

XXI MEĐUNARODNO SAVJETOVANJE  
21<sup>st</sup> INTERNATIONAL CONFERENCE

# KRMIVA 2014

**ZBORNİK SAŽETAKA** ❖ **BOOK OF ABSTRACTS**

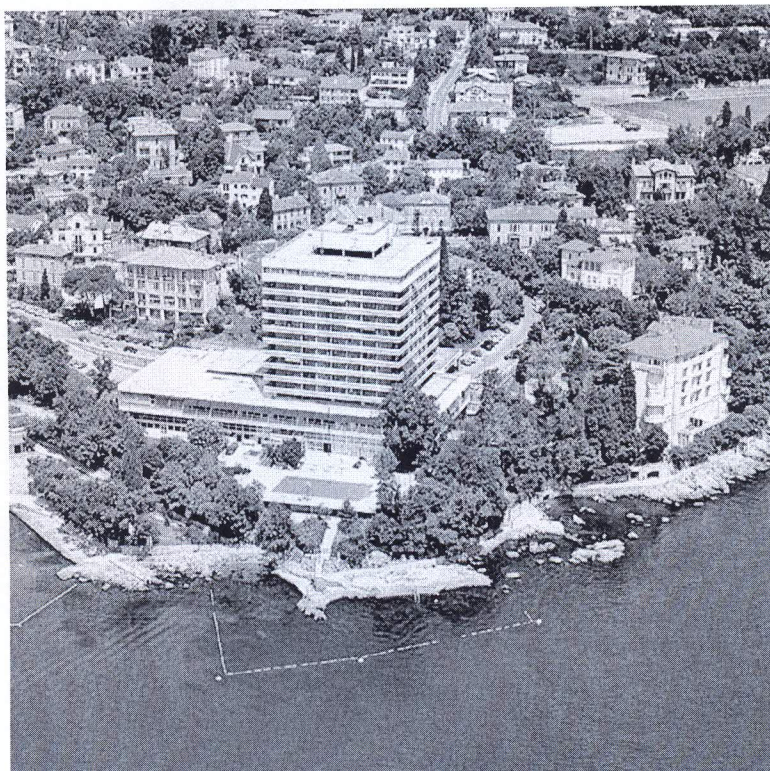
**Opatija HRVATSKA** ❖ **CROATIA**

**4.-6. lipnja 2014.** ❖ **June 4-6, 2014**



# **KRMIVA 2014**

**XXI MEĐUNARODNO SAVJETOVANJE  
21<sup>st</sup> INTERNATIONAL CONFERENCE**



**Pokrovitelji Savjetovanja**  
Under the patronage

**Ministarstvo poljoprivrede**  
Ministry of Agriculture

**Ministarstvo znanosti, obrazovanja i sporta**  
Ministry of Science, Education and Sports

4.-6. lipnja 2014. / June 4-6, 2014

Hotel Ambassador, Opatija  
Hrvatska / Croatia

NAKLADNIK | *PUBLISHER*:  
Krmiva d.o.o. ZAGREB  
10000 Zagreb, Tomićeva 3  
www.krmiva.hr

GLAVNI UREDNIK | *EDITOR IN CHIEF*:  
Slavko Lulić, dipl. ing. agr.

TEHNIČKI UREDNICI | *TECHNICAL EDITORS*:  
Neven Debelić  
Zdenka Horvat

RECENZENTI | *REVIEWERS*:  
prof. dr. sc. Zlatko Janječić

REALIZACIJA | *REALIZATION*:  
LASERplus  
Zagreb, Brijunska 1a

NAKLADA | *EDITION*:  
300

Zagreb, 2014.

ISSN: 1847-2370

## SAVJETOVANJE JE PRIREĐENO U SURADNJI SA: | CONFERENCE PREPARED IN COORDINATION WITH:

- Ministarstvom poljoprivrede
- Ministarstvom znanosti, obrazovanja i sporta
- Hrvatskim agronomskim društvom, Zagreb
- Agronomskim fakultetom, Zagreb
- Poljoprivrednim fakultetom, Osijek
- Veterinarskim fakultetom, Zagreb
- University of Kaposvar, Kaposvar – Mađarska
- University of Debrecen, Debrecen – Mađarska
- Wrocław University of Environmental and Life Sciences, Wrocław – Poljska
- National Veterinary Research Institute, Pulawy – Poljska
- National Research Institute of Animal Production in Krakow, National feed laboratory, Lublin – Poljska
- University of Veterinary and Pharmaceutical Sciences, Brno – Češka
- Slovačkim poljoprivrednim fakultetom, Nitra – Slovačka
- Biotehniškom fakultetom, Domžale – Slovenija
- Fakultetom za kmetijstvo in biosistemske vede, Hoče – Slovenija
- Poljoprivredno-prehrambenim fakultetom, Sarajevo – Bosna i Hercegovina
- Veterinarskim fakultetom, Sarajevo – Bosna i Hercegovina
- Agronomskim i prehrambeno tehnološkim fakultetom, Mostar – Bosna i Hercegovina
- Fakultetom agronomskih znanosti i hrane, Skopje – Makedonija
- Institutom za stočarstvo, Skopje – Makedonija
- Veterinarskim fakultetom, Bitola – Makedonija
- Veterinarskim fakultetom, Skopje – Makedonija
- Veterinarskim fakultetom, Ljubljana – Slovenija
- Institutom za stočarstvo, Beograd – Zemun – Srbija
- Fakultetom veterinarske medicine, Beograd – Srbija
- Institutom za prehrambene tehnologije, Novi Sad – Srbija
- Visokim gospodarskim učilištem, Križevci
- Udrugom proizvođača, tehnologa i nutricionista stočne hrane Hrvatske

## SUORGANIZATOR: | CO-ORGANISER:

- EurAgEng – The European Society of Agricultural Engineers

**EurAgEng**

## ZNANSTVENI ODBOR SAVJETOVANJA: | CONFERENCE SCIENTIFIC BOARD:

- Dr. sc. dr. h. c. Gordana Kralik, professor emeritus**, Poljoprivredni fakultet u Osijeku, predsjednica Znanstvenog odbora Savjetovanja  
**Prof. dr. sc. Vlasta Šerman**, Zagreb  
**Slavko Lulić, dipl. ing.**, Krmiva, Zagreb  
**Prof. dr. sc. Pavel Suchy**, rektor University of Veterinary and Pharmaceutical Sciences, Brno – Češka  
**Prof. dr. sc. Ferenc Szavai**, rektor University of Kaposvar, Kaposvar – Mađarska  
**Prof. dr. sc. Tajana Krička**, dekanica Agronomskog fakulteta, Zagreb  
**Prof. dr. sc. Vlado Guberac**, dekan Poljoprivrednog fakulteta, Osijek  
**Prof. dr. sc. Tomislav Dobranić**, dekan Veterinarskog fakulteta, Zagreb  
**Prof. dr. sc. Mirsad Kurtović**, dekan Poljoprivredno-prehrambenog fakulteta, Sarajevo – Bosna i Hercegovina  
**Prof. dr. sc. Nihad Fejzić**, dekan Veterinarskog fakulteta, Sarajevo – Bosna i Hercegovina  
**Dr. sc. Marijana Ivanek-Martinić**, dekanica Visokog gospodarskog učilišta, Križevci  
**Doc. dr. sc. Danijela Petrović**, v.d. dekanica Agronomskog i prehrambeno tehnološkog fakulteta, Mostar, Bosna i Hercegovina  
**Prof. dr. sc. Živko Gacovski**, dekan Veterinarskog fakulteta, Bitola – Makedonija  
**Prof. dr. sc. Zlatko Janječić**, predstojnik Zavoda za hranidbu životinja Agronomskog fakulteta, Zagreb  
**Prof. dr. sc. Stjepan Mužić**, Agronomski fakultet, Zagreb  
**Prof. dr. sc. Laszlo Babinszky**, University of Debrecen, Debrecen – Mađarska  
**Prof. dr. sc. Željko Mikulec**, Veterinarski fakultet, Zagreb  
**Prof. dr. sc. Zdenko Steiner**, Poljoprivredni fakultet, Osijek  
**Prof. dr. sc. Eva Strakova**, predstojnica Zavoda University of Veterinary and Pharmaceutical Sciences, Brno – Češka  
**Prof. dr. sc. Vladimir Večerek**, prorektor University of Veterinary and Pharmaceutical Sciences, Brno – Češka  
**Prof. dr. sc. Janez Salobir**, predstojnik Katedre za prehrano, Biotehniška fakulteta, Domžale – Slovenija  
**Prof. dr. sc. Salko Muratović**, predstojnik Zavoda za zootehniku Poljoprivredno-prehrambenog fakulteta, Sarajevo – Bosna i Hercegovina  
**Prof. dr. sc. Dorota Jamroz**, predstojnica Zavoda za hranidbu, Wrocław University of Environmental and Life Sciences, Wrocław – Poljska  
**Prof. dr. sc. Darko Grbeša**, Agronomski fakultet, Zagreb  
**Prof. dr. sc. Stjepan Pliestić**, Agronomski fakultet, Zagreb  
**Prof. dr. sc. Ivan Bogut**, Poljoprivredni fakultet, Osijek i Agronomski i prehrambeno tehnološki fakultet, Mostar, Bosna i Hercegovina  
**Prof. dr. sc. Boris Antunović**, Poljoprivredni fakultet, Osijek  
**Prof. dr. sc. Davor Kralik**, Poljoprivredni fakultet, Osijek  
**Doc. dr. sc. Zlata Kralik**, Poljoprivredni fakultet, Osijek  
**Doc. dr. sc. Igor Kralik**, Poljoprivredni fakultet, Osijek  
**Prof. dr. sc. Zvonko Antunović**, Poljoprivredni fakultet, Osijek  
**Mr. sc. Igor Ujčić-Vrhovnik**, Veterinarski fakultet, Ljubljana – Slovenija  
**Prof. dr. sc. Srećko Gjorgjievski**, Fakultet agronomskih znanosti i hrane, Skopje – Makedonija  
**Prof. dr. sc. Nikola Pacinovski**, Institut za stočarstvo, Skopje – Makedonija  
**Prof. dr. sc. Nora Mas**, predstojnica Zavoda za prehranu i dijetetiku životinja, Veterinarski fakultet, Zagreb  
**Doc. dr. sc. Tomislav Mašek**, Veterinarski fakultet, Zagreb  
**Doc. dr. sc. Jasna Pintar**, Agronomski fakultet, Zagreb  
**Prof. dr. sc. Mirjana Baban**, Poljoprivredni fakultet, Osijek  
**Prof. dr. sc. Matija Domaćinović**, Poljoprivredni fakultet, Osijek  
**Prof. dr. sc. Goce Cilev**, Sveučilište Sv. Kliment Ohridski, Veterinarski fakultet, Bitola – Makedonija  
**Dr. sc. Waldemar Korol**, National Research Institute of Animal Production in Krakow, National feed laboratory, Lublin – Poljska  
**Prof. dr. sc. Krzysztof Kwiatek**, National Veterinary Research Institute, Pulawy – Poljska  
**Dr. sc. Branislav Živković**, Institut za stočarstvo Beograd – Zemun – Srbija  
**Božica Lachner, dr. vet. med.**, TSH Valpovka, Valpovo  
**Vlasta Mezga, dipl. ing.**, TSH Čakovec, Čakovec  
**Mario Modrić, dipl. ing.**, Krmiva, Zagreb  
**Dr. sc. Sven Menčik**, Veterinarski fakultet, Zagreb  
**Dr. sc. Vanja Jurišić**, Agronomski fakultet, Zagreb  
**Dr. sc. Ana Matin**, Agronomski fakultet, Zagreb

**ORGANIZACIJSKI ODBOR SAVJETOVANJA: | CONFERENCE ORGANISATION BOARD:**

**Slavko Lulić, dipl. ing.**, Krmiva, Zagreb, predsjednik Organizacijskog odbora Savjetovanja  
**Prof. dr. sc. Zlatko Janječić**, predstojnik Zavoda za hranidbu životinja Agronomskog fakulteta, Zagreb  
**Andreja Misir**, savjetnik za poljoprivredu, USDA/FAS, Veleposlanstvo SAD, Zagreb  
**Vlado Čondić, prof.**, PP Orahovica, Orahovica  
**Dušan Alebić, dipl. ing.**, PP Orahovica, Orahovica  
**Mr. sc. Tomica Belić**, TSH Čakovec, Čakovec  
**Drago Kušić**, Kušić-promet, Donje Psarjevo  
**Branko Kuna, dipl. ing.**, TSH Valpovka, Valpovo  
**Nevenka Barić, dipl.ing.**, BELJE PC TSH Darda  
**Mario Modrić, dipl. ing.**, Krmiva, Zagreb

**Teme savjetovanja: Conference topics:**

Hranidba preživača	<i>Feeding of ruminants</i>
Hranidba nepreživača	<i>Feeding of non-ruminants</i>
Hranidba riba	<i>Feeding of fishes</i>
Hranidba divljači	<i>Feeding of wild animals</i>
GMO – transgene biljke u hranidbi životinja	<i>GMO – transgenic plants in animal nutrition</i>
Tehnologija proizvodnje krmnih smjesa	<i>Technology of production of animal feed mixture</i>
Kvaliteta i sigurnost hrane za životinje i životinjskih proizvoda	<i>The quality and safety of animal feed and animal products</i>
Nova krmiva u hranidbi životinja	<i>New feed in animal nutrition</i>
Slobodne teme	<i>Open topics</i>

**PRIJENOS  $^{40}\text{K}$  I  $^{226}\text{Ra}$  IZ TLA U USJEVE**  
**TRANSFER OF  $^{40}\text{K}$  AND  $^{226}\text{Ra}$  FROM SOIL INTO CROPS**

Angjeleska Aleksandra, Uzunov Risto, Črčeva-Nikolovska Radmila, Dimitrieska-Stojkovič  
Elizabeta, Hajrulai-Musliu Zehra, Stojanovska-Dimzoska Biljana, Angelovski Ljupčo

Food Institute, Faculty of Veterinary Medicine, University of „Ss. Cyril and Methodius“, Skopje,  
R. Macedonia; e-mail: mizasandra@fvm.ukim.edu.mk

**ABSTRACT**

*The transfer of radioactive elements from soil to plant is determined with the transfer factor (TF). Numerous studies have been conducted, about the transfer of natural radionuclides from soil into plant in different regions of the world. Taking into consideration the importance of distribution and the transfer of radionuclides from soil into crops, the objective of this work was to determine the transfer factor of  $^{40}\text{K}$  and  $^{226}\text{Ra}$  in some agricultural crops. These data have been extensively applied in the models of radiological evaluation and they have great importance for the radiation risk assessment, for the determination of preventive measures in events of nuclear accidents, as well as for potential land decontamination by cultivation of specific plants.*

*The assessment of the transfer factor from the soil into plants is performed on the basis of the measured concentrations of activities of soil from particular locations in the surrounding of Skopje. The agricultural crops used for the analysis included barley and maize, assuming that these are the most commonly used crops in R. Macedonia, so the grain and the stem of the plant have been separately analyzed.*

*Radiometric analysis of these samples has been conducted by applying a gamma-ray spectrometer with high-purity germanium (HPGe), detector with 30% relative efficiency and energy resolution (FWHM) of 1.8 keV for 1.33 MeV reference transition of  $^{60}\text{Co}$ . The software used for obtaining data is Canberra software package Genie-2000, which enables identification of radionuclides.*

*From the research itself, one can notice that the level of radioactive contamination in separate parts of the plant is not equal. Primarily it depends on the differences in the chemical compositions and the direction of the ion transport (from the vegetative to the generative organs, from the root system to the grain). Also there are significant differences between separate plant species, in terms of sensitivity of the absorption of radioactive material.*

*These data can be the foundation for assessment of risk of radioactive contamination of the population, which people receive by ingestion of manufactured food.*

**Keywords:**

Radioactivity, soil, plant, transfer factor (TF)