

**XXIV INTERNATIONAL  
ECO-CONFERENCE® 2020  
23–25<sup>th</sup> SEPTEMBER**

# **XI SAFE FOOD**



**PROCEEDINGS**

**NOVI SAD, SERBIA**

**XXIV INTERNATIONAL ECO-CONFERENCE**

**XI SAFE FOOD**

23–25<sup>th</sup> SEPTEMBER 2020.

NOVI SAD, SERBIA

**XXIV INTERNATIONAL ECO-CONFERENCE**  
**XI SAFE FOOD**  
23–25<sup>th</sup> SEPTEMBER 2020.  
NOVI SAD, SERBIA

*Publisher*

ECOLOGICAL MOVEMENT OF NOVI SAD  
21000 Novi Sad, Vojvođanskih brigada 17  
Phone: (+381 21) 6372 940  
Mob: (+381 69) 304 73 38  
E-mail: ekopokretns@gmail.com  
www.ekopokret.org.rs

*Editorial Board*

Academician Kastori Rudolf, President  
Nikola Aleksić  
Prof. dr Desanka Božidarević  
Prof. dr Radmila Šovljanski  
Prof. dr Velibor Spalević  
Prof. dr Vladan Joldžić  
Dr Vera Popović

*Project Editor*

Nikola Aleksić

*Copy Editor*

Vesna Karajović

*Layout and Formatting*

Vesna Karajović

*For the Publisher*

Nikola Aleksić

*Print*

Red Copy, Novi Sad

*Cirkulation*

100 copies

Publication year: 2020-09-20  
THE AUTHORS ARE RESPONSIBLE FOR THE  
QUALITY OF ENGLISH TRANSLATIONS

**XXIV INTERNATIONAL ECO-CONFERENCE**  
**XI SAFE FOOD**  
23–25<sup>th</sup> SEPTEMBER 2020.  
NOVI SAD, SERBIA

**SAFE FOOD**

PROCEEDINGS  
2020.

***Organizer:***

- Ecological Movement of Novi Sad

***Co-organizers:***

- University of Novi Sad
- Russian State Agrarian University–MTAA, Moscow, Russian Federation
- International Independent Ecological–Politicalology University in Moscow, Russian Federation
- Institute for Field and Vegetable Crops Novi Sad, Novi Sad, Serbia
- Pasteur Institute of Novi Sad,
- Scientific Veterinary Institute "Novi Sad" Serbia
- Legambiente, d' Itali (National environmental Organisation)

***Patronage:***

- Matica srpska, Novi Sad

***Host:***

- Institute for Nature Conservation of Vojvodina Province, Novi Sad

***Honorary Committee:***

***President:***

- **Prof. Dr Dragan Stanić**, President of Matica srpska, Serbia

***Vice-Presidents:***

- **Prof. Dr Dejan Jakšić**, Rector of the University of Novi Sad, Serbia
- **Prof. Dr Vladimir M. Bautin**, Rector at Russian State Agrarian University-MTAA
- **Prof. Dr. Stanislav A. Stepanov**, Rector of the International Independent Ecological-Politicalology University in Moscow, Russian Federation
- **Dr. Svetlana Balešević Tubić**, Director of the Institute for Field and Vegetable Crops Novi Sad, Serbia
- **Prof Dr Predrag Vraneš**, Director of the Pasteur Institute of Novi Sad, Serbia
- **Prof. Dr. Sava Lazić**, Director Scientific Veterinary Institute "Novi Sad", Serbia
- **Vittorio Cogliati Dezza**, President of Legambiente d' Italy
- **Dr. Marina Tomić**, Director of the Institute for Nature Protection of Vojvodina Province, Serbia

### *Scientific Committee:*

#### *President:*

- **Academician Rudolf Kastori**, Academy of Science and Art of Vojvodina, Novi Sad, Serbia and Hungarian Academy of Sciences, Budapest, Hungary, Russian Academy of Natural Sciences

#### *Vice-Presidents:*

- **Prof. Dr. Stevan Stankovski**, Vice-Chancellor for science at the University of Novi Sad, Serbia
- **Prof. Dr Evgenij Ivanovich Koshkin**, Vice-Chancellor for International Cooperation at the Russian State Agrarian University – MTAA, Moscow, Russian Federation
- **Prof. Dr. Marfenin N.N.**, Russian Federation, Vice-Chancellor of the International Independent Ecological- Politicology University in Moscow, Russian Federation
- **Dr. Dušan Lalošević**, Assistant Director for Science at the Pasteur Institute of Novi Sad, Serbia
- **Dr. Ana Marjanović Jeromela**, Assistant Director for Science at the Institute for Field and Vegetable Crops in Novi Sad, Serbia
- **Dr Tamaš Petrović**, Assistant Director for Science at the Scientific Veterinary Institute "Novi Sad", Serbia
- **Stefano Ciafani**, Vice-Presidente of Legambiente d' Italy

#### *Secretary:*

- **Ljubica Aleksić**, Organizer of the Ecological Movement of Novi Sad, Serbia

#### *Members:*

- **Academician Srbislav Denčić**, Institute for Field and Vegetable Srops, Novi Sad, Serbia
- **Academician Vaskrsija Janjić**, University of Belgrade, Resident Professor at the Agricultural Faculty, Serbia
- **Academician Branka Lazić**, University of Novi Sad, Resident Professor at Agricultural Faculty, Serbia
- **Academician Vukadin Leovac**, University of Novi Sad Faculty of Mathematics and Natural Sciences, Serbia
- **Prof. Dr. Ištvan Bikit**, University of Novi Sad Faculty of Mathematics and Natural Sciences, Serbia
- **Prof. Dr. Desanka Božidarević**, University of Novi Sad, Resident Professor at Agricultural Faculty, Serbia
- **Prof. Dr. Miodrag Dimitrijević**, University of Novi Sad, Resident Professor at Agricultural Faculty, Serbia
- **Prof. Dr. Ivana Đujić**, University of Belgrade, Resident Professor at Food Chemistry and Biological Faculty, Serbia

- **Prof. Dr. Éva Erdélyi**, Budapest Business School, University of Applied Sciences, Hungary
- **Prof. Dr. Vladan Joldžić**, Institute for Criminological and Sociological Research, University of Belgrade, Resident Professor at the Biological and Chemical Faculty, Serbia
- **Prof. Dr. Marjan Jošt**, JOST Seed-Research, Križevci, Croatia
- **Prof. Dr. Gabriele Jovtchev**, Institute of Biodiversity and Ecosystem Research, Bulgaria
- **Prof. Dr. Nila Kapor Stanulović**, University of Novi Sad, Resident Professor at the faculty of Philosophy, Serbia,
- **Prof. Dr. Ivana Maksimović**, University of Novi Sad, Resident Professor at Agricultural Faculty, Serbia
- **Prof. Dr. Dragutin Mihailović**, University of Novi Sad, Resident Professor at Agricultural Faculty, Serbia
- **Prof. Dr. Elizabeta Miskoska Milevska**, University "Saints Cyril and Methodius", Faculty of Agricultural of Skopje, North Republic of Macedonia
- **Prof. Dr. Marina Putnik Delić**, University of Novi Sad, Faculty of Agriculture, Serbia
- **Prof. Dr. Atila Salvai**, University of Novi Sad, Resident Professor at the Agricultural Faculty,
- **Prof. Dr. Velibor Spalević**, University of Montenegro, Research associate at the Biotechnical Faculty of Podgorica, Montenegro
- **Prof. Dr. Ivan Šimunić**, University of Zagreb, RESIDENT Professor at the Agricultural Faculty, Croatia
- **Prof. Dr. Radmila Šovljanski**, University of Novi Sad, Resident Professor at the Agricultural Faculty, Serbia
- **Prof. Dr. Ion C. Ungureanu**, Professor at the University of Agricultural Sciences and Veterinary Medicine, Buckarest, Romania
- **Prof. Dr. Victor Veniamovič Zakrevskiĭ**, North-Western State Medical University named after I.I.Mechnikov, Resident Professor, Sanct-Petersburg, Russian Federation
- **Prof. Dr. Lu Zhongmei**, Resident Professor at the Wu Han Law University, China
- **Dr. Vera Popović**, Institute of Field and Vegetable Crops Novi Sad, Serbia
- **Dr. Jela Ikanović**, University of Belgrade, Faculty of Agriculture, Zemun, Serbia
- **Dr. Ksenija Mačkić**, University of Novi Sad, Faculty of Agriculture, Zemun, Serbia
- **Dr. Maja Ignjatov**, Institute of Field and Vegetable Crops Novi Sad, Serbia.

***Organizing Committee:***

***President:***

- **Nikola Aleksić**, Director of the Ecological Movement of Novi Sad, Serbia

***Vice-president:***

- **Angelo Mancone**, Co-ordinator Legambiente Veneto, Rovigo, Italy

***Secretary:***

- **Zoran Kovačević**, Organizer of the Ecological Movement of Novi Sad, Serbia

***Members:***

- **Prof. Dr. Mihailo Peruničić**, University of Novi Sad, Faculty of Agriculture, Serbia
- **Prof. Dr. Milan Stanulović**, University of Novi Sad, Resident Professor at the Medical Faculty, Serbia
- **Prof. Dr. Dragoslav Stoiljković**, University of Novi Sad, Faculty of Technology, Serbia
- **Doc. Dr. Jasna Grabić**, University of Novi Sad, Faculty of Agriculture, Serbia
- **Dr. Stevan Domazet**, Institute of Field and Crops Vegetable of Novi Sad, Serbia
- **Dr. Željko Mihaljev**, Scientific Veterinary Institute "Novi Sad", Serbia
- **Dr. Bratimir Nešić**, Translator and Lector of the Ecological Movement of Novi Sad, Serbia
- **Dr. Djordje Okanović**, Institute for Food Technology of Novi Sad (FINS), Serbia
- **Dr. Vera Popović**, Institute of Field and Vegetable Crops, Novi Sad, Serbia
- **Dr. Vera Rajičić**, University of Nis, Faculty of Agriculture, Krusevac, Serbia
- **Dr. Verica Simin**, Pasteur Institute of Novi Sad, Serbia
- **Luka Vujasinović**, Organizer of the Ecological Movement of Novi Sad, Serbia
- **Milan Vurdelja**, Rector's Office, University of Novi Sad, Serbia

***Official host of the XX International Eco-Conference® 2018***

- **Institute for Nature Conservation of Vojvodina Province in Novi Sad**





## THE ECOLOGICAL MOVEMENT OF THE CITY OF NOVI SAD: AN IMPORTANT DECISION OF ITS PROGRAMME COUNCIL

Since 1995, the Ecological Movement of the City of Novi Sad organizes "Eco-Conference® on Environmental Protection of Urban and Suburban Areas", with international participation. Seven biennial conferences have been held so far (in 1995, 1997, 1999, 2001, 2003, 2005, 2007, 2009, 2011, 2013 and 2015.). Their programs included the following environmental topics:

- Session 1: Environmental spheres: a) air, b) water, c) soil, d) biosphere
- Session 2: Technical and technological aspects of environmental protection
- Session 3: Sociological, health, cultural, educational and recreational aspects of environmental protection
- Session 4: Economic aspects of environmental protection
- Session 5: Legal aspects of environmental protection
- Session 6: Ecological system projecting (informatics and computer applications in the field of integrated protection)
- Session 7: Sustainable development of urban and suburban settlements-ecological aspects.

Conference participants have commended the scientific and organizational levels of the conferences. Conference evaluations have indicated that some aspects are missing in the conference program. In addition, since a team of conference organizers was completed, each even year between the conferences started to be viewed as an unnecessary lag in activity.

### ***Eco-Conference® on Safe Food***

With the above deliberations in mind, a decision was made that the Ecological Movement of the City of Novi Sad should embark on another project – the organization of Eco-Conferences® on Safe Food. These Conferences were planned to take place in each even year. Preparations for the first Eco-Conferences® on safe food started after the successful completion of the Eco-Conference® '99.

So far four Eco-Conferences® have been held (in 2000, 2002, 2004, 2006, 2008, 2010, 2012 and 2014.) focusing this general theme.

### ***Theme of the Eco-Conference®***

By organizing the Eco-Conference® on Safe Food, the organizer wishes to cover all factors that affect the quality of human living. Exchange of opinions and practical experiences should help in identifying and resolving the various problems associated with the production of safe food.

Since 2007 Eco-Conference gained patronship from UNESCO and became purely scientific Conference.

### ***Objectives of the Eco-Conference®***

- To acquaint participants with current problems in the production of safe food.
- To make realistic assessments of the causes of ecological imbalance in the conventional agricultural production and the impact of various pollution sources on the current agricultural production.
- Based on an exchange of opinions and available research data, to make long-term strategic programs of developing an industrialized, controlled, integral, alternative and sustainable agriculture capable of supplying sufficient quantities of quality food, free of negative side effects on human health and the environment.

### ***Basic Topics of the Eco-Conference®***

Basic topics should cover all relevant aspects of the production of safe food.

When defining the basic topics, the intention was itemize the segments of the production of safe food as well as the related factors that may affect or that already have already been identified as detrimental for food safety and quality. The topics include ecological factors of safe food production, correct choice of seed (genetic) material, status and preparation of soil as the basic substrate for the production of food and feed, use of fertilizers and pesticides in integrated plant protection, use of biologicals, food processing technology, economic aspects, marketing and packaging of safe food.

To paraphrase, the envisaged topics cover the production of safe food on the whole, individual aspects of the production and their mutual relations, and impact on food quality and safety.

### ***Sessions of the Eco-Conference®***

1. Climate and production of safe food.
2. Soil and water as the basis of agricultural production.
3. Genetics, genetic resources, breeding and genetic engineering in the function of producing safe food.
4. Fertilizers and fertilization practice in the function of producing safe food.
5. Integrated pest management and use of biologicals.

6. Agricultural production in view of sustainable development
7. Production of field and vegetable crops.
8. Production of fruits and grapes.
9. Livestock husbandry from the aspect of safe food production.
10. Processing of agricultural products in the framework of safe food production.
11. Economic aspects and marketing as segments of the production of safe food.
12. Food storage, transportation and packaging.
13. Nutritional food value and quality nutrition.
14. Legal aspects of protecting brand names of safe food.
15. Ecological models and software in production of safe food.

Attempts will be made to make the above conference program permanent. In this way will the conference become recognizable in form, topics and quality, which should help it find its place among similar conferences on organized elsewhere in the world.

By alternately organizing conferences on environmental protection of urban and suburban areas in odd years and conferences on safe food in even years, the Ecological Movement of the City of Novi Sad is completing its contribution to a higher quality of living of the population. Already in the 19th century, Novi Sad was a regional center of social progress and broad-mindedness. Today, owing first of all to its being a university center, Novi Sad is in the vanguard of ecological thought in this part of Europe.

It is our duty to work on the furtherance of the ecological programs of action and, by doing so, to make our contribution to the protection of the natural environment and spiritual heritage with the ultimate goal of helping the population attain a higher level of consciousness and a higher quality of living.

Director of the Ecological  
Movement of Novi Sad  
**Nikola Aleksic**



## CONTENT

THE ECOLOGICAL MOVEMENT OF NOVI SAD: AN IMPORTANT DECISION OF ITS PROGRAMME COUNCIL.....	9
FOREWORD .....	21

### INTRODUCTORY PRESENTATION

*Željko Mihaljev*

RADIONUCLIDES IN THE ENVIRONMENT AND THEIR IMPACT ON FOOD SAFETY AND HUMAN HEALTH.....	25
---	----

*Sofija Nikolić Popadić*

USE OF PESTICIDES IN AGRICULTURAL PRODUCTION IN THE EUROPEAN UNION – LEGAL ASPECTS.....	41
--	----

*Tijana Pribičević, Tomka Miljanović, Vera Županec*

NUTRITION AND FOOD SAFETY TOPICS IN PREVIOUS AND CURRENT BIOLOGY SYLLABI IN PRIMARY SCHOOLS IN THE REPUBLIC OF SERBIA .....	49
---	----

### CLIMATE AND SAFE FOOD PRODUCTION

*G. Jovtchev, S. Gateva, Ts. Angelova, K. Katrandzhiev, N. Nikolova,  
D. Dimitrov, Ch. Angelov*

IMPACT OF UV RADIATION ON THE DNA OF PLANTS AT DIFFERENT ALTITUDES IN RILA MOUNTAIN, BULGARIA – A THREE YEARS STUDY .....	59
---	----

### SOIL AND WATER AS THE BASIS OF AGRICULTURAL PRODUCTION

*Zora Lujić, Stanko Milić, Snežana Jakšić, Jordana Ninkov, Dragan Milić,  
Jovica Vasin, Milorad Živanov*

SOIL FERTILITY CONTROL OF STATE OWNED AGRICULTURAL LAND IN VOJVODINA PROVINCE .....	71
--	----

<i>Ana Tasić MSc, Vladan Ugrenović PhD, Stojan Jevremović PhD</i> COMPOSTING OF MUNICIPAL ORGANIC WASTE FOR THE PURPOSE OF SUSTAINABLE FOOD PRODUCTION.....	79
<i>M. Sc. Dusan Stevanovic, M. Sc. Bratimir Nestic, M. Sc. Predrag Umicevic, B. Sc. Nenad Nestic, B. Sc. student Luka Nestic, M. Sc. Nemanja Petrovic, M. Sc. Natalija Tosic, B. Sc. Dusan Milincic, B. Sc. Aleksandar Aleksic</i> POTENTIALS OF COMPOST BASED PRODUCTS FOR ORGANIC AGRICULTURE .....	87
<i>M. Sc. Predrag Umičević, Ph. D. Nenad Zivkovic, M. Sc. Bratimir Nestic, B. Sc. Nenad Nestic, B. Sc. student Luka Nešić, B. Sc. student Nikola Kostic</i> COMPOST AS A PRIMARY BASIS FOR SAFE FOOD PRODUCTION.....	93
<i>B. Sc. Aleksandar Aleksic, M. Sc. Bratimir Nestic, M. Sc. Predrag Umicevic, B. Sc. Nenad Nešić, B. Sc. student Luka Nešić, M. Sc. Nemanja Petrovic, M. Sc. Natalija Tosic, B. Sc. Dusan Milincic, M. Sc. Dusan Stevanovic</i> POTENTIALS OF COMPOST FOR ORGANIC AGRICULTURE.....	101
<i>B. Sc. Student Nikola Kostic, M. Sc. Bratimir Nestic, M. Sc. Predrag Umičević, B. Sc. Nenad Nestic, B. Sc. Student Luka Nestic</i> COMPOST QUALITY ANALYSIS FOR APPLICATION IN ORGANIC AGRICULTURE AND SAFE FOOD PRODUCTION.....	109
<i>Jovan Dimishkovski, Dragica Stojiljković, Biserka Dimishkovska, Isidora Rajic</i> GROUNDWATER QUALITY IN THE IRRIGATION SYSTEMS OF BACKA REGION.....	115
<i>Assoc. Prof. Dr. sc. Lenche Velkoska-Markovska, Prof. Dr. sc. Biljana Petanovska-Ilievska</i> HPLC METHOD FOR DETERMINATION OF SOME PESTICIDE RESIDUES IN WATER SAMPLES .....	123
<i>Prof. dr Jasna Grabić, Msc Radoš Zemunac, Msc Senka Bubulj, Mcs Bojana Dabić</i> IMPORTANCE OF WATER FOR SAFE FOOD PRODUCTION AND PUBLIC HEALTH PROTECTION UNDER COVID-19 PANDEMIC .....	133
<i>Lazić G., Samojlović M., Lupulović D., Petrović T., Lazić S.</i> ENTERIC VIRUSES IN SURFACE WATER IN VOJVODINA AS A RISK FOR HEALTHY FOOD PRODUCTION .....	141
 <b>GENETICS, GENETIC RESOURCES, BREEDING AND GENETIC ENGINEERING IN THE FUNCTION OF PRODUCING SAFE FOOD</b>  	
<i>Vera Rajičić, Dragan Terzić, Vera Popović, Marijana Dugalić, Snežana Branković, Kristina Luković, Milomirka Madić</i> GENETIC POTENTIAL OF WINTER TRITICALE AS A HEALTHY SAFE FOOD .....	151

<i>Violeta Mickovski Stefanović, Dragana Stanisavljević, Sonja Simić, Predrag Ilić</i> THE EFFECT OF GENOTYPE AND LOCATION ON THE HEAVY METAL CONTENT IN WHEAT ROOTS AT HEADING STAGE .....	161
---	-----

## FERTILIZERS AND FERTILIZATION PRACTICE IN THE FUNCTION OF PRODUCING SAFE FOOD

<i>Ana Radulović, Marija Bukilica</i> FERTILIZERS AND FERTILIZATION IN THE FUNCTION OF HEALTHY SAFE FOOD PRODUCTION.....	169
<i>Dragan Grčak, Milosav Grčak, Dragana Grčak, Miroljub Aksić, Katerina Nikolić, Vera Rajičić, Stefan Grčak</i> BIOSTIMULANTS IN AGRICULTURE .....	173

## INTEGRATED PEST MANAGEMENT AND USE OF BIOLOGICAL

<i>dr Danijela Jašin, dr Matilda Lazić</i> ANALYSIS AND APPLICATION OF THE SAFETY DATA SHEET OF ECOCID 5 AS A DISINFECTANT .....	181
--	-----

## PRODUCTION OF FIELD AND VEGETABLE CROPS

<i>Bsc. Liljana Saltirov, Prof. Dr. sc. Ileski, Assist. Prof. Dr. sc. Dushko Nedelkovski, Assoc. Prof. Dr. sc. Ileskanec</i> GENERAL CHARACTERISTICS OF TABLE INTERSPECIES VARIETY <i>VIERUL</i> 59 CULTIVATED IN CONDITIONS IN THE SKOPJE REGION .....	189
<i>Ivan Šimunić, Tanja Likso, Palma Orlović-Leko</i> ESTIMATION OF DROUGHT IMPACT ON MAIZE AND SOY BEAN YIELDS IN THE DRAVA RIVER BASIN IN CROATIA .....	195
<i>Červenski J., Medić-Pap S., Danojević D., Bugarski D.</i> SIGNIFICANCE OF VEGETABLE CROPS ROTATION IN GARDEN PLOTS FROM THE PERSPECTIVE OF PRODUCING HEALTH-SAFE FOOD .....	205
<i>Ivana Janković, Vesna Vujasinović, Miloš Ćirić, Sanja Dimić</i> ACRYLAMIDE – POTENTIAL CONTAMINANT IN FRIED POTATO PRODUCTS IN CATERING.....	213
<i>Vesna Perišić, Vladimir Perišić, Kristina Luković, Vera Rajičić, Dragana Predojević, Snežana Pešić, Filip Vukajlović</i> PERSISTENCE AND EFFICACY OF DIATOMACEOUS EARTH FROM SERBIA AGAINST <i>RHYZOPERTHA DOMINICA</i> F. ON WHEAT .....	221



## FRUITS AND GRAPES PRODUCTIONS

*Ana Selamovska, Elizabeta Miskoska-Milevska*

THE HIGHEST QUALITY TRADITIONAL PEAR VARIETIES IN MACEDONIA .....	231
--	-----

## LIVESTOCK HUSBANDRY FROM THE ASPECT OF SAFE FOOD PRODUCTION

*Vesna Gantner, Mirna Gavran, Maja Gregić, Dragan Dokić,  
Franjo Poljak, Zvonimir Steiner*

ESTIMATION OF AMMONIUM POLLUTION FROM DAIRY SIMMENTAL COWS USING PRECISION FARMING TECHNOLOGIES IN ORDER TO PRODUCE HEALTH SAFE FOOD .....	245
--	-----

*Mirna Gavran, Goran Kušec, Vesna Gantner*

USE OF ANABOLICS IN LIVESTOCK PRODUCTION AND THEIR PERCEPTION FOR FOOD SAFETY IN DIFFERENT REGIONS OF THE WORLD .....	253
---	-----

*Stipo Benak, Zvonimir Steiner, Tina Bobić, Vesna Gantner*

THE EVALUATION OF THE EFFECT OF THE DIFFERENT STARTERS ON BODY MEASUREMENTS OF DAIRY CALVES .....	261
--	-----

*Aleksandar Milovanović*

EFFECT OF MYCOTOXINS ON PORCINE SEMEN QUALITY IN ARTIFICIAL INSEMINATION CENTERS .....	271
---	-----

*B. Sc. Student Luka Nestic, M. Sc. Predrag Umicevic, B. Sc. Nenad Nestic,  
M. Sc. Bratimir Nestic, B. Sc. Student Nikola Kostic*

SUSTAINABLE DEVELOPMENT OF AGRICULTURE VERSUS MALNUTRITION, DISEASES AND POVERTY .....	279
---	-----

## PROCESSING OF AGRICULTURAL PRODUCTS IN THE FRAMEWORK OF SAFE FOOD PRODUCTION

*V.V. Zakrevskii*

ANTIBIOTICS IN MEAT AND MEAT PRODUCTS .....	289
---	-----

*Popović V., Ikanović J., Rajčić V., Ksenija Mačkić, Ljubičić N.,  
Kostic M., Radovic M., Šarčević-Todosijević Lj.*

MILLET – <i>Panicum miliaceum</i> L. PRODUCTION TREND IN THE WORLD. IMPORTANCE OF MILLET IN NUTRITION AND FOR BIOENERGY .....	297
---	-----

*Vladimir Filipović Ph.D., Ivana Filipović M.Sc., Milica Nićetin Ph.D.,  
Biljana Lončar Ph.D., Violeta Knežević Ph.D., Jelena Filipović Ph.D.*

FOOD SAFETY ASPECTS OF OSMOTIC DEHYDRATION PROCESS .....	307
--	-----

<i>Snežana Đorđević, Ljubica Šarčević-Todosijević, Vera Popović, Marija Perić, Ljubiša Živanović, Niklola Đorđević, Aleksandar Stevanović</i> HEALTH SAFE FOOD – RISK OF CARCINOGENIC SUBSTANCES.....	315
<i>Sonja Simić, Biljana Pajin ScD, Jovana Petrović ScD, Ivana Lončarević ScD, Dragan Psodorov ScD, Dragana Stanisavljević ScD, Violeta Mickovski Stefanović ScD</i> CHEMICAL PROPERTIES OF BISCUITS WITH THE ADDITION OF CORN GRITS EXTRUDATE ENRICHED WITH SUGAR BEET PULP .....	323
<i>Miloš Ćirić, Ivana Janković</i> SAFE FOOD AS THE MAIN INDICATOR FOR SUCCESSFUL BUSINESS OPERATIONS OF HOSPITALITY FACILITIES .....	329
<i>Nemanja Ristić, Dragana Stanisavljević, Svetlana Lakićević, Predrag Ilić, Violeta Mickovski Stefanović</i> CONTENT OF TOTAL PHENOLS AND FLAVONOIDS OF SOME COMMERCIAL BEERS .....	337
<i>B. Sc. Nenad Nesic, M. Sc. Predrag Umicevic, B. Sc. student Luka Nesic, B. Sc. Student Nikola Kostic, M. Sc. Bratimir Nesic</i> PROTECTION OF FOOD FROM CONTAMINATION WITH EXAMPLES FROM PRACTICE .....	345
<i>Nemanja Lakić, Vesna Vujasinović, Biljana Rabrenović, Sanja Dimić, Miloš Bjelica</i> REVIEW OF THE QUALITY OF OIL DURING FOOD FRYING IN CATERING FACILITIES.....	353

## ECONOMIC ASPECTS AND MARKETING AS SEGMENTS OF THE PRODUCTION SAFE FOOD

<i>Marija Bukilica, Ana Radulović</i> ORGANIC ECONOMY-CONCEPT OF SUSTAINABLE DEVELOPMENT .....	363
<i>M. Sc. Bratimir Nesic, M. Sc. Predrag Umicevic, B. Sc. Nenad Nesic, B. Sc. student Luka Nesic, M. Sc. Nemanja Petrovic, M. Sc. Natalija Totic, B. Sc. Dusan Milincic, B. Sc. Aleksandar Aleksic, M. Sc. Dusan Stevanovic</i> COST AND PROFIT ANALYSIS OF PROPOSED COMPOSTING TECHNOLOGY IN PWW COMPANY .....	371

## FOOD STORAGE, TRANSPORTATION AND PACKAGING

<i>Dragana Stanisavljević, Violeta Mickovski Stefanović, Predrag Ilić, Milić Vojinović, Sonja Simić</i> PACKAGING IN FOOD PRODUCTION AND PROCESSING.....	381
---	-----

*Ph. D. Petra Tanović, M. Sc. Bratimir Nešić Ph. D. Student,  
Anja Tanović B. Sc. Student, B. Sc. Nenad Nešić*  
SAFE FOOD AND THE ROLE OF PACKAGING DURING  
THE COVID-19 EPIDEMIC ..... 387

*Tanja Žugić-Petrović, Katarina Mladenović, Mirjana Muruzović,  
Zorana Žugić, Sunčica Kocić-Tanackov, Vladimir Tomović,  
Ljiljana Čomić*  
EFFECTS OF VACUUM AND MAP PACKAGING  
ON MICROBIOLOGICAL STATUS AND SENSORY PROPERTIES  
OF FRESH PORK ..... 395

## NUTRITIONAL FOOD VALUE AND QUALITY NUTRITION

*Agota Vitkay-Kucsera*  
PROPER NUTRITION FOR ELITE VOCAL PROFESSIONALS..... 405

*Danijela Rajić*  
DETERMINATION OF HEAVY METAL CONTENT IN TEAS FROM  
THE CITY OF ZVORNIK (BIH)..... 413

*Dragan Dokić, Mirna Gavran, Maja Gregić, Vesna Gantner*  
THE ANALYSIS OF FOOD SECURITY IN THE STATE  
IN CRISIS CONDITIONS ..... 419

*Ana Jovičić Vuković, Aleksandra Terzić*  
EATING HABITS OF STUDENT POPULATION:  
CASE STUDY OF UNIVERSITY OF NOVI SAD ..... 427

*Jelena Filipović, Vladimir Filipović, Milenko Košutić,  
Vesna Vujačić*  
SPELT BREAD WITH FRESH COMMONNETTLEAS  
FUNCTIONAL FOOD TO IMPROVE DIET AND MODERN  
LIFESTYLE..... 435

*Predrag Ilić, Dragana Stanisavljević, Violeta Mickovski Stefanović,  
Natalija Tošić*  
BEER AS HIGHLY VALUABLE PRODUCT ..... 441

*M. Sc. Nemanja Petrovic, M. Sc. Bratimir Nesic, M. Sc. Natalija Tosic,  
B. Sc. Nenad Nesic, M. Sc. Dusan Stevanovic, B. Sc. student Luka Nesic,  
B. Sc. Dusan Milincic, B. Sc. Aleksandar Aleksic*  
FOOD HEALTH RISK AND ISO 22000 ..... 447

*M. Sc. Natalija Tosic, M. Sc. Bratimir Nesic, M. Sc. Nemanja Petrovic,  
B. Sc. Nenad Nesic, B. Sc. Dusan Milincic, B. Sc. student Luka Nesic,  
B. Sc. Aleksandar Aleksic, M. Sc. Dusan Stevanovic*  
HEALTH SAFETY OF MEDICINAL HERBS..... 453

## LEGAL ASPECTS OF PROTECTING BRAND NAMES OF SAFE FOOD

*Professor Dr Vladan Joldžić*

ENVIRONMENTAL LAW APPROACH TO HEALTHY

FOOD PRODUCTION ..... 463

## ECOLOGICAL MODELS AND SOFTWARE IN SAFE FOOD PRODUCTION

*B. Sc. Dusan Milincic, M. Sc. Bratimir Nestic, M. Sc. Nemanja Petrovic,*

*B. Sc. Nenad Nestic, M. Sc. Natalija Totic, B. Sc. student Luka Nestic,*

*B. Sc. Aleksandar Aleksic, M. Sc. Dusan Stevanovic*

FOOD WASTE MANAGEMENT AS A GLOBAL PROBLEM ..... 473

NAME REGISTRY ..... 479



**Zora Lujic<sup>a</sup>, Stanko Milić<sup>a</sup>, Snežana Jakšić<sup>a</sup>, Jordana Ninkov<sup>a</sup>, Dragan Milić<sup>b</sup>,  
Jovica Vasin<sup>a</sup>, Milorad Živanov<sup>a</sup>**

<sup>a</sup> Institute of Field and Vegetable Crops, National Institute of the Republic of Serbia,  
Laboratory for Soil and Agroecology

<sup>b</sup> Faculty of Agriculture, Department of Agricultural Economics  
and Rural Sociology, Novi Sad  
E-mail: zora.lujic@ifvns.ns.ac.rs

## **SOIL FERTILITY CONTROL OF STATE OWNED AGRICULTURAL LAND IN VOJVODINA PROVINCE**

### **Abstract**

The paper presents the results of soil fertility control of the public land in AP Vojvodina. A total of 514 soil samples were collected in 2018 from the depth of 0-30cm. The majority of the collected samples (70%) had slightly alkaline reaction. Low-humus soil class was found in 54% of the samples, which indicated the need for harvest residue plowing down and organic fertilization, so as to enhance soil humus content and thus preserve soil fertility. The analysis of readily available phosphorus revealed an optimum P content in only one third, while optimum potassium content was found in all of the collected soil samples.

**Key words:** *soil fertility, humus, Vojvodina Province*

## **INTRODUCTION**

Soil is a natural resource of the utmost strategic importance (Yang et al., 2020). Soil is created by a group of pedogenetic factors: climate, parent material, terrain, organic matter and terrain age (Sekulić et al., 2003). Soil functions are numerous; besides enabling food production and species survival, soil is the habitat of various animals and microorganisms (Yang et al., 2020) and a reservoir of essential nutrients with an important role in the carbon cycle. Soil is considered a non-renewable resource, as the damages, once incurred, can no longer be repaired during an average human lifespan (Yang et al., 2020). Various factors cause soil degradation, among which agricultural intensification, i.e. increase in agricultural production per surface unit,

plays a major role (Kopittke et al., 2019). According to the estimates of the UN Food and Agriculture Organization, the global population will have risen to 9 billion by 2050, thus enhancing human and animal food and fiber requirements by 60% (FAO, 2015). Intensive soil use without the adequate fertilization can significantly reduce soil fertility (Smith et al., 2016). To preserve crop yields and soil quality, a steady supply of essential soil macro-elements must be provided after soil chemical analyses. Excessive mineral fertilization can lead to over-accumulation of nutrients in soils, ground water and plants, thereby turning soil nutrients from plant growth and yield boosters into environment pollutants. The Law on Agricultural Land (Official Gazette of RS No. 95/2018) governing planning, protection, arrangement and use of agricultural land, obliges the owner or user of arable land to control its fertility and record the amount of introduced mineral fertilizers and pesticides.

The paper aims to share the results of quality control of the public land leased to large agricultural producers, in order to prevent inadequate use and preserve soil as a natural resource.

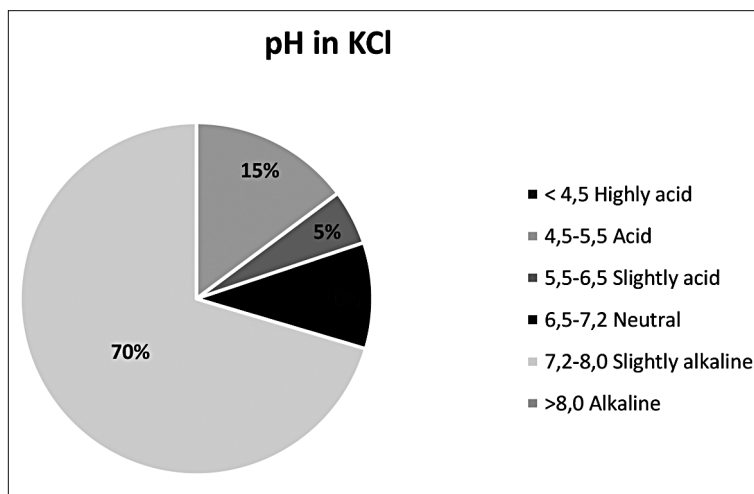
## MATERIALS AND METHODS

For the purpose of conducting soil quality control of public land at the territory of AP Vojvodina, a total of 514 soil samples were collected from the depth of 0-30 cm, in 2018. The soil samples were collected using an agrochemical probe, where one average sample was composed of 20-25 individual samples, according to the principles of the fertility control system. Soil samples were analyzed at the Laboratory for Soil and Agroecology, Institute of Field and Vegetable Crops, National Institute of the Republic of Serbia, using the following methods:

- pH-value in soil suspension with potassium chloride
- CaCO<sub>3</sub> content – using the Scheibler calcimeter
- humus content – by the Turin method
- readily available phosphorus – by AL method
- readily available potassium – by AL method

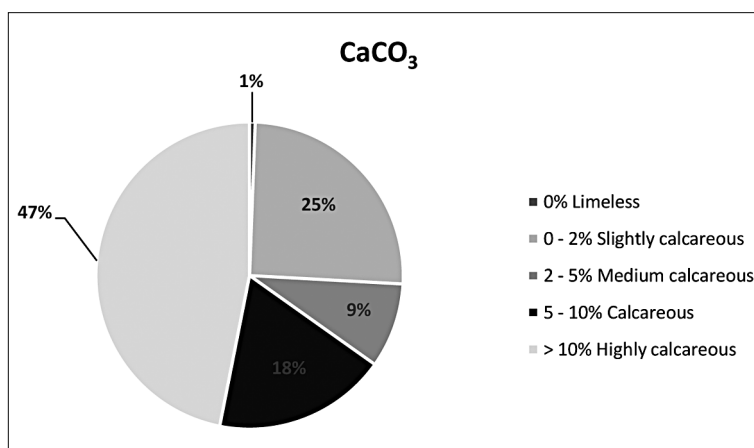
## RESULTS AND DISCUSSION

**Soil reaction.** Soil pH is an important factor of soil fertility control and fertilization. Based on the average results of soil analysis (Table 1.) soil pH value ranged from 4.55 to 7.97, while mean soil pH was 6.98. The values of substitutional acidity of the tested soil samples, as shown in Graph 1, lead to the conclusion that the majority of the soil samples (70%) are slightly alkaline. Prevalence of alkaline soils limits crop production due to higher nutrient (Fe, Mn, Zn) availability in acidic soils, as compared to slightly alkaline or alkaline soils (Deshmuk, 2015). Acidic soils were found in 15% collected soil samples. Crop production favors soils with a neutral pH reaction, observed in only 10% of the analyzed samples. The adoption of microelements allows slightly acidic soils with a pH of 5.5-6.5 (Bogdanović et al., 2004), found in only 5% of the samples.



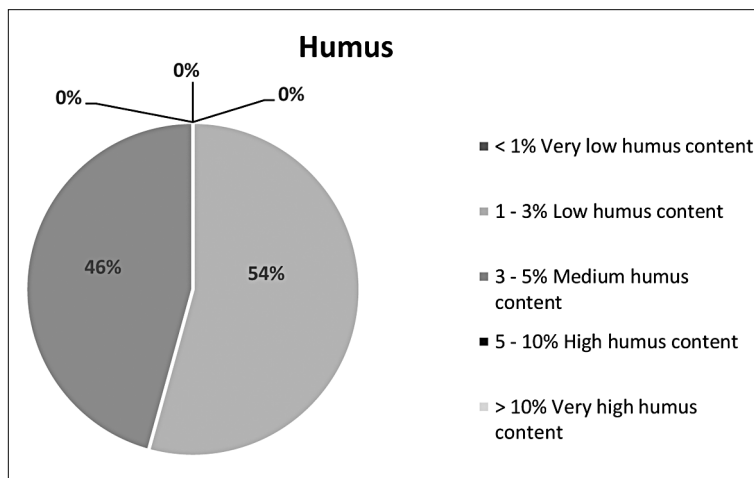
*Graph 1. Soil prevalence according to pH value*

**CaCO<sub>3</sub> content.** Analysis of the obtained results in Graph 2 shows that the highest number of samples (47%) belongs to the class of strongly carbonate soils with over 10% CaCO<sub>3</sub>. The next most common is soil with a low share of free CaCO<sub>3</sub>. The class of low-carbonate soils, with a CaCO<sub>3</sub> content of less than 2%, includes 25% of samples. Calcareous soils make up 18%, medium calcareous 9%, and non-calcareous 1% of the total number of analyzed samples. CaCO<sub>3</sub> negatively affect the uptake of micro-elements by plants, while its positive impact on soil structure decreases in soils with a low content of Ca<sup>2+</sup> ions (Vasin et al., 2005). The CaCO<sub>3</sub> content (Table 1) ranges from 0 to 23, while the average value is 8.16% for all the analyzed samples.



*Graph 2. Soil prevalence according to CaCO<sub>3</sub> content*

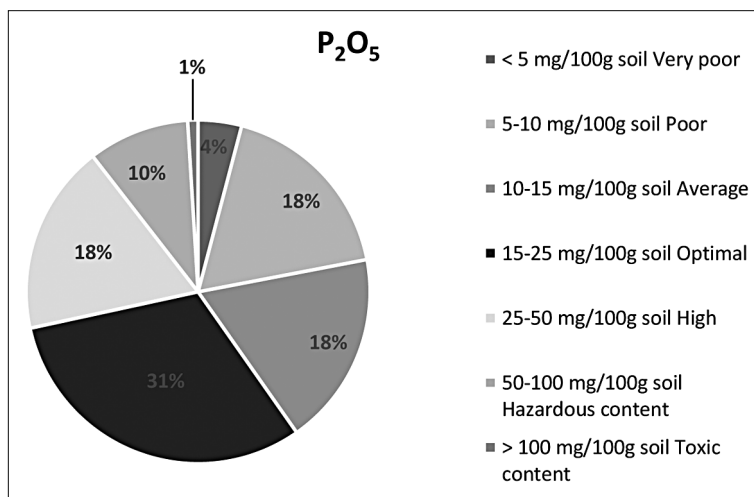
**Humus content.** Humus is essential for soil fertility preservation because of its favorable effect on the physical, chemical and biological soil properties. Graph 3, containing the results of humus content analysis, shows that as much as 54% of the analyzed soil samples of public land belong to the low-humus soil class. Good soil humus availability was found in 46% of the analyzed samples. The average humus level was at 2.94% for all analyzed samples (Table 1). Low humus availability results from inadequate cultivation practices, insufficient application of organic fertilizers and removal of crop residues (Sekulić et al., 2010).



*Graph 3. Soil prevalence according to soil humus content*

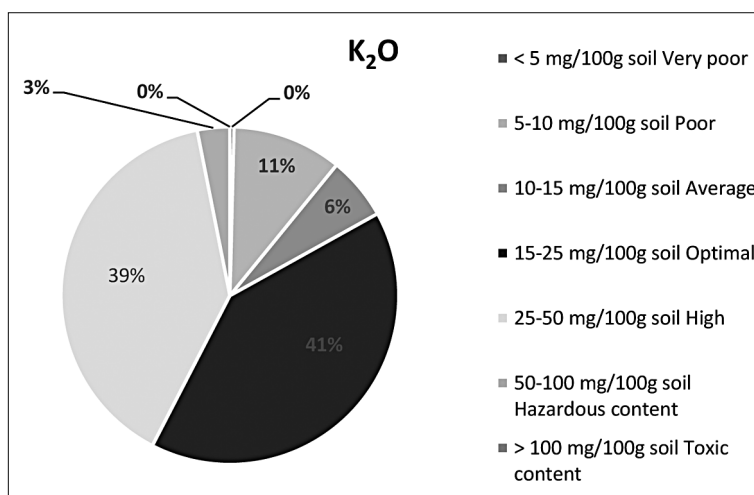
**The content of readily available phosphorus.** Phosphorus belongs to the group of essential macronutrients, whereby growth, development and reproduction of plants depend on its concentration in the soil (Wagh et al., 2013). According to the average content of readily available phosphorus, which is 23.61 mg / 100 g of soil (Table 1), the analyzed soil samples exhibited an optimal supply of this macronutrient. Of the total amount of analyzed samples, as shown in Graph 4 only 31% belongs to the class with optimal soil phosphorus content for the production of most field and vegetable crops. According to Milić et al. (2011) the same results were obtained from the analysis of privately owned land. A total of 18% of the samples belong to the class with a medium content of readily available phosphorus. What causes concern is that 18% of the samples exhibited low content, while 4% of the samples exhibited very low content of readily available phosphorus. with toxic, very high, or high content of readily available phosphorus, indicates inadequate application of mineral fertilizers or application of fertilizers without prior soil quality control. These classes belong to almost a third of the total number of analyzed samples. Toxic phosphorus content was found in 1% of samples, very high phosphorus content in 10% of samples, and high content in 18% of samples.





*Graph 4. Soil prevalence according to the content of readily available phosphorus*

**The content of readily available potassium.** According to the content of readily available potassium, most analyzed samples exhibited an optimum or high content of readily available potassium, as shown in Graph 5. The optimum content of readily available potassium was found in 41% of the samples, while high content of readily available potassium was observed in 39% of the samples, which indicates the influence of pedogenesis in soil formation. The soils of Vojvodina were mostly formed on the



*Graph 5. Soil prevalence according to the content of readily available potassium*

parent substrate rich in potassium (Vasin et al., 2006). The content of readily available potassium ranged from 3.49 to 73.80 mg / 100 g of soil (Table 1). The difference between the minimum and maximum values indicates the impact of anthropogenic activity on soil quality.

*Table 1. Mean values for the analyzed soil samples*

<b>Parameter</b>	<b>pH KCl</b>	<b>CaCO<sub>3</sub>(%)</b>	<b>Humus(%)</b>	<b>Al P<sub>2</sub>O<sub>5</sub>(mg/100g soil)</b>	<b>Al K<sub>2</sub>O(mg/100g soil)</b>
Average	6.98	8.16	2.94	23.61	24.06
Min.	4.55	0.00	1.16	3.10	3.49
Max.	7.97	23.86	4.52	121.50	73.80

## CONCLUSION

The following conclusions can be drawn based on the examination of the main chemical properties of public land at the territory of AP Vojvodina:

– The tested samples predominantly belong to the class of soils with a slightly alkaline reaction. The application of acidic mineral fertilizers is required in order to prevent further alkalization of the soils.

– Prevalence of highly calcareous soils, as a potential limiting factor of agricultural production, indicates a lack of trace elements because their uptake by plants is significantly hampered under such conditions.

– Prevalence of low-humus soils indicates the need for adequate cultivation practices, plowing down crop residues and controlled organic fertilization.

– A relatively high percentage of soils with inadequate content of readily available phosphorus indicates inadequate application of mineral fertilizers.

– The majority of analyzed samples exhibited optimum or high content of readily available potassium

– The results of the study indicate the need for further systematic monitoring of soil fertility status at the examined agricultural plots, in order to preserve the land as a natural resource of national interest.

## REFERENCES

- Bogdanović D., Vasin J., Sekulić P.Đ., Zeremski-Škorić, T.M., Ralev, J., *Stanje plodnosti zemljišta u zaštićenim prostorima na kojima se proizvodi povrće u Vojvodini*, Zbornik radova Instituta za ratarstvo i povrtarstvo, 40, 91-99, 2004.
- Vasin J., Sekulić P., *Plodnost zemljišta u Vojvodini*, *Ekonomika poljoprivrede* 52, (4): 495-502. 2005.

- Vasin J., Sekulić P., Kurjački I., *Vojvodina soil fertility control results considering land use*, Annals of the Faculty of Engineering Hunedoara, 194-198, 2006.
- Deshmukh K.K., *Studies on chemical characteristics and classification of soils from Sangamner area, Ahmednagar District, Maharashtra, India*, Rasayan Journal of Chemistry, 5, 2012. cit.loc. Tale S., Ingole S., A review on a Role Physico-Chemical Properties in Soil Quality, 2015.
- Koppitke P., Menezies N., Wang P., McKenna A., Lombi E., *Soil and intensification of agriculture for global food security*, Environmental International, 132, 2019.
- Milić S., Vasin J., Ninkov J., Zeremski T., Brunet B., Sekulić P.: Fertility of Privately Owned Plowland Used for Crop Production in Vojvodina, Sebja, Ratarstvo i povrtarstvo, 359-368, 2011.
- Sekulić P., Kastori R., Hadžić V., *Zaštita zemljišta od degradacije*, Novi Sad: Naučni institute za ratarstvo i povrtarstvo, 2003.
- Sekulić P, Ninkov J, Hristov N, Vasin J, Šeremešić S, Zeremski-Škorić T. *Sadržaj organske materije u zemljištima AP Vojvodine i mogućnost korišćenja žetvenih ostataka kao obnovljivog izvora energije*, Ratarstvo i povrtarstvo, 591-598, 2010.
- Smith P., House J., Bustamante M., Sobocka J., Harper R., Pan G., i dr., *Global change pressures on soil from land use and management*, Global Change Biology, 22, 2016.
- Zakon o poljoprivrednom zemljištu, Službeni glasnik Republike Srbije br. 62/2006, 65/2008-dr. zakon, 41/2009, 112/2015, 80/2017 i 95/2018 – dr. zakon
- FAO Sustainable Development Goals. Land and soils. <http://www.fao.org/sustainable-development-goals/overview/fao-and-the-post-2015-development-agenda/land-and-soils/en/> Google scholar
- Yang T., Siddique K.H.M., Liu K. *Cropping systems in agriculture and their impact on soil health-A review*, Global Ecology and Conservation, 23, 2020.
- Wagh G. S., Chavhan D. M., Sayyed M. R. G., *Physicochemical Analysis of Soils from Eastern Part of Pune City*, Universal Journal of Environmental Research and Technology, 93-99, 2013.

**Zora Lujic<sup>a</sup>, Stanko Milić<sup>a</sup>, Snežana Jakšić<sup>a</sup>, Jordana Ninkov<sup>a</sup>, Dragan Milić<sup>b</sup>,  
Jovica Vasin<sup>a</sup>, Milorad Živanov<sup>a</sup>**

<sup>a</sup>Institut za ratarstvo i povrtarstvo, Laboratorija za zemljište i agroekologiju

<sup>b</sup>Poljoprivredni fakultet, Departman za ekonomiku poljoprivrede  
i sociologiju sela Novi Sad

E-mail: zora.lujic@ifvcns.ns.ac.rs

## **KONTROLA PLODNOSTI ZEMLJIŠTA U DRŽAVNOM VLASNIŠTVU NA TERITORIJI AP VOJVODINE**

### **Abstract**

U radu su prikazani rezultati kontrole plodnosti zemljišta na području AP Vojvodine, koje u državnom vlasništvu. Tokom 2018. godine prikupljeno je ukupno 514 uzorka sa dubine 0-30 cm. Najveći broj uzoraka zemljišta (70%) ima blago alkalnu reakciju, što predstavlja potencijalno ograničavajući faktor u biljnoj proizvodnji. Klasi slabo humoznog zemljišta pripada čak 54% uzoraka, te je neophodno zaoravanje žetvenih ostataka i primena organskog đubriva kako bi se sadržaj humusa u zemljištu povećao, a time sačuvala plodnost. Analizom lakopristupačnog fosfora, utvrđeno je da samo trećina uzoraka ima optimalnu koncentraciju, dok je obezbeđenost zemljišta kalijumom optimalna.

**Key words:** *plodnost zemljišta, humus, AP Vojvodina*

CIP – Каталогизација у публикацији  
Библиотеке Матице српске, Нови Сад

502:613.2(082)

**INTERNATIONAL Eco-Conference (24 ; Novi Sad ; 2020)**

Kastori Rudolf ... et al.]. – Novi Sad : Ecological movement of Novi Sad, 2020  
(Novi Sad : Red copy). – 480 str. : ilustr. ; 23 cm + 1 elektronski optički disk  
(CD-ROM)

Prema nasl. str. ovo je XI Eko-konferencija sa temom "Safe food". – Tiraž 20.  
– Str. 9-11: The Ecological movement of the city of Novi Sad: an important  
decision of its programme council / Nikola Aleksić. – Bibliografija uz svaki rad.  
– Rezime na srp. jeziku uz pojedine radove. – Registar.

ISBN 978-86-83177-56-1

а) Здрава храна – Зборници б) Животна средина – Заштита  
– Храна – Зборници

COBISS.SR-ID 21035273



ISBN 978-86-83117-56-1



9 788683 177561