro Krstić*, Ph.D., Dean, Faculty of Agriculture, University of Bijeljina, Bijeljina - Bosnia and Herzegovina.
- Prof. *Mihai Dinu*, Ph.D, Director, AGRIDATA, Bucharest – Romania

SCIENTIFIC BOARD

- Prof. *Jonel Subić*, Ph.D., Serbia - President
- Prof. *Wim Heijman*, Ph.D., the Netherlands
- Prof. *Adam Wasilewski*, Ph.D., Poland
- Prof. *Adrian Stancu*, Ph.D., Romania
- Prof. *Agnieszka Wrzochalska*, Ph.D., Poland
- Prof. *Albena Miteva*, Ph.D., Bulgaria
- Prof. *Aleksandar Ostojić*, Ph.D., Bosnia and Herzegovina
- Prof. *Aleksandra Despotović*, Ph.D., Montenegro
- Prof. *Alexandru Stratan*, Ph.D., Moldova
- Prof. *Andras Nabradi*, Ph.D., Hungary
- Prof. *Andreica Marin*, Ph.D., Romania
- Prof. *Anna Ivolga*, Ph.D., Russia
- Prof. *Blagica Sekovska*, Ph.D., Macedonia
- Prof. *Boro Krstić*, Ph.D., Bosnia and Herzegovina
- Prof. *Carmen Dobrota*, Ph.D., Romania
- Prof. *Catalin Dobrea*, Ph.D., Romania
- Prof. *Claudiu Cicea*, Ph.D., Romania
- Prof. *Cosmin Salasan*, Ph.D., Romania
- Prof. *Dan Boboc*, Ph.D., Romania
- Prof. *Donatella Privitera*, Ph.D., Italy
- Prof. *Dorel Dusmanescu*, Ph.D., Romania
- Prof. *Eirik Romstad*, Ph.D., Norway
- Prof. *Ferhat Čejvanović*, Ph.D., Bosnia and Herzegovina
- Prof. *Florentina Constantin*, Ph.D., Romania
- Prof. *Francisco J. Matus*, Ph.D., Chile
- Prof. *Gabriel Popescu*, Ph.D., Romania
- Prof. *Giuseppe Castaldelli*, Ph.D., Italy
- Prof. *Irina Gostin*, Ph.D., Romania
- Prof. *Irina Petrescu*, Ph.D., Romania
- Prof. *Ivo Grgić*, Ph.D., Croatia
- Prof. *Jean Vasile Andrei*, Ph.D., Romania
- Prof. *Jorde Jakimovski*, Ph.D., Macedonia
- Prof. *Julia Doitchinova*, Ph.D., Bulgaria
- Prof. *Karoly Bodnar*, Ph.D., Hungary
- Prof. *Maja Kožar*, Ph.D., Slovenia
- Prof. *Marco Platania*, Ph.D., Italy
- Prof. *Margaret Loseby*, Ph.D., Italy
- Prof. *Marian Podstawka*, Ph.D., Poland
- Prof. *Mariana Eftimie*, Ph.D., Romania
- Prof. *Marina Leshcheva*, Ph.D., Russia
- Prof. *Matteo Vituari*, Ph.D., Italy
- Prof. *Micol Mastrocicco*, Ph.D., Italy
- Prof. *Mirela Matei*, Ph.D., Romania
- Prof. *Mirela Stoian*, Ph.D., Romania
- Prof. *Natalia Bannikova*, Ph.D., Russia
- Prof. *Novak Jauković*, Ph.D., Montenegro
- Prof. *Raluca Ignat*, Ph.D., Romania
- Prof. *Raluca Ion*, Ph.D., Romania
- Prof. *Raluca Ladaru*, Ph.D., Romania
- Prof. *Richard Simmons*, Ph.D., Scotland
- Prof. *Roxana Patarlageanu*, Ph.D. Romania
- Prof. *Vasilii Erokhin*, Ph.D., Russia
- Prof. *Vesna Gantner*, Ph.D., Croatia
- Prof. *Zvonimir Stienner*, Ph.D., Croatia
- Prof. *Željko Vaško*, Ph.D., Bosnia and Herzegovina
- Doc. *Adis Puška*, Ph.D., Bosnia and Herzegovina
- *Barbara Wieliczko*, Ph.D., Poland
- *Bogdan Bazga*, Ph.D., Romania
- *Dori Pavloska*, Ph.D., Macedonia
- *Ion Certan*, Ph.D., Moldova
- *Klaus Dieter Wagner*, Ph.D., Austria
- *Marek Wigier*, Ph.D., Poland
- *Marius Voicilas*, Ph.D., Romania
- *Monica Tudor*, Ph.D., Romania
- *Pawel Chmielinski*, Ph.D., Poland
- *Vaclav Vilhelm*, Ph.D., Czech Republic
- *Zbigniew Floriańczyk*, Ph.D., Poland
- Prof. *Aleksandra Vujko*, Ph.D., Serbia
- Prof. *Andreja Andrejević*, Ph.D., Serbia
- Prof. *Bojan Dimitrijević*, Ph.D., Serbia
- Prof. *Boris Kuzman*, Ph.D., Serbia
- Prof. *Branislav Vlahović*, Ph.D., Serbia
- Prof. *Danijela Despotović*, Ph.D., Serbia

- Prof. *Dejan Janković*, Ph.D., Serbia
- Prof. *Dejan Molnar*, Ph.D., Serbia
- Prof. *Dejan Sekulić*, Ph.D., Serbia
- Prof. *Dragan Milić*, Ph.D., Serbia
- Prof. *Dragan Nedeljković*, Ph.D., Serbia
- Prof. *Dragana Latković*, Ph.D., Serbia
- Prof. *Gordana Dozet*, Ph.D., Serbia
- Prof. *Gordana Mrdak*, Ph.D., Serbia
- Prof. *Igor Tomašević*, Ph.D., Serbia
- Prof. *Ilija Brčeski*, Ph.D., Serbia
- Prof. *Irena Janković*, Ph.D., Serbia
- Prof. *Ivan Bošnjak*, Ph.D., Serbia
- Prof. *Ivana Domazet*, Ph.D., Serbia
- Prof. *Jasmina Mijajlović*, Ph.D., Serbia
- Prof. *Jugoslav Aničić*, Ph.D. Serbia
- Prof. *Lela Ristić*, Ph.D., Serbia
- Prof. *Leposava Zečević*, Ph.D., Serbia
- Prof. *Ljubinko Jovanović*, Ph.D., Serbia
- Prof. *Marija Kostić*, Ph.D., Serbia
- Prof. *Marija Lakićević*, Ph.D., Serbia
- Prof. *Marija Mandarić*, Ph.D., Serbia
- Prof. *Marija Nikolić*, Ph.D., Serbia
- Prof. *Marija Lazarević*, Ph.D., Serbia
- Prof. *Mića Mladenović*, Ph.D., Serbia
- Prof. *Mihailo Manić*, Ph.D., Serbia
- Prof. *Mihajlo Ratknić*, Ph.D., Serbia
- Prof. *Milena Rikalović*, Ph.D., Serbia
- Prof. *Milica Bošković*, Ph.D., Serbia
- Prof. *Milivoj Ćosić*, Ph.D., Serbia
- Prof. *Miljan Leković*, Ph.D., Serbia
- Prof. *Miljana Barjaktarović*, Ph.D., Serbia
- Prof. *Miodrag Brzaković*, Ph.D., Serbia
- Prof. *Natalija Bogdanov*, Ph.D., Serbia
- Prof. *Nemanja Berber*, Ph.D., Serbia
- Prof. *Nenad Stanišić*, Ph.D., Serbia
- Prof. *Nikola Milićević*, Ph.D., Serbia
- Prof. *Olgica Zečević Stanojević*, Ph.D., Serbia
- Prof. *Rade Popović*, Ph.D., Serbia
- Prof. *Radivoj Prodanović* Ph.D. Serbia
- Prof. *Sanja Mrazovac Kurilić*, Serbia
- Prof. *Sanjin Ivanović*, Ph.D., Serbia
- Prof. *Sladjan Rašić*, Ph.D., Serbia
- Prof. *Sladana Vujčić*, Ph.D., Serbia
- Prof. *Sonja Josipović*, Ph.D., Serbia
- Prof. *Sreten Jelić*, Ph.D., Serbia
- Prof. *Stanislav Zekić*, Ph.D., Serbia
- Prof. *Tamara Paunović*, Ph.D., Serbia
- Prof. *Tanja Stanišić*, Ph.D., Serbia
- Prof. *Tatjana Dimitrijević*, Ph.D., Serbia
- Prof. *Tatjana Jovanić*, Ph.D., Serbia
- Prof. *Todor Marković*, Ph.D., Serbia
- Prof. *Veljko Vukoje*, Ph.D., Serbia
- Prof. *Vera Mirović*, Ph.D., Serbia.
- Prof. *Vesna Rodić*, Ph.D., Serbia
- Prof. *Vladan Pavlović*, Ph.D., Serbia
- Prof. *Vlade Zarić*, Ph.D., Serbia
- Prof. *Vladimir Zakić*, Ph.D., Serbia
- Prof. *Vladislav Zekić*, Ph.D., Serbia
- Prof. *Zoran Njegovan*, PhD., Serbia
- Prof. *Zoran Rajić*, Ph.D., Serbia
- Prof. *Zorica Sredojević*, Ph.D., Serbia
- Prof. *Željko Dolijanović*, Ph.D., Serbia
- Prof. *Vera Rajičić*, Ph.D., Serbia.
- Doc. *Dragan Terzić*, Ph.D., Serbia
- Doc. *Gordana Radović*, Ph.D., Serbia
- Doc. *Marija Lukić*, Ph.D., Serbia
- Doc. *Maja Grgić*, Ph.D., Croatia
- Doc. *Mirela Tomaš*, PhD., Serbia
- Doc. *Miroslav Nedeljković*, PhD., Serbia
- Doc. *Violeta Babić*, Ph.D., Serbia
- Doc. *Vladan Cogoljević*, Ph.D., Serbia
- *Aleksandar Laposavić*, PhD., Serbia
- *Aleksandar Lučić*, Ph.D., Serbia
- *Aleksandra Ivetić*, Ph.D., Serbia
- *Ana Marjanović Jeromela*, Ph.D., Serbia
- *Aneta Buntić*, Ph.D., Serbia
- *Anton Puškarić*, Ph.D., Serbia
- *Biljana Grujić Vučkovski*, Ph.D., Serbia
- *Branko Mihailović*, Ph.D., Serbia
- *Danica Mićanović*, Ph.D., Serbia
- *Dejan Živkov*, Ph.D., Serbia
- *Đivna Simić*, Ph.D., Serbia

- *Gordana Radović*, Ph.D., Serbia
- *Isidora Beraha*, Ph.D., Serbia
- *Isidora Ljumović*, Ph.D., Serbia
- *Jelena Maksimović*, Ph. D., Serbia
- *Katica Radosavljević*, Ph.D., Serbia
- *Lana Nastić*, Ph.D., Serbia
- *Ljiljana Rajnović*, Ph.D., Serbia
- *Marijana Jovanović Todorović*, Ph.D., Serbia
- *Marko Jeločnik*, Ph.D., Serbia
- *Mihajlo Ratknić*, Ph.D., Serbia
- *Milena Simić*, Ph.D., Serbia
- *Mirjana Despotović*, Ph.D., Serbia
- *Nataša Kljajić*, Ph.D., Serbia
- *Nataša Papić Blagojević*, Ph.D., Serbia
- *Olivera Jovanović*, Ph.D., Serbia
- *Predrag Vuković*, Ph.D., Serbia
- *Radmila Jovanović*, Ph.D., Serbia
- *Ratibor Štrbanović*, Ph.D., Serbia
- *Robert Radišić*, Ph.D., Serbia
- *Sanja Đurović*, Ph.D., Serbia
- *Sanja Popović Pantić*, Ph.D, Serbia
- *Sladjan Stanković*, Ph.D., Serbia
- *Slavica Arsić*, Ph.D., Serbia
- *Slavica Čolić*, Ph.D., Serbia
- *Slavica Stevanović*, Ph.D., Serbia
- *Slobodan Cvetković*, Ph.D., Serbia
- *Sonja Đuričin*, PhD., Serbia
- *Vedran Tomić*, Ph.D., Serbia
- *Vera Popović*, Ph.D., Serbia
- *Vesna Paraušić*, Ph.D., Serbia
- *Vesna Popović*, Ph.D., Serbia
- *Violeta Anđelković*, Ph.D., Serbia
- *Vladan Ugrenović*, Ph.D., Serbia
- *Vladeta Stevović*, Ph.D., Serbia
- *Vladimir Filipović*, Ph.D., Serbia
- *Vladimir Miladinović*, Ph.D., Serbia
- *Vlado Kovačević*, Ph.D., Serbia
- *Zoran Simonović*, Ph.D., Serbia
- *Željko Despotović*, Ph.D., Serbia

ORGANIZATIONAL BOARD

- *Marijana Jovanović Todorović*, Ph.D. - President
- *Doc. Miroslav Nedeljković*, Ph.D. - Vice President
- *Prof. Jonel Subić*, Ph.D.
- *Anton Puškarić*, Ph.D.
- *Biljana Grujić Vučkovski*, Ph.D.
- *Boban Zarić*
- *Bojana Bekić Šarić*, Ph.Ds.
- *Gordana Radović*, Ph.D.
- *Irina Marina*, PhDs.
- *Ivana Vučetić*
- *Lana Nastić*, Ph.D.
- *Ljiljana Rajnović*, Ph.D.
- *Marko Jeločnik*, Ph.D.
- *Milena Marinković*
- *Nada Mijajlović*, M.A.
- *Nataša Kljajić*, Ph.D.
- *Predrag Vuković*, Ph.D.
- *Prof. Boris Kuzman*, Ph.D.
- *Prof. Branko Mihailović*, Ph.D.
- *Prof. Dragan Nedeljković*, Ph.D.
- *Prof. Leposava Zečević*, Ph.D.,
- *Prof. Olgica Zečević Stanojević*, Ph.D.
- *Prof. Zoran Simonović*, Ph.D.
- *Slavica Arsić*, Ph.D.
- *Velibor Potrebić*, Ph.Ds.
- *Vesna Paraušić*, Ph.D.
- *Vesna Popović*, Ph.D.
- *Vesna Stajčić*

CONTENT

PLENARY SECTION

1. *Andrei Jean Vasile, Luminita Chivu, Mile Vasić, Madalina Ionescu* - **INVESTIGATING SOME POSSIBLE IMPACTS OF ENERGY USE ON AGRICULTURAL SECTOR DEVELOPMENT**. 1
2. *Vasilii Erokhin, Gao Tianming* - **REVEALING COMPARATIVE ADVANTAGES IN THE CHINA-SERBIA AGRICULTURAL TRADE** 13
3. *Vesna Gantner, Boro Krstić, Ranko Gantner, Zvonimir Steiner, Vera Popović* - **DOES CATTLE PRODUCTION AFFECT GLOBAL WARMING?**. 27
4. *Jelena Nestorov Bizonj* - **AGRICULTURAL COOPERATIVES IN THE FUNCTION OF IMPROVEMENT OF MARKET POSITION OF FARMERS IN VOJVODINA** 39
5. *Marijana Joksimović* - **THE INFLUENCE OF FOREIGN DIRECT INVESTMENTS ON THE IMPROVEMENT OF AGRIBUSINESS** 49
6. *Nenad Trkulja, Anja Milosavljević* - **MULTI-RESISTANCE OF CERCOSPORA BETICOLA TO MBC, DMI AND QoI FUNGICIDES AND IMPACT ON MANAGAMENT** 59
7. *Radivoj Prodanović, Dragan Ivanišević* - **ADDING VALUE IN SHEEP FARMING THROUGH THE DEVELOPMENT OF ALTERNATIVE PRODUCTS** 73
8. *Sanjin Ivanović, Saša Todorović* - **NEW APPROACHES TO INVESTMENT DECISIONS ON AGRICULTURAL HOLDINGS** 87
9. *Snežana Cico, Ljiljana Rajnović* - **SOCIALLY RESPONSIBLE STATE BUSINESS AND AGRICULTURAL LAND RESTITUTION PROCEDURE** 97

10. *Sonja Đuričin* - **IMPACT OF RESEARCH AND DEVELOPMENT INVESTMENT ON MEDIUM-SIZED AGRICULTURAL ENTERPRISES' BUSINESS SUCCESS IN SERBIA 107**
11. *Vedran Tomić, Robert Radišić* - **ECONOMIC ASPECTS OF MILK PRODUCTION AND COTTAGE CHEESE AS A TRADITIONAL DAIRY PRODUCT ON FAMILY FARMS IN SERBIA 119**

WORKING SECTION

1. *Aleksandar Miljatović, Veljko Vukoje, Veljko Šarac* - **THE ECONOMIC CHARACTERISTICS OF AGRICULTURAL HOLDINGS IN THE REPUBLIC OF SERBIA 135**
2. *Bianca Florentina Nistoroiu, Ștefan Laurentiu Prahoveanu* - **SUSTAINABLE FAMILY FARMING IN THE EUROPEAN UNION 145**
3. *Gheorghe Dan Isbasoiu, Dana Volosevici* - **NON-STANDARD FORMS OF EMPLOYMENT IN THE ROMANIAN AGRICULTURE 161**
4. *Jovana Dedić, Radovan Pejanović, Jelica Eremić Dođić* - **TAX ASPECT OF THE ACCOUNTING OF PERENNIAL PLANTINGS 171**
5. *Marko Jeločnik, Lana Nastić, Božo Ilić* - **INVESTMENT IN CREATING THE VALUE ADDED IN LIVESTOCK PRODUCTION 181**
6. *Miroslav Nedeljković, Milorad Đokić, Velibor Potrebić* - **SELECTION OF SUSTAINABLE SUPPLIERS IN AGRICULTURAL ENTERPRISES 195**
7. *Silviu Beciu, Georgiana Armenița Arghiroiu, Maria Bobeică Colpoș* - **STUDY ABOUT EVOLUTION OF THE ROMANIAN OIL SEED MARKET AND ROMANIAN PLACE IN THE INTERNATIONAL TRADE WITH OILSEED 207**

| | | |
|-----|---|-----|
| 8. | <i>Steliana Mocanu, Ionut Laurentiu Petre, Marilena E. Potârniche Berheci</i> - ANALYSIS OF CEREAL FOREIGN TRADE IN EUROPEAN UNION | 215 |
| 9. | <i>Vesna Paraušić, Bojana Bekić Šarić, Jasna Babić</i> - THE GLOBAL G.A.P. CERTIFICATION SCHEME IN SERBIAN AGRICULTURE: CONSULTANTS' ATTITUDES | 231 |
| 10. | <i>Violeta Sima, Ileana Georgiana Gheorghe</i> - AN OVERVIEW OF THE EUROPEAN UNION WINE SECTOR DYNAMICS: AN EMPIRICAL ANALYSIS FROM THE ROMANIAN PERSPECTIVE. | 241 |
| 11. | <i>Vlado Kovacević</i> - ANALYSIS OF AGRICULTURAL POLICY DEVELOPMENTS IN SERBIA | 255 |
| 12. | <i>Zoran Simonović, Biljana Ilić</i> - COMPLEX BUSINESS SYSTEM MANAGEMENT IN AN AGRO-INDUSTRIAL COMPLEX | 265 |
| 13. | <i>Angel Sarov, Ekaterina Tzvetanova</i> - ECONOMIC EFFECTIVENESS OF APPLICATION OF BIOSTIMULATORS IN SPRING OATS | 275 |
| 14. | <i>Georgi Georgiev</i> - STUDY OF THE INFLUENCE OF FOLIAR HUMAT ROST FERTILIZER ON GROWTH IN OILY SUNFLOWER. | 287 |
| 15. | <i>Irina Marina, Biljana Grujić Vučkovski, Marijana Jovanović Todorović</i> - IMPACT OF INTENSIVE AGRICULTURAL PRODUCTION ON THE ENVIRONMENT | 301 |
| 16. | <i>Marina Đorović, Radojica Rakić, Jela Ikanović, Vera Popović, Zdravka Petković, Dragana Popović, Nikola Rakašćan</i> - SPANISH CANE PRODUCTION IN THE FUNCTION OF CIRCULAR ECONOMY AND RENEWABLE ENERGY SOURCES. | 313 |
| 17. | <i>Nataša Kljajić, Jonel Subić, Predrag Vuković</i> - NATURAL CHARACTERISTICS AS A BASE FOR THE SUSTAINABLE AGRICULTURAL PRODUCTION – THE MUNICIPALITY OF TEMERIN EXAMPLE | 325 |

18. *Ranko Gantner, Igor DelVechio, Zvonimir Steiner, Bishal K. Sitaula, Krešimir Bošnjak, Vesna Gantner* - **MAIZE GRAIN YIELD IN ANIMAL-POWERED FARMING AS AFFECTED BY SOIL FERTILIZATION VARIANT: RESULTS FROM THE 2023 SEASON IN NORTH-EAST CROATIA.** 341
19. *Slavica Arsić, Ivan Bošnjak, Anton Puškarić* – **THE PRODUCTS OBTAINED FROM MILK PROCESSING WITH SPECIAL REFERENCE TO WHEY PRODUCTION IN CHEESE PRODUCTION** 353
20. *Tatjana Dimitrijević, Mihailo Ratknić, Miroljub Aksić, Gordana Šekularac, Vojkan Dimitrijević* - **EVALUATING OF ECOSYSTEM SERVICES: CARBON STORAGE IN THE FOREST ECOSYSTEMS OF BELGRADE** 361
21. *Vera Popović, Marijana Jovanović Todorović, Vesna Gantner, Vera Rajičić, Vladimir Filipović, Dragan Dokić, Gordana Dozet* - **THE CURRENT STATE OF ORGANIC PRODUCTION IN US AND THE WORLD** 371
22. *Vesna Gantner, Vera Popović, Zvonimir Steiner, Ranko Gantner, Klemen Potočnik* - **THE DIFFERENCES IN SUBCLINICAL MASTITIS PREVALENCE AND EFFECT ON MILK PRODUCTION DUE TO COWS' BREED AND BREEDING REGION** 383
23. *Zoranka Malešević, Đorđe Ilić, Mirjana Jovović* - **POSSIBILITY OF BIOLOGICAL RECLAMATION OF DEGRADED SOIL IN THE DUMPS OF THE PLJEVLJA MINE** 393
24. *Zvonimir Steiner, Ivan Babić, Vesna Gantner, Ranko Gantner* - **EFFECT OF MILK REPLACEMENT ON GROWTH, NUTRITION COEFFICIENT AND OTHER RELEVANT PARAMETERS IN DAIRY CALVES** 403
25. *Gorica Cvijanović, Vojin Cvijanović, Bajagić Marija, Nenad Đurić, Milivoje Čosić* - **INFLUENCE OF EFFECTIVE MICROORGANISMS ON BIOACTIVE SUBSTANCES IN DIFFERENT PLANT SPECIES** 413

| | |
|--|-----|
| 26. <i>Aleksandra Vujko, Radmila Bojović, Miroslav Knežević</i> - RURAL TOURISM IN THE FUNCTION OF SERBIAN AND EU TOURISM DEVELOPMENT | 423 |
| 27. <i>Aliyu Mansur Sulaiman, Mustapha Umar, Jimoh Abdulrauf Kayode, Raftu Olalekan Yusuf, Miroslav P. Popović</i> - SOCIOECONOMIC EFFECTS OF CATTLE RUSTLING ON THE LIVELIHOOD OF INHABITANTS OF SOME SELECTED RURAL COMMUNITIES IN NORTHERN NIGERIA | 433 |
| 28. <i>Andreea Roxana Firăţoiu, Liviu Mărcuţă, Elena Soare, Irina Adriana Chiurciu</i> - THE CONTRIBUTION OF TOURISM TO THE DEVELOPMENT OF THE RURAL AREA IN ILFOV COUNTY: CASE STUDY FOR BUFTEA AREA | 441 |
| 29. <i>Daniela Nicoleta Voicila, Diana Maria Ilie</i> - BIBLIOMETRIC ANALYSIS - QUALITY OF LIFE IN RURAL AREA | 453 |
| 30. <i>Gordana Radović, Radovan Pejanović, Zorica Vasiljević</i> - FINANCING THE DEVELOPMENT OF RURAL TOURISM IN SERBIA FROM THE IPARD II PROGRAM | 467 |
| 31. <i>Lela Ristić, Petar Veselinović, Danijela Despotović</i> – GLOBAL TRENDS AND OUTLOOKS IN AGRICULTURAL DEVELOPMENT AND FOOD SECURITY | 473 |
| 32. <i>Marija Inđin</i> - CHALLENGES OF GREEN TRANSITION IN RURAL AREAS | 483 |
| 33. <i>Marija Popović, Sreten Jelić</i> - SOCIO-DEMOGRAPHIC CHARACTERISTICS OF SERBIAN HOUSEHOLDS AND SUSTAINABLE DEVELOPMENT | 491 |
| 34. <i>Radmila Jovanović, Claudete Oliveira Moreira, Debajit Datta</i> - OBSERVING CHANGES OF SETTLEMENT SIZE IN VITICULTURAL ZONES OF SERBIA USING VIIRS NIGHTTIME LIGHT DATA | 501 |
| 35. <i>Sara Stanić Jovanović, Dragana Vuković, Nevena Miletović</i> - DEVELOPMENT OF SPECIAL FORMS OF TOURISM WITH THE AIM TO REVITALIZE THE RURAL AREA OF PLJEVLJA MUNICIPALITY | 511 |

| | |
|--|------------|
| 36. <i>Snežana Milićević, Nataša Đorđević, Marija Mandarić</i> - RURAL TOURISM: EMPOWERING RURAL DEVELOPMENT . . . | 523 |
| 37. <i>Sonja Josipović, Milena Rikalović, Dejan Molnar</i> - OPPORTUNITIES AND CHALLENGES FOR RURAL AREA TRANSITION TO GREEN GROWTH | 533 |
| 38. <i>Sara Stanić Jovanović, Marica Milošević, Dragana Vuković</i> - THE IMPORTANCE OF QUALITY IN THE DEVELOPMENT OF RURAL TOURISM IN ARANDJELOVAC | 547 |
| 39. <i>Branko Mihailović, Vesna Popović, Katica Radosavljević</i> - OPTIMIZING AGRICULTURAL SUSTAINABILITY THROUGH INDOOR SMART GARDENS | 557 |
| 40. <i>Mirjana Dejanović, Sanja Popović-Pantić, Ana Kovačević</i> - THE SIGNIFICANCE OF DIGITAL TRANSFORMATION IN AGRICULTURE FOR SUSTAINABLE DEVELOPMENT. . . | 569 |
| 41. <i>Nedeljko Prdić, Boris Kuzman, Sara Kostić</i> - DIGITALIZATION OF THE SALE OF AGRICULTURAL PRODUCTS AS A CHALLENGE TO THE CRISIS | 585 |
| 42. <i>Olgica Zečević Stanojević, Dragan Nedeljković, Leposava Zečević, Boris Stanojević</i> - SIGNIFICANCE OF INNOVATIONS AND APPLICATION OF INFORMATION - COMMUNICATION TECHNOLOGIES IN AGRICULTURE AND RURAL DEVELOPMENT OF SERBIA | 593 |
| 43. <i>Sladjan Stanković, Vedran Tomić, Cosmin Salasan</i> - PERSPECTIVES OF DIGITAL TOOLS IN THE AGRICULTURAL ADVISORY WORK | 607 |
| 44. <i>Tina Bobić, Maja Gregić, Pero Mijić, Vesna Gantner</i> - INFORMATION AND COMMUNICATION TECHNOLOGYS IN CATTLE LAMENESS DETECTION . | 615 |
| 45. <i>Vladimir Pejanović, Boris Stanojević, Gordana Radović</i> - NEW TECHNOLOGIES IN AGRICULTURE AND SMART VILLAGES | 627 |
| 46. <i>Alina Florentina Gheorghe, Mihaela Ivanov</i> - DIGITIZED AGRICULTURE. CASE STUDY ON CROP360 AGRICOVER | 637 |

THE CURRENT STATE OF ORGANIC PRODUCTION IN US AND THE WORLD

Vera Popović¹, Marijana Jovanović Todorović², Vesna Gantner³,
Vera Rajičić⁴, Vladimir Filipović⁵, Dragan Dokić⁶, Gordana Dozet⁷

Abstract

Stability and quality of agricultural production can be ensured by sustainable resource management. Health-safe products, economic benefit, preserving the environment and health can be achieved by organic production. Organic production in the World, Serbia, Montenegro, Croatia, Bosnia and Herzegovina, Slovenia and North Macedonia was analyzed in this research. Agricultural land covers 76 mill. ha which is 1.6% of world land. It is noted a growth trend of the organic agricultural area in 2021 by 1.7% according data collected from 191 countries. The largest organic agricultural land areas are in Oceania (36 mill. ha or 47%) and Europe (17.8 mill. ha - 23%) followed by Latin America (9.9 mill. ha - 13%), Asia (6.5 mill. ha, 8.5 percent), Northern America (3.5 mill. ha - 4.6%) and Africa (2.7 mill. ha - 3.5%). A trend of area growth in 2021 compared to 2020 was noted Serbia, Croatia, Slovenia, B&H and North Macedonia. The largest increase had North Macedonia (7794 ha, 109.1%), then B&H (2495 ha, 47.5%), Serbia (23527 ha, 21.8%) and Croatia (121924 ha, 12.3%). Great export opportunity of Serbia is in that it has excellent conditions for the growth of organic production, because of its excellent geographical position and good quality land.

Key words: *Organic production, trend of growth, health-safe products.*

-
- 1 Vera Popović, Ph.D., Full Professor, Principal Research Fellow; Institute of Field and Vegetable Crops, Novi Sad, Serbia. E-mail: vera.popovic@ifvcns.ns.ac.rs
 - 2 Marijana Jovanović Todorović, Ph.D., Research Associate, Institute of Agricultural Economics Belgrade, Serbia. E-mail: marijana_j@iep.bg.ac.rs
 - 3 Vesna Gantner, Ph.D., Full Professor, University of Osijek, Faculty of Agrobiotechnical Sciences Osijek, Vladimira Preloga 1, Osijek, Croatia. E-mail: vgantner@fazos.hr
 - 4 Vera Rajičić, Ph.D., Full Professor, Principal Research Fellow University of Niš, Faculty of Agriculture, Kruševac, Serbia. E-mail: verarajic74@gmail.com
 - 5 Vladimir Filipović, Ph.D., Senior Research Associate, Institute for Medicinal Plants Research "Dr Josif Pancic", Belgrade, Serbia. E-mail: vfilipovic@mocbilja.rs
 - 6 Dragan Dokić, Ph.D., Erdut Municipality, Bana Josipa Jelačića 4, Dalj, Croatia. E-mail: dragan.dokic79@gmail.com
 - 7 Gordana Dozet, Ph.D., Associate Professor, Research Associate, Megatrend University, Faculty of Biofarming, Belgrade, Serbia. E-mail: dozet.gordana@open.telekom.rs

Introduction

Conservation of soil and water, protection of plant, animal, and human health, biodiversity, and agro-biodiversity can be made easy by growth of organic farming. It, with the application of ecological principles, emphasizes the control, quality, and safety of the product. Popovic et al. (2012) states that, for customers to obtain a high-quality, controlled product, organic production is required. Maintaining and improving of soil fertility in the long run can be achieved by organic farming. A production system - crop rotation harmonized with proper soil cultivation, fertilization based on soil fertility level (organic and other permitted fertilizers), and other cultural practices (Bavec & Bavec, 2006) maintain soil fertility. Using of biological fertilizers (derived largely from animal and plant wastes and nitrogen-fixing cover crops) in organic farming makes it a sustainable agricultural system. Products made on organic way have lower yields (for 5- 25%) and a slightly larger price for consumers. Soil well-provided with organic matter and possessing good structure and water-air properties is the main for organic farming to be successful and, in connection with that, main point of organic production is soil tillage. In the development of integrated systems very important are Field-rotation and crop- rotation. Weed control measures which are: proper treatment of crop residues and by-products of primary agricultural production; crop rotation; intercropping; companion cropping; exploitation of allelopathic relations etc. are important for organic production. Malesevic et al. (2008), Popovic et al. (2012) recommend that for weed control, disease, and pest control, it has to use plants that contain natural chemical toxins or possess allelopathic properties should be used in. Conventional agriculture, by use of chemical pesticides and synthetic fertilizers made the environmental damage, but organic farming could be the solution to it because it uses fewer pesticides, reduces soil erosion, decreases nitrate leaching into groundwater and surface water, and recycles animal wastes back into the farm (Popovic et al., 2019; 2022; Buric et al., 2023).

In 191 countries, on more than 76 million hectares of agricultural land cultivated by at least 3.7 million farmers, organic production is practiced. A growth trend of global sales of organic food and drink recorded and, in 2021, it reached almost 125 billion euro. Organic agriculture, farmland and sales of organic product, worldwide, according to the latest FiBL survey, reached another all-time high in 2021. This study aimed to determine the agricultural state production in our country and the world.

Materials and Methods

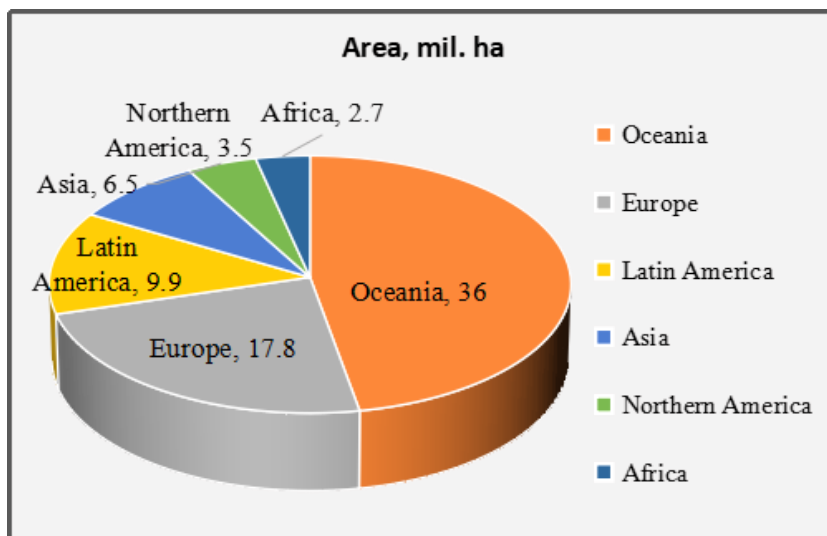
Organic production in Serbia, Montenegro, Croatia, Bosnia and Herzegovina, Slovenia and North Macedonia was analyzed in this research (FiBL, 2023; Willer et al., 2023) and possibilities for improving organic production were indicated. The survey results were processed descriptively and shown in tables and graphics.

Results and Discussion

World production of agricultural organic products

In 2021 (FiBL, 2023), in the world, more than 76.4 million hectares was belonged to organic farmland which was 1.6 percent of the total farmland and represented increasing of 1.7 percent compared to 2020. The largest organic agricultural land has Oceania (36.0 mill. ha or 47%), then Europe (17.8 mill. ha or 23%), Latin America (9.9 mil. ha or 13%), followed by Asia (6.5 mil. ha or 8.5%), Northern America (3.5 mil. ha or 4.6%), and Africa (2.7 mil. ha or 3.5%). Oceania (9.7%) and in Europe (3.6%; European Union: 9.6 %) are regions that have higher organic shares of the total agricultural land. The biggest organic agricultural land by area among countries have Australia (35.7 mil. ha), Argentina (4.1 mil. ha), and France (2.8 mil. ha), Picture 1.

Picture 1. Organic agricultural land in 2021 in million ha, by regions.



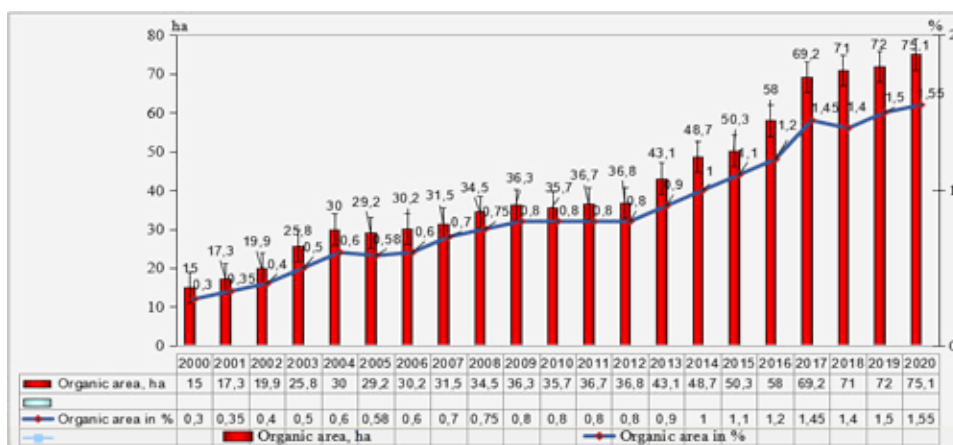
Rising of area of organic land was noted in Africa, Asia, Europe, and Oceania in 2021. (Table 1, Figures 1 and 2) while in North- and Latin- America it decreased.

Table 1. The World organic agricultural land in 2021 and the share of regions in it

| Region | Organic agricultural land, ha | Shares of the total agricultural land, % | Shares | Increased |
|------------------|-------------------------------|--|--|-----------|
| | | | of global organic agricultural land, % | |
| Oceania | 35985809 | 9.7 | 47.1 | +23.0 |
| Europe | 17844853 | 3.6 | 23.4 | +4.4 |
| Latin America | 9870887 | 1.4 | 12.9 | -1.55 |
| Asia | 6504211 | 0.4 | 8.5 | +5.8 |
| Northern America | 3542140 | 0.8 | 4.6 | -1.35 |
| Africa | 2663983 | 0.2 | 3.5 | +17.3 |
| World* | 76403777 | 1.6 | 100 | +1.7 |

Source: FiBL survey 2023. Note: Agricultural land includes in-conversion areas and excludes wild collection, aquaculture, forest, and non-agricultural grazing areas.

Picture 2. World’s agricultural land for organic production (2000-2020). Area and share

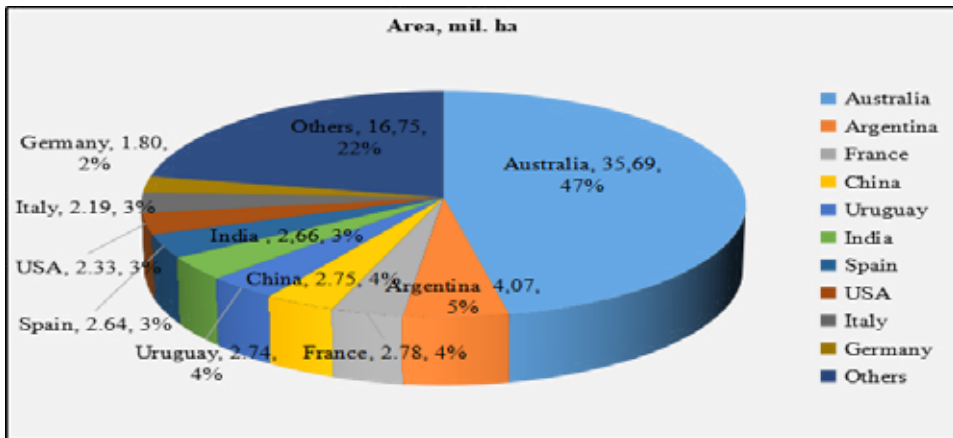


Source: FiBL-IFOAM-SOEL surveys 2001-2023

The biggest of a growth trend were in China (320000 ha or 13.1%), France (228000 ha or 8.9 %), and Spain (198000 ha or 8.1%), some countries decreases was recorded (in Argentina, 0.38 mil. ha less). The highest organic share has Liechtenstein (40.2%), Samoa (29.1 %), and Austria (26.5 %). Demand for organic products of consumers all around is showing a growing trend because COVID-19 has raised consumer interest in health. Country with the most organic agricultural land

was Australia (35.69 mil. ha) followed by Argentina (4.07 mil. ha), (2.78 mil. ha), China (2.75 mil. ha), Uruguay (2.74 mil. ha), India (2.66 mil. ha), Spain (2.64 mil. ha), USA (2.33 mil. ha), Italy (2.19 mil. ha), Germany (1.80 mil. ha), (Picture 3). Almost 80% of the world's organic agricultural land is in ten countries - total of 59.6 million hectares.

Picture 3. 10 countries with the largest areas of organic land in 2021 (mil. ha).



In 2021, there were 3,699 million of organic producers worldwide and, compared to the year before, their number increased by 4.9 %. More than 91% of them were in Asia (48.6 %), Africa (30.6 %), and Europe (12 %). The absolute highest numbers are in India 1.6 million farmers, then Uganda (400,000) and Ethiopia (218,000) (Table 2). The number of producers (in 2021) increased in Africa, Oceania, Europe, North and Latin America, while in Asia slightly decrease (Table 2).

Table 2. World: The producers number changes by region

| Region | 2020, no. | 2021, no. | 1 year growth, no. | 1 year growth, % | 10 years growth, no. | 10 years growth, % |
|------------------|-----------|-----------|--------------------|------------------|----------------------|--------------------|
| Africa | 968'233 | 1'123'255 | 155'022 | 16.0% | 595'342 | 112.8% |
| Asia | 1'811'209 | 1'782'134 | -29'075 | -1.6% | 1'171'012 | 191.6% |
| Europe | 417'987 | 442'274 | 24'287 | 5.8% | 152'646 | 52.7% |
| Latin America | 262'115 | 280'436 | 18'321 | 7.0% | -27'111 | -8.8% |
| Northern America | 22'448 | 23'392 | 944 | 4.2% | 6'794 | 40.9% |
| Oceania | 15'930 | 18'479 | 2'549 | 16.0% | 4'293 | 30.3% |
| World | 3'496'898 | 3'669'201 | 172'303 | 4.9% | 1'902'412 | 107.7% |

Source: FiBL survey 2023.

Total of organic products retail sales in 2021

The World sales of organic food and drink, in 2021, according to the FiBL survey, it reached almost 125 billion euro which is 3 % higher than in 2020. Leading markets in 2021 were the United States (48.6 billion euro), Germany (15.9 billion euro), France (12.7 billion euro) and China (11.3 billion euro). The largest single market was the United States, followed by the European Union (46.7 billion euro) and China. By region, Europe had the lead (54.5 billion euro), followed by North America (53.9 billion euro) and Asia (13.7 billion euro). Estonia registered the biggest percentage market growth (21 %). Denmark with 13% had highest shares of organic market of the total market, then Austria (11.6 %), Luxembourg (11 %), and Switzerland (10.9 %), (The World of Organic Agriculture, 2023). Speaking of the countries of the former Yugoslavia, the largest area and share in organic production in 2021 was Croatia (121924 ha; 8.1%), followed by Slovenia (52078 ha; 10.8%), Serbia (23527 ha; 0.7%), North Macedonia (7794 ha; 0.6%), Montenegro (4404 ha; 0.57%), Bosnia & Herzegovina (2495 ha; 0.14%), (Table 3).

The most of former Yugoslav republic of (Serbia, Croatia, Slovenia, B&H, and North Macedonia) recorded a trend of area growth in 2021 compared to 2020. The largest area increases recorded Macedonia (7794 ha), of 109.1%, then B&H (2495 ha, 47.5%), Serbia (23527 ha, 21.8%), Croatia (121924 ha, 12.3%). Slovenia recorded stagnation (52078 ha), while Montenegro recorded a decrease in surface area in 2021 (4404 ha) compared to 2020 (4823 ha), by 418.8 ha ie. 8.7%.

Table 3. Organic agricultural land by ex-Yugoslavia countries , 2020-2021,

| Country/ Territory | Organic agricul- tu. land 2020, ha | Organic agricult. land 2021, ha | 1 year growth, ha | 1 year growth, % | 10 years growth, ha | 10 years growth % | Share in word, % |
|-------------------------|---|--|-------------------------|------------------------|---------------------------|-------------------------|---------------------|
| Slovenia | 52078 | 52078 | 0.0 | 0.0 | 16977.0 | 48.4 | 10.8 |
| Croatia | 108610 | 121924 | 13314.0 | 12.3 | 90020.5 | 282.2 | 8.1 |
| Serbia | 19317 | 23527 | 4210.4 | 21.8 | 17187.3 | 271.1 | 0.7 |
| North Macedo- nia | 3727 | 7794 | 4067.0 | 109.1 | -4937.2 | -38.8 | 0.6 |
| Montene- gro | 4823 | 4404 | -418.8 | -8.7 | 1335.9 | 43.5 | 0.57 |
| Bosnia & Herzeg. | 1692 | 2495 | 803.3 | 47.5 | 2152.5 | 627.8 | 0.14 |

Source: statistics.fibl.org, FiBL survey 2023

The largest number of organic production producers, processors and importers in 2021 had Croatia (6024; 378; 12), then Slovenia (3685; 139; 28), Serbia (458; 152; 74), North Macedonia (887; 17; 8), Montenegro (422; 25), while smallest Bosnia & Herzegovina (90; 51), (Table 4).

Table 4. Organic producers, processors, importers and exporters of ex-Yugoslavia countries in 2021

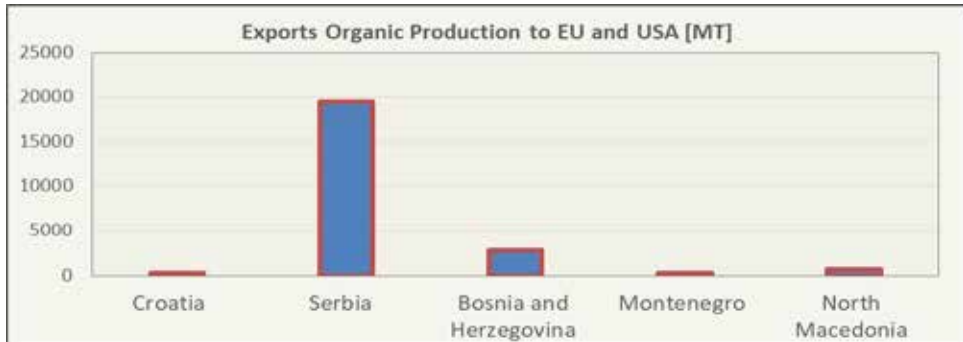
| Country/Territory | Producers ¹ | Processors | Importers | Exporters |
|---------------------|------------------------|------------|-----------|-----------|
| Slovenia | 3685 | 139 | 28 | 0 |
| Croatia | 6024 | 378 | 12 | - |
| Serbia | 458 | 152 | 74 | 82 |
| North Macedonia | 887 | 17 | 8 | 1 |
| Montenegro | 422 | 25 | - | 0 |
| Bosnia& Herzegovina | 90 | 51 | - | 20 |

The organic products largest exporter to the EU and USA in 2021 was Serbia (199468 MT), then Bosnia and Herzegovina (2788 MT), North Macedonia (662 MT), Croatia (27 MT), and Montenegro (17 MT), while Slovenia did not export organic products or did not submit export data (Table 5, Picture 4).

Table 5. Ex-Yugoslavia countries exports of organic products to the EU and USA in 2021

| Country/Territory | Exports to EU [MT] | Exports to USA [MT] | Exports to EU and USA [MT] |
|------------------------|--------------------|---------------------|----------------------------|
| Croatia | | 27 | 27 |
| Serbia | 19373 | 95 | 19468 |
| Bosnia and Herzegovina | 2762 | 26 | 2788 |
| Montenegro | 17 | | 17 |
| North Macedonia | 654 | 8 | 662 |

Picture 4. Export of organic products to the EU and USA from ex Yu countries, 2021



Important Methods of Organic Farming

Governments defined organic agriculture. Farmers must be certified for their producing and products, to become labeled “organic”. In the European Union (EU), organic standards ban the use of genetically engineered plants or products, synthetic pesticides, fertilizers, ionizing radiation, sewage sludge. Organic certification and inspection in the EU (according to EU standards), are carried out by approved organic control bodies. The National Organic Standards of the Department of Agriculture defined organic farming, and many accredited organic certifiers are across the country.

Agriculture, organic production and the environment have been closely linked in the past years. Organic farming employs a variety of methods to cultivate crops and raise animals in a sustainable and eco-friendly manner. Each method is designed to work in harmony with nature and minimize the use of synthetic inputs: crop Rotation, composting, green manure cover crops, mulching, biological pest control, integrated pest management, natural weed control, non-GMO seeds - non-genetically modified seeds to maintain biodiversity and preserve traditional crop varieties, animal husbandry practices, and water conservation, Picture 4.

Picture 4. Important Methods of Organic



Farming <https://geopard.tech/blog/why-is-organic-farming-better-for-the-environment/>

These methods of organic farming prioritize environmental sustainability, soil health, and natural resource conservation. By adopting these practices, organic farmers contribute to healthier ecosystems, reduced environmental impact, and the production of nutritious and safe food (Bavec & Bavec, 2006; Malesevic et al., 2012; Ikanović & Popović, 2020; Zejak et al., 2012; Popović et al., 2012; 2019; 2022; Burić et al., 2023).

Organic farming holds the key to a sustainable future. Its myriad benefits, from preserving soil health and conserving water to providing healthier and safer food options, highlight its importance. By choosing organic products, consumers can support farmers, protect the environment, and contribute to a more resilient and balanced ecosystem.

Health, Ecology, Fairness, and Care are principles of organic agriculture which is answer to industrialization paradigm.

These principles and their interactions make a positive impact on economic, environmental, social, cultural, and health contexts. Popović et al. (2022), Burić et al., (2023) said that enhances of the immune system, reduces the presence of pesticides, boosts cardiovascular protection, prevents cancer and premature aging represent only a few of benefit of organic food.

Conclusion

Just 1.6% of the world's agricultural land is farmed organically. Oceania has the largest organic agricultural land areas (36 mill. ha or 47%), then Europe (17.8 mill. ha, 23%), Latin America (9.9 mill. ha, 13%), Asia (6.5 mill. ha, 8.5 percent), Northern America (3.5 mill. ha, 4.6%) and Africa (2.7 mill. ha, 3.5%). 80 percent of the total world's organic agricultural land (59.6 million hectares) are in the next ten countries: Australia, 35.69 mill. ha, Argentina, 4.07 mill. ha, France, 2.78 mill. ha, China, 2.75 mill. ha, Uruguay, 2.74 mill. ha, India, 2.66 mill. ha, Spain, 2.64 mil. ha, USA, 2.33 mil. ha, Italy, 2.19 mil. ha, Germany, 1.8 mil. ha.

In 2021. there were 20 countries with 10% or more of all agricultural land under organic management which is more compared with 2020 (18 countries). Countries with the largest share of organic land were Liechtenstein (40.2 %), Samoa (29.1 %), Austria (26.5%), Sao Tome and Principe (21.1 %) and Sweden (20.2 %).

An increase in the area of organic agricultural land experienced in 86 countries, while 37 countries reported decrease. Many countries kept up or initiated support activities for organic agriculture, including new action plans or policies aiming to foster growth.

A trend of area growth in 2021 compared to 2020 was recorded in Serbia, Croatia, Slovenia, B&H, and North Macedonia. The largest increase recorded Macedonia (7794 ha), of 109.1%, then B&H (2495 ha, 47.5%), Serbia (23527 ha, 21.8%), Croatia (121924 ha, 12.3%). Slovenia had a stagnation of surface area (52078 ha) was recorded, while Montenegro decreases in surface area in 2021 (4404 ha) compared to 2020 (4823 ha), by 418.8 ha i.e., 8.7%. Serbia's great export opportunity is excellent conditions for the growth of organic production thanks to our excellent geographical position and good quality land.

The challenge for future organic agriculture will be increase area and yields, maintain of environmental benefits, and while meeting the challenges of climate change and an increasing number of world's population.

Acknowledgments

This research was supported by the Ministry of Science, Technological Development and Innovation of the Republic of Serbia, grant numbers: 451-03-47/2023-01/200032, 200009, 2000383, 200003, and 200006.

Literature

1. Bavec F, Bavec M. (2006): Organic production and USE of Alternative Crops. Taylor and Francis Group. Boca Raton, New York, Abingdon. 2006.
2. Ikanović J., Popović V. (2020). Organic plant production. Bijeljina, 1-250.
3. Malešević, M., Jacimović G., Babić M., Latković D. (2008): Management of crop production. Iz. Lazić B., Babović J. (2008): Organic farming. I, Institut za ratarstvo i povrtarstvo, Novi Sad, 155-158.
4. Popović V., Burić M., Gantner V., Janković S., Dokić D., Filipović V., Ikanović J., Bojović R. (2022). State and the importance of organic plant production to human health. "Sustainable agriculture and rural development-III". 15-16.12.2022. Belgrade. pp.54-56.
5. Popović V., Jovović Z., Mirecki N., Lakić Ž. (2019). The trend of organic production. Collection of papers. In the line. Filipović, Ugrenović. Organic production and biodiversity. Biodiversity Open Days, Pančevo, ISBN 978-86-88997-16-4, p. 3-32.
6. Popović V., Sikora V., Glamoclija Đ., Cervenski J., Vasić M., Gvozdanović Varga J., Maksimović L. (2012): Effect of soil conditioner on yield and quality of organic soybean. Third International Scientific Symposium "Agrosym Jahorina 2012" 10.7251/AGSY1203435P UDK 546.62:631.445.1, p. 435 - 440.
7. Willer H., Schlatter B., Trávníček J. (2023): The World of Organic Agriculture Statistics and Emerging Trends 2023. Research Institute of Organic Agriculture FiBL IFOAM–Organics International. P. 1-357. <https://www.fibl.org/fileadmin/documents/shop/1254-organic-world-2023.pdf>
8. Zejak D., Popović V., Spalević V., Popović D., Radojević V., Sezai Erçisli, Glišić I. (2022). State and Economical Benefit of Organic Production: Fields Crops and Fruits in the World and Montenegro. Notulae Botanicae Horti Agrobotanici Cluj-Napoca. 50, 3, 12815 DOI: 10.15835/nbha50312815

CIP - Каталогизација у публикацији

Народна библиотека Србије, Београд

631:502.121.1(082)

005.591.6:631(082)

338.432(082)

INTERNATIONAL scientific conference Sustainable agriculture and rural development (4 ; 2023 ; Beograd)

Proceedings / IV international scientific conference Sustainable agriculture and rural development, [December 14-15th, 2023.] ; [organizers] Institute of Agricultural Economics ... [et al.] ; [editors Jonel Subić ... [et al.]]. - Belgrade : Institute of Agricultural Economics, 2024 (Novi Sad : NS Mala knjiga +). - XVII, 643 str. ; 24 cm

Tiraž 200. - Str. XVII: Preface / editors. - Bibliografija uz svaki rad.

ISBN 978-86-6269-134-7

1. Subić, Jonel, 1964- [уредник]

а) Пољопривреда -- Научно-технолошки развој -- Зборници б) Пољопривреда -- Економски аспект -- Зборници в) Пољопривреда -- Одрживи развој -- Зборници г) Пољопривредна производња -- Зборници д) Рурални развој -- Зборници

COBISS.SR-ID 137427721

