

**FP7 Centre of Excellence in Food Safety and  
Emerging Risks (CEFSEER) from the Faculty of  
Technology**

**Novi Sad, Serbia:**

***A point of joint research in domain of chemical  
contaminants in food and the environment***

**Prof. Dr. Biljana Škrbić, *JSPS Fellow 2014***

*Head of the CEFSEER*

University of Novi Sad, Faculty of Technology Novi Sad



# **Center of Excellence in Food Safety and Emerging Risks**



**is established at the Faculty of Technology  
during the FP7 project CEFSEK based on the  
human and material resources of**

***Laboratory for Chemical Contaminants  
in Food and the Environment.***

## CEFSEr project details

**Coordinator:** Faculty of Technology Novi Sad

**Total cost:** 1.01 million euro

**EU contribution :** 897650.00 euro

**Start Date:** 2009-02-01

**Duration:** 42 months

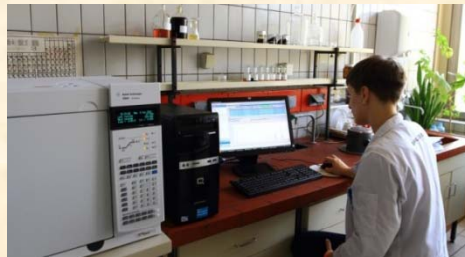
**End Date:** 2012-07-31



**It is**

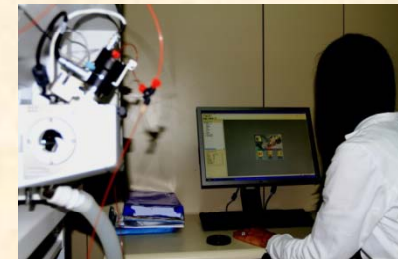
**A UNIQUE WESTERN BALKAN LABORATORY**

**for analysis of chemical contaminants in various**



**matrices**

**with**



**highly sophisticated analytical instruments,**

**collaborating with advanced EU institutions.**





# *Equipment*

## ultra high performance liquid chromatography coupled to tandem mass spectrometry (Accela UHPLC-TSQ Vantage, Thermo Fisher Scientific)



2010



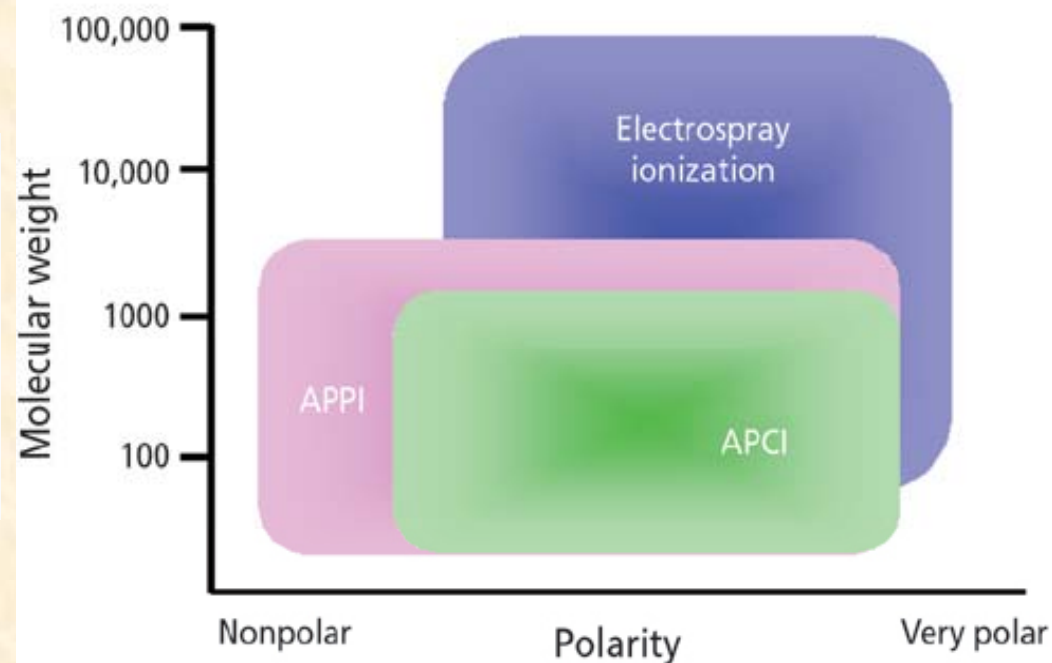
## ultra high performance liquid chromatography coupled to high resolution mass spectrometry with Orbitrap technology (Accela UHPLC-Exactive, Thermo Fisher Scientific)



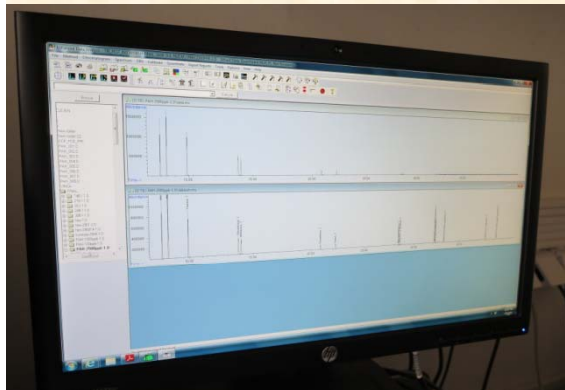
2010



## Three ionisation sources for LC-MS systems, enabling possibility to analyzed compounds of different polarities.



# gas chromatograph coupled to mass spectrometer (Agilent 7890B/5977MSD) equipped with autosampler for liquid injection, “head space” and solid phase microextraction (SPME)

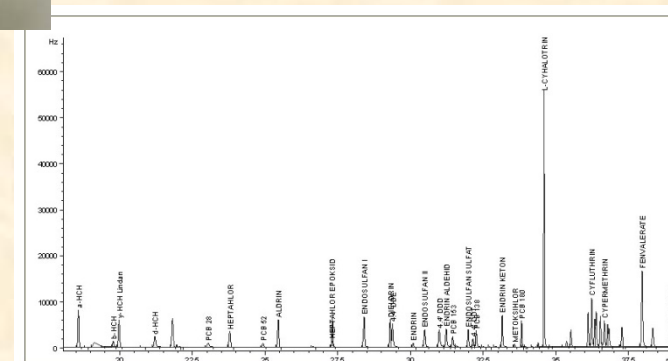
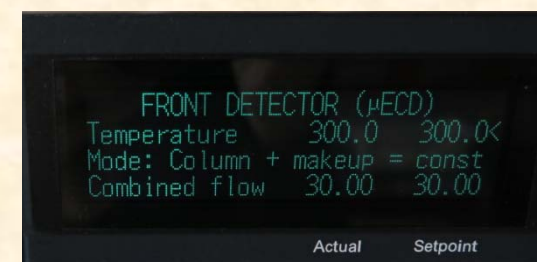


2013



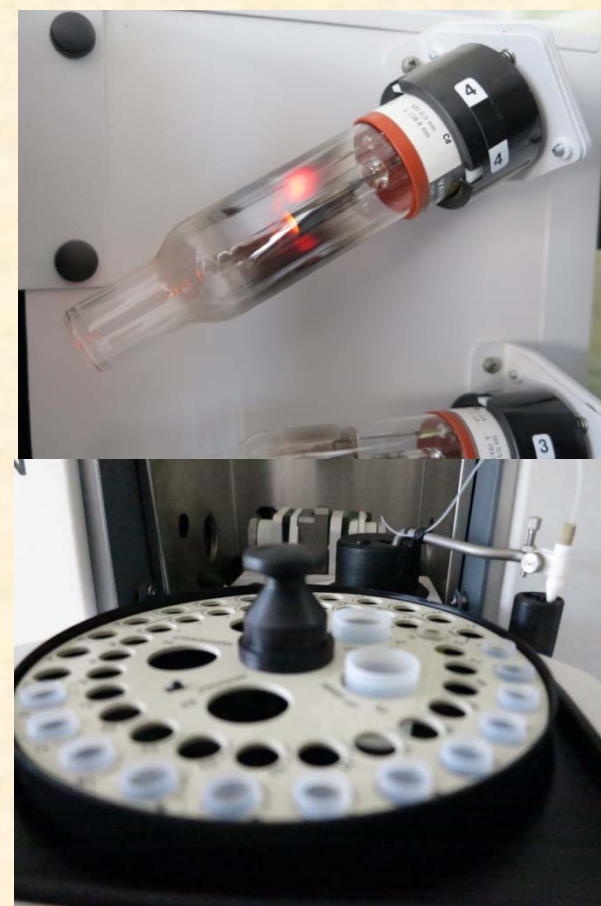


## gas chromatograph with micro electron capture detector (Agilent 7890A)



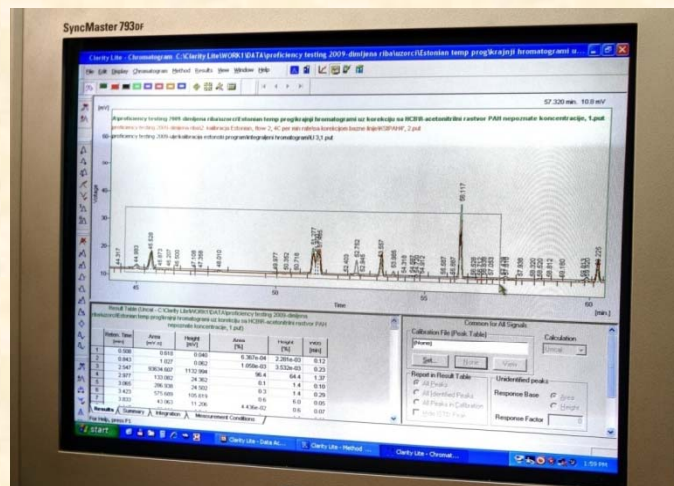
2011

## atomic absorption spectrometer with graphite furnace (Varian AAS240/GTA120)



2007

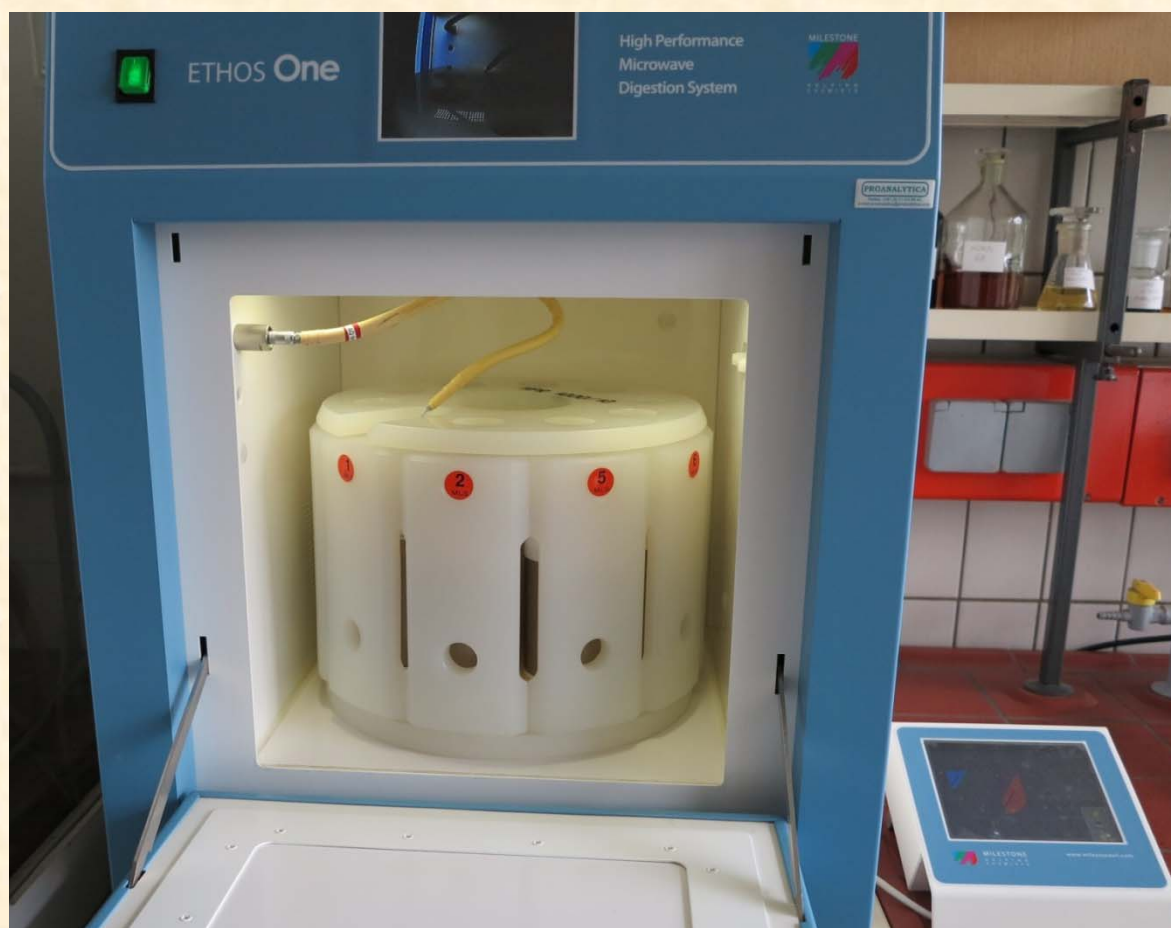
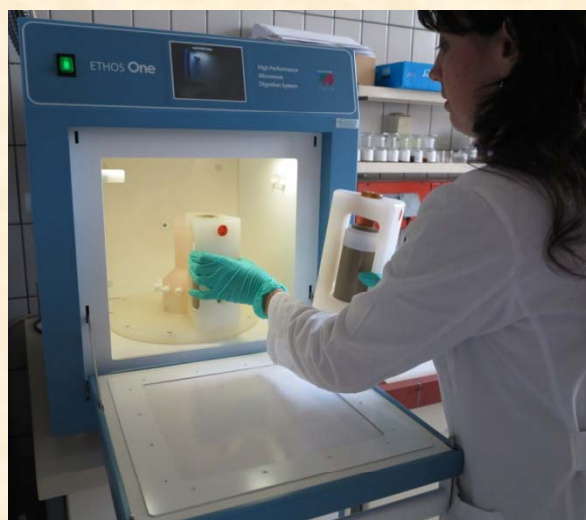
## gas chromatograph with flame ionisation detector (DANI GC1000)



2006



## microwave digestion system (Ethos one, Milestone)



2011

## accelerated solvent extractor Dionex ASE350 (Thermo Scientific)

2014





## centrifuge (Thermo Scientific)



2011

## ultra pure water system (Millipore)



2010

## water deionization system



2012



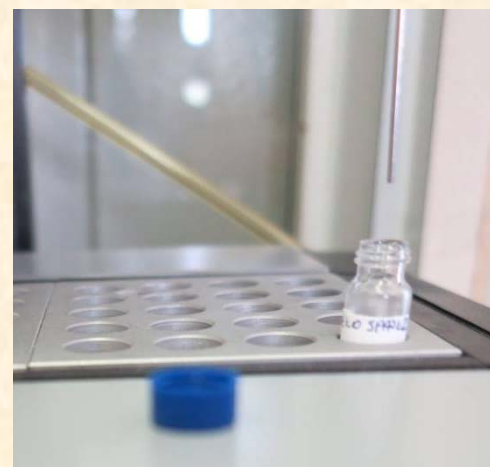


**equipment for  
mass and  
volume  
measurement**

**sample prep  
equipment**



## sample concentrator with block heater



2011



## Shaker (Heidolph)



## Rotary vacuum evaporator (Heidolph)





# *Publications*

**CEFSEER team has the highest publication record with more than 534 papers/presentations of which 98 articles are published in leading international journals with impact factors, some of them are prepared jointly with international partners.**





## Selected articles published in journals from the SCI list dedicated to the **chemical food safety issues:**

### **Mycotoxins:**

1. B. Škrbić, I. Antić, J. Živančev, Presence of **aflatoxin M1 in white and hard cheese samples** from Serbia, Food Control (2014) <http://dx.doi.org/10.1016/j.foodcont.2014.08.031>
2. B. Škrbić, J. Živančev, M. Godula, **Multimycotoxin analysis of crude extracts of nuts** with ultra-high performance liquid chromatography/tandem mass spectrometry, J. Food Compos. Anal., 34, 171-177, 2014. <http://dx.doi.org/10.1016/j.jfca.2014.03.002>
3. B. Škrbić, J. Živančev, I. Antić, M. Godula, Levels of **aflatoxin M1 in different types of milk** collected in Serbia: Assessment of human and animal exposure, Food Control, 40, 113-119, 2014.
4. B. Škrbić, S. Koprivica, M. Godula, Validation of a method for determination of **mycotoxins subjected to the EU regulations in spices**: the UHPLC-HESI-MS/MS analysis of the crude extracts, Food Control, 31, 461-466, 2013.
5. B. Škrbić, J. Živančev, N. Đurišić-Mladenović, M. Godula, **Principal mycotoxins in wheat flour** from the Serbian market: levels and assessment of the exposure by wheat-based products, Food Control, 25, 389-396, 2012.
6. B. Škrbić, A. Malachova, J. Živančev, Z. Veprikova, J. Hajšlova, **Fusarium mycotoxins in wheat samples** harvested in Serbia: A preliminary survey, Food Control, 22, 1261-1267, 2011.

# Webinar

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**ThermoFisher SCIENTIFIC**

### Rapid Analysis of Mycotoxins in Foods and Feed

Dr. Michal Godula<sup>1</sup>, Prof. Biljana Škrbić<sup>2</sup>  
<sup>1</sup> Thermo Fisher Scientific, Prague, Czech Republic  
<sup>2</sup> Centre of Excellence in Food Safety and Emerging Risks, University of Novi Sad, Serbia

Pause 00:01 / 22:16

Rapid Analysis of Mycotoxins in Foods and Feed



## In general, multiple mycotoxins were determined in crude extracts prepared by simple method of extraction analyzed by UHPLC-HESI-MS/MS...

Wheat grains,  
flour, paprika,  
black pepper,  
green coffee,  
maize,  
sunflower seed



Homogenized sample 5g

Extraction 1 h (shaking)

← 20 ml ACN/H<sub>2</sub>O (84:16, v/v)

Filtration

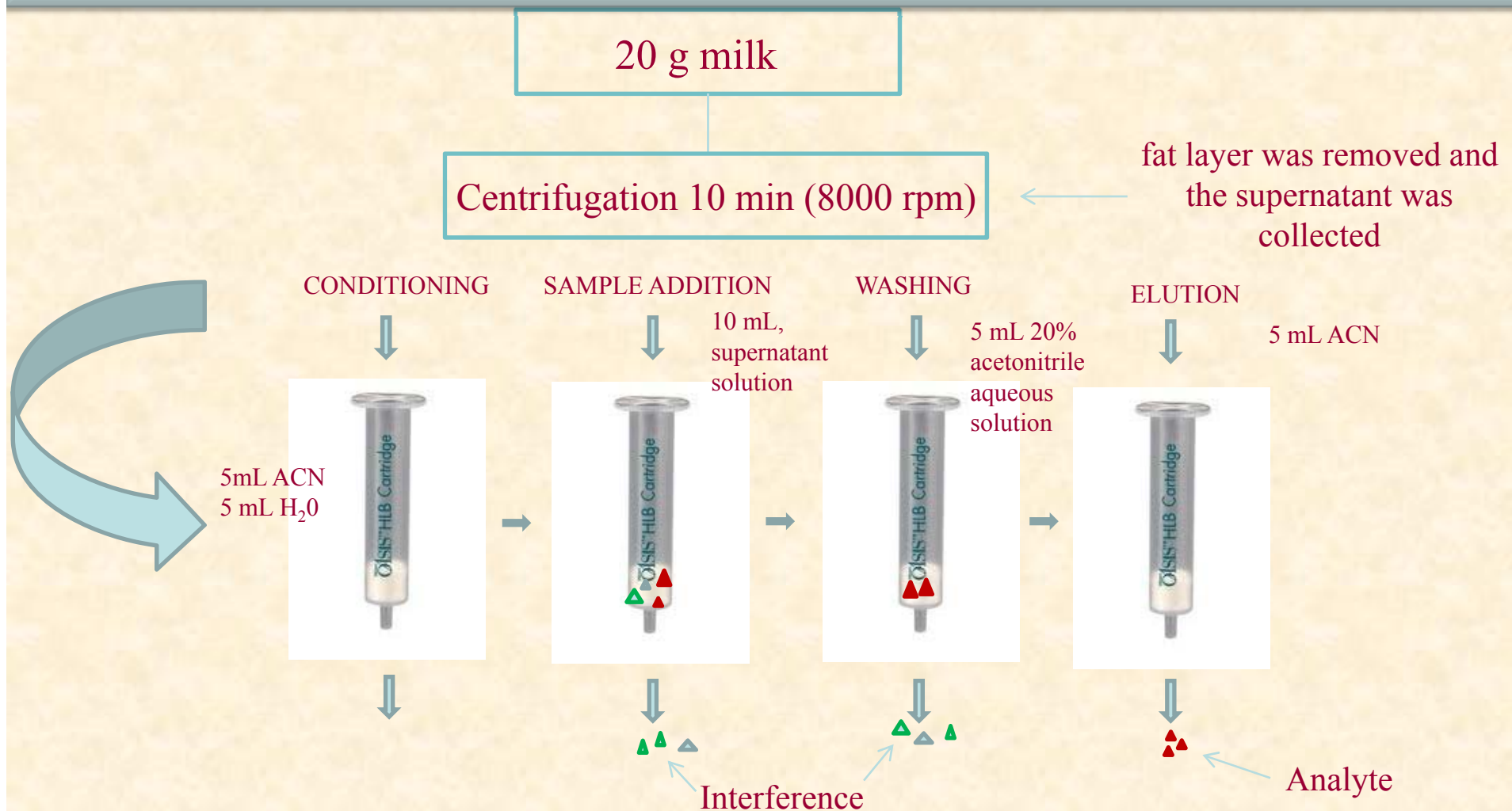
Dilution (1:3)

← with UHPLC mobile phase of the initial content (95% A and 5% B)

0.2 µm nylon syringe filter

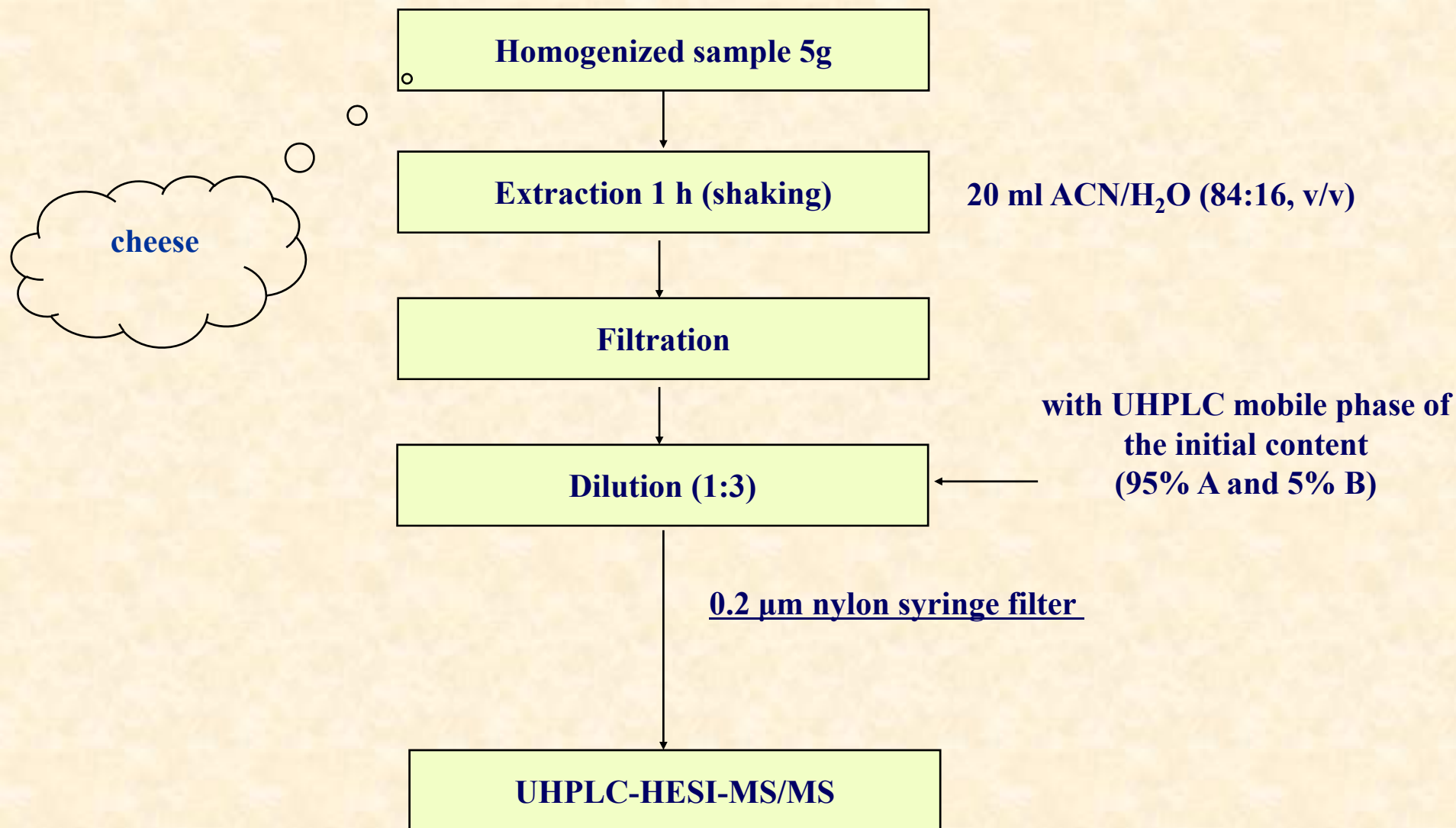
UHPLC-HESI-MS/MS

The sample preparation procedure for AFM1 determination in milk was based on solid phase extraction (Oasis HLB, Waters).



*Eluate was collected and evaporated to dryness using gentle stream of nitrogen. The residue was reconstituted with 1 ml of 20% aqueous acetonitrile and the obtained solution was passed through the 0.2 µm nylon syringe filter.*

The simple sample preparation technique with only one step of extraction was also used for isolation of AFM1 from cheese.





**The results of these studies represent the first most comprehensive data published on the mycotoxins occurrence in the foodstuff from the Serbian market.**

**Generally, all the analyzed food commodities were in compliance with the relevant national and EU regulation, except in the case of milk...**



*The obtained results indicate that the contamination of milk with AFM1 has the potential to be a serious public health problem in Serbia, particularly if the EU regulation would be taken into account.*

## Selected articles published in journals from the SCI list dedicated to the **chemical food safety issues:**

### **Inorganic and organic pollutants:**

1. S. Škaljac, Lj. Petrović, T. Tasić, P. Ikonić, M. Jokanović, V. Tomović, N. Džinić, B. Šojić, A. Tjapkin, B. Škrbić, Influence of smoking in traditional and industrial conditions **on polycyclic aromatic hydrocarbons content in dry fermented sausages** (*Petrovska klobása*) from Serbia, *Food Control*, 40, 12-18, 2014.
2. Z. Šereš, B. Škrbić, D. Šoronja-Simović, B. Pajin, Lj. Dokić, Dj. Tadić, **Metal and polycyclic aromatic hydrocarbon content of products in sugar production**, In: *Sucrose -properties, biosynthesis and health implications*; editor Salvatore Magzu, Nova Publisher, New York, p 1 – 35, 2013.
3. B. Škrbić, J. Živančev, N. Mrmoš, Concentrations **of arsenic, cadmium and lead in selected foodstuffs** from Serbian market basket: Estimated intake by the population from the Serbia, *Food Chem. Toxicol.*, 58, 440-448, 2013.
4. B. Škrbić, N. Đurišić-Mladenović, N. Mačvanin, Determination **of metal contents in sugar beet** (*Beta vulgaris*) and its products: Empirical and statistical approach, *Food Sci. Technol. Res.*, 16, 123-134, 2010.
5. B. Škrbić, J. Cvejanov, N. Đurišić-Mladenović, **Polycyclic aromatic hydrocarbons in products of a beet sugar factory** in Vojvodina: Levels and intakes, *Polycycl. Aromat. Comp.*, 28, 348-361, 2008.
6. B. Škrbić, Z. Predojević, Levels of **organochlorine pesticides in crops and related products** from Vojvodina, Serbia: Estimated dietary intake, *Arch. Environ. Contam. Toxicol.*, 54, 628-636, 2008.
7. B. Škrbić, J. Sudi, R. Vučković, Levels **of polycyclic aromatic hydrocarbons in products of the Serbian beet sugar factory**, *Zuckerindustrie*, 133, 31-35, 2008.
8. B. Škrbić, Assessment of the Serbian population exposure **to polychlorinated biphenyls by crops**, *Environ. Toxicol. Pharmacol.*, 25, 171-175, 2008.
9. B. Škrbić, J. Gyura, **Iron, copper and zinc in white sugar** from Serbian sugar beet refineries, *Food Control*, 18, 135-139, 2007.
10. B. Škrbić, A. Onjia, Multivariate analyses of **microelement contents in wheat** cultivated in Serbia (2002), *Food Control*, 18, 338-345, 2007.



## Selected articles published in journals from the SCI list dedicated to the **chemical food safety issues:**

### **Inorganic and organic pollutants:**

11. B. Škrbić, J. Cvejanov, N. Đurišić-Mladenović, **Organochlorine residues in some the Serbian agricultural products**, *Fresen. Environ. Bull.*, 16, 122-126, 2007.
12. B. Škrbić, B. Filipčev, **Element intakes through the consumption of different types of bread** by Serbian population, *Acta Alimentaria*, 36, 217-229, 2007.
13. B. Škrbić, **Organochlorine and organophosphate pesticide residues in wheat** varieties from Serbia, *Food Addit. Contam.*, 24, 695-703, 2007.
14. B. Škrbić, N. Đurišić-Mladenović, **Non-dioxin-like PCBs in crops and related products**: levels and intakes in Serbia, *Food Addit. Contam.*, 24, 652-662, 2007.
15. B. Škrbić, Level of **organochlorine pesticides and polychlorinated biphenyls in products of sugar beet refineries** in Serbia, *Fresen. Environ. Bull.*, 16, 576-581, 2007.
16. B. Škrbić, J. Gyura, Survey on some **contaminants in white sugar** from Serbian sugar beet refineries, *Food Addit. Contam.*, 23, 31-35, 2006.
17. B. Škrbić, S. Čupić, **Toxic and essential elements in soft wheat grain** cultivated in Serbia, *Eur. Food Res. Technol.*, 221, 361-366, 2005.
18. B. Škrbić, N. Đurišić-Mladenović, **Toxic and essential elements in Serbian sugar beet, molasses and white sugar**, *Zuckerindustrie*, 130, 913-917, 2005.
19. E. Lončar, Lj. Kolarov, R. Malbaša, B. Škrbić, Qualitative TLC determination of some **polycyclic aromatic hydrocarbons in sugar-beet**, *J. Serb. Chem. Soc.*, 70, 1237-1242, 2005.

**Heavy elements and persistent organic pollutants (OCPs, PCBs, PAHs) were analyzed in samples of food collected in the Serbian supermarkets as well as in some raw materials and by products of the Serbian sugar beet processing plants.**

**These results were also the FIRST ones of this kind used for the assessment of the intake by the general Serbian population.**

## Selected articles published in journals from the SCI list dedicated to the **food quality**:

1. Nebojša Stilinović, Biljana Škrbić, Jelena Živančev, Nataša Mrmoš, Nebojša Pavlović and Saša Vukmirović, **The level of elements and antioxidant activity of commercial dietary supplement formulations based on edible mushrooms**, Food and Function 2014 (accepted paper) DOI: 10.1039/c4fo00703d
2. B. Škrbić, N. Mačvanin, **Nutritional and sensorial aspects of wheat bread enriched with high-oleic sunflower seed**, Acta Alimentaria, 40, 194-204, 2011.
3. B. Škrbić, J. Cvejanov, **The enrichment of wheat cookies with high-oleic sunflower seed and hull-less barley flour: Impact on nutritional composition, content of heavy elements and physical properties**, Food Chemistry, 124, 1416-1422, 2011.
4. S. Žilić, D. Dodig, V. Hadži-Tašković Šukalović, M. Maksimović, G. Saratlić, B. Škrbić, **Bread and durum wheat compared for antioxidants contents, and lipoxigenase and peroxidase activities**, Internat. J. Food Sci. Technol., 45, 1360-1367, 2010.
5. B. Škrbić, S. Milovac, D. Dodig, B. Filipčev, **Effects of hull-less barley flour and flakes on bread nutritional composition and sensory properties**, Food Chemistry, 115, 982-988, 2009.
6. B. Škrbić, B. Filipčev, **Element intakes through the consumption of different types of bread by Serbian population**, Acta Alimentaria, 36, 217-229, 2007.



**The work on food quality was dedicated to new recipes on wheat based products enriched with nutritionally valuable ingredients like high-oleic sunflower seed and hull-less barley flour.**

**In the enriched bread and cookies, the nutritionally valuable components were determined as well as the presence of the toxic elements in order to evaluate their chemical safety.**

## Selected articles published in journals from the SCI list dedicated to the **environmental pollution:**

### **Inorganic and organic pollutants:**

1. M. Petrović, B. Škrbić, J. Živančev, L. Ferrando-Climent, D. Barcelo, Determination of 81 **pharmaceutical drugs** by high performance liquid chromatography coupled to mass spectrometry with hybrid triple quadrupole–linear ion trap **in different types of water** in Serbia, *Sci. Total Environ.*, 468-469, 415-428, 2014.
2. B. Škrbić, N. Đurišić-Mladenović, Distribution of **heavy elements in urban and rural surface soils**: the Novi Sad city and the surrounding settlements, Serbia, *Environ. Monit. Assess.*, 185, 457-471, 2013.
3. B. Škrbić, S. Milovac, M. Matavulj, **Multielement profiles of soil, road dust, tree bark and wood-rotten fungi** collected at various distances from high-frequency road in urban area, *Ecol. Ind.*, 13, 168-177, 2012.
4. B. Škrbić, N. Đurišić-Mladenović, Levels of **PAHs in soil samples** from the vicinity of oil refinery Novi Sad-Serbia, *Kuwait J. Sci. Eng.*, 36 (1A), 63-75, 2009.
5. B. Škrbić, J. Cvejanov, N. Đurišić-Mladenović, **Organochlorine pesticides and polychlorinated biphenyls in surface soils** of Novi Sad and bank sediment of the Danube River, *J. Environ. Sci. Health*, B42 , 311-319, 2007.
6. B. Škrbić, J. Cvejanov, N. Đurišić-Mladenović, **Polycyclic aromatic hydrocarbons in surface soils** of Novi Sad and bank sediment of the Danube River, *J. Environ. Sci. Health A*, 40, 29-43, 2005.
7. B. Škrbić; S. Čupić, **Trace metal distribution in surface soils** of Novi Sad and bank sediment of the Danube River, *J. Environ. Sci. Health A*, 39, 1547-1558, 2004.
8. B. Škrbić, J. Novaković, N. Miljević, **Mobility of heavy metals** originating from bombing of industrial sites, *J. Environ. Sci. Health*, A 37, 7-16, 2002.
9. B. Škrbić, N. Miljević, An **evaluation of residues at an oil refinery sites** following fires, *J. Environ. Sci. Health*, A 37, 1029-1039, 2002.

**The samples from the urban and rural environment in**

**selected locations mainly**

**from the Vojvodina Province were**

**analyzed for the presence of**

**•persistent organic pollutants,**

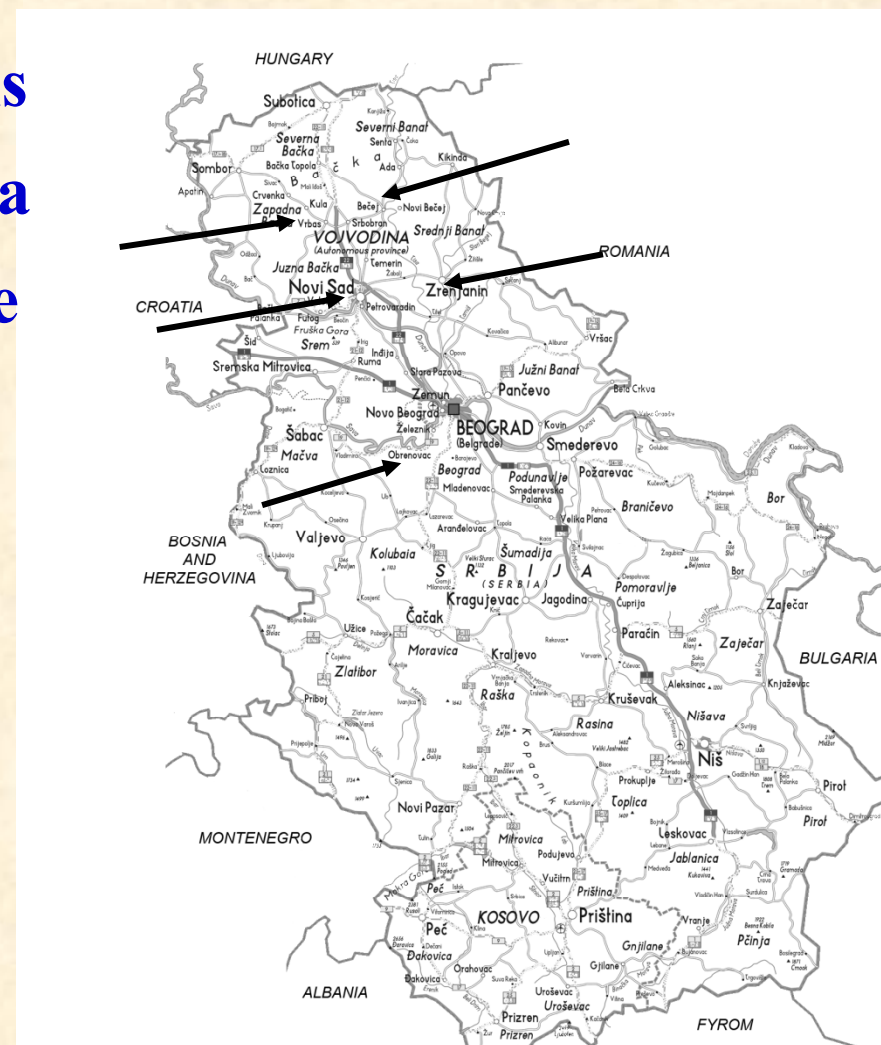
**•heavy elements and**

**•emerging pollutants like**

**pharmaceutically active compounds**



**Monitoring of pharmaceuticals in waters from northern Serbia was conducted jointly with the team from Catalan Institute for Water Research, Girona, Spain, coordinated by Prof. Dr. Damia Barcelo and Dr. Mira Petrović.**



## PhAC Analysis in water samples

SAMPLE  
PRE-TREATMENT

FILTRATION

500 mL ground and surface water 200 mL effluent

EXTRACTION &  
PRE-  
CONCENTRATION  
SPE OASIS HLB®

Elution with 2x4 mL MeOH, 1 mL MeOH/H<sub>2</sub>O (25:75, v/v)

Addition of 34 isotopically labelled standards

UPLC-QqLIT-MS/MS

**Filtration:** 1 µm glass fiber filters  
V (sample) – 200 mL effluent, 500 mL ground and surface water



*Parameters of the applied UPLC-QqLIT-MS/MS method could be found in Škrbić et al.*

*Sci. Tot. Environ. 468-469 (2014) 415-428*

**This was the first comprehensive study on  
the simultaneous occurrence of  
pharmaceuticals in different types of water  
from Serbia,**

...





**which is dominated almost  
entirely by the drainage basin of  
the river Danube  
and could therefore reflect  
water contamination by drugs throughout  
Eastern Europe.**





- **81 pharmaceutically active compounds were analyzed in surface, underground, drinking and municipal waste waters by UPLC-QqLIT-MS/MS method.**





**The HIGHEST concentrations (more than 1  $\mu\text{g/L}$ ) of pharmaceuticals like ibuprofen, diclofenac, and carbamazepine metabolites, were found in MUNICIPAL WASTE WATER, while the lowest occurrence were in drinking waters.**

**In the absence of the official limits,  
comparison with literature data revealed generally  
lower levels of the pharmaceuticals in surface and  
drinking waters from Serbia.**



## Selected articles published in journals from the SCI list dedicated to the **environmental protection, including “green” remediation and waste valorization:**

1. E. Sajben-Nagy, L. Manczinger, B. Škrbić, J. Živančev, I. Antić, J. Krisch, Cs. Vágvölgyi, Characterization of an **extracellular laccase** of *Leptosphaerulina chartarum*, *World J. Microbiol. Biotechnol.*, DOI 10.1007/s11274-014-1670-8
2. Cs. Vágvölgyi, E. Sajben –Nagy, B. Boka, M. Voros, A. Berki, A. Palagyi, J. Krisch, B. Škrbić, N. Đurišić-Mladenović, L. Manczinger, Isoaltion and characterization of antagonistic ***Bacillus* strains capable to degrade ethylenethiourea**, *Curr. Microbiol.*, 66, 243-250, 2013.
3. M.Šćiban, M.Klašnja, M. Antov, B.Škrbić, **Removal of water turbidity by natural coagulants** obtained from chestnut and acorn, *Bioresour. Technol.*, 100, 6639-6643, 2009.
4. M.Šćiban, M.Klašnja, B.Škrbić, **Adsorption of copper ions from water by modified agricultural by-products**, *Desalination*, 229, 170-180, 2008.
5. M.Šćiban, M.Klašnja, B.Škrbić, **Modified hardwood sawdust as adsorbent of heavy metal ions from water**, *Wood Sci. Technol.*, 40, 217-227, 2006.
6. M.Šćiban, M.Klašnja, B.Škrbić, **Modified softwood sawdust as adsorbent of heavy metal ions from water**, *J. Hazard. Mater.*, B136, 266-271, 2006.
7. B.Škrbić, J.Cvejanov, **Pressure drop determination in packed column for sulfur dioxide absorption**, *J.Serb.Chem.Soc.*, 60, 821-825, 1995.
8. B.Škrbić, J.Cvejanov, **Liquid holdup determination in packed columns for sulfur dioxide absorption**, *Sep. Purif.Tech.*, 8, 13-16, 1994.
9. B.Škrbić, J.Cvejanov, R.Paunović, **Citrate process for SO<sub>2</sub> recovery, Vapor-liquid data and correlation**, *Sep. Purif.Tech.*, 7, 27-30, 1993.
10. B.Škrbić, J.Cvejanov, R.Paunović, **An extension of semiempirical gas-liquid equilibrium model for sulphur dioxide absorption in aqueous sodium citrate solution**, *Chem.Eng.Sci.*, 46, 3314-3317, 1991.



**Articles published with the Hungarian colleagues presented the results obtained in 2 Hungarian-Serbian IPA projects, which main research interests were in domain of eco-friendly bioremediation techniques, while the activities of CEFSEER referred to**

- **identification and quantification of the various pesticides and their degradation products in soil and water,**
- **determination of selected pesticides degradation kinetics**



**Magyarország-Szerbia**  
IPA Határon Átnyúló Együttműködési Program



**Hungary-Serbia**  
IPA Cross-border Co-operation Programme



**Mađarska-Srbija**  
IPA prekogranični program

# Additionally, waste valorization was also tackled by investigating the potential of lignocelulozic materials for wastewater treatment and removal of heavy elements.

Wood Sci Technol (2006) 40: 217–227  
DOI 10.1007/s00226-005-0061-6

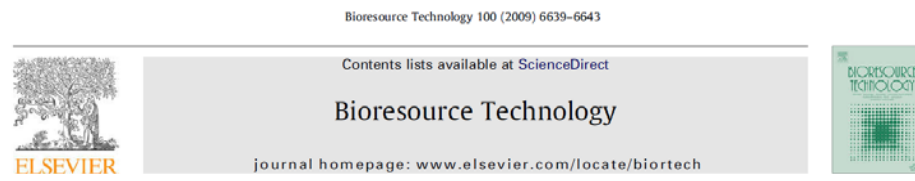
**ORIGINAL**

Marina Sciban · Mile Klasnja · Biljana Škrbić

## Modified hardwood sawdust as adsorbent of heavy metal ions from water

Received: 21 February 2005 / Published online: 25 January 2006  
© Springer-Verlag 2006

**Abstract** The sawdust of oak and black locust hardwood was four good adsorption capacities for heavy metal ions. The leaching of organic matters during the adsorption can be prevented by each of following pre-treatments of adsorbents: with formaldehyde in acidic medium, with sodium hydroxide solution after formaldehyde treatment, or with sodium hydroxide only. The studies indicated that the leaching of colour from modified hardwood sawdust was less than that from unmodified wood sawdust, namely between 70 and 94%, dependent on wood species and the method of modification. At the same time, adsorption capacities of modified adsorbents were higher than unmodified adsorbents when sodium hydroxide was applied for modification. When formaldehyde was applied for modification, the adsorption capacities of adsorbents were lower than unmodified adsorbents.



Short Communication

## Removal of water turbidity by natural coagulants obtained from chestnut and acorn

Marina Šćiban\*, Mile Klasnja, Mirjana Antov, Biljana Škrbić

Faculty of Technology, University of Novi Sad, Bul. Cara Lazara 1, 21000 Novi Sad, Serbia



Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

 ScienceDirect

Desalination 229 (2008) 170–180

**DESALINATION**

[www.elsevier.com/locate/desal](http://www.elsevier.com/locate/desal)

## Adsorption of copper ions from water by modified agricultural by-products

M. Šćiban\*, M. Klasnja, B. Škrbić

Faculty of Technology, University of Novi Sad, Bul. Cara Lazara 1, 21000 Novi Sad, Serbia  
Tel. +381 (21) 4853737; Fax +381 (21) 450413; email: [msciban@uns.ns.ac.yu](mailto:msciban@uns.ns.ac.yu)

## Selected articles published in journals from the SCI list dedicated to the **application of chemometrics:**

1. B. Škrbić, K. Heberger, N. Đurišić-Mladenović, Comparison of multianalyte proficiency test results by sum of ranking differences, principal component analysis, and hierarchical cluster analysis, *Anal. Bioanal. Chem.*, 405, 8363-8375, 2013.
2. K. Héberger, B. Škrbić, Ranking and similarity for quantitative structure–retention relationship models in predicting Lee retention indices of polycyclic aromatic hydrocarbons, *Anal. Chim. Acta*, 716, 92-100, 2012.
3. T. Stafilov, B. Škrbić, J. Klanova, P. Čupr, I. Holoubek, M. Kočor, N. Đurišić-Mladenović, Chemometric assessment of the semivolatile organic contaminants content in the atmosphere of the selected sites in the republic of Macedonia, *J. Chemometr.*, 25, 262-274, 2011.
4. B. Škrbić, N. Đurišić-Mladenović, Chemometric interpretation of heavy metal patterns in soils worldwide, *Chemosphere*, 80, 1360-1369, 2010.
5. B. Škrbić, K. Szyrwińska, N. Đurišić-Mladenović, P. Nowicki, J. Lulek, Principal component analysis of indicator PCB profiles in breast milk from Poland, *Environ. Int.*, 36, 862-872, 2010.
6. B.Škrbić, A. Onjia, Multivariate analyses of microelement contents in wheat cultivated in Serbia (2002), *Food Control*, 18, 338-345, 2007.
7. B. Škrbić, N. Đurišić-Mladenović, Distribution of chlorinated organic pollutants in a wide variety of soils from Europe and Asia worldwide: A multivariate statistical approach, *Arch. Environ. Contam. Toxicol.*, 52, 466-474, 2007.
8. B. Škrbić, N. Đurišić-Mladenović, Principal component analysis for soil contamination with organochlorine compounds, *Chemosphere* 68, 2144-2152, 2007.
9. B. Škrbić, A. Onjia, Prediction of programmed-temperature retention indices of polycyclic aromatic hydrocarbons in the Lee index scale by artificial neural network, *MATCH Commun. Math. Comput. Chem.*, 55, 287-304, 2006.
10. B. Škrbić, A. Onjia, Prediction of the Lee retention indices of polycyclic aromatic hydrocarbons by artificial neural network, *J. Chromatogr. A*, 1108, 279-284, 2006.



## Selected articles published in journals from the SCI list dedicated to the **application of chemometrics:**

11. B. Škrbić, N. Đurišić-Mladenović, J. Cvejanov, Principal component analysis of trace elements in Serbian wheat, *J. Agric. Food Chem*, 53, 2171-2175, 2005.
12. S. Sremac, B. Škrbić, A. Onjia, Artificial neural network prediction of quantitative structure – retention relationships of polycyclic aromatic hydrocarbons in gas chromatography, *J. Serb. Chem. Soc.*, 70, 1291-1300, 2005.
13. B.Škrbić, A.Onjia, J.Cvejanov, N.Đurišić-Mladenović, S.Čupić, Relation between selected heavy metal concentrations in wheat from growing regions of Serbia, *J. Environ. Prot. Ecol.*, 6, 651-659, 2005.
14. D.Golobočanin, B.Škrbić, N.Miljević, Principal component analysis for soil contamination with PAHs, *Chemom. Intell. Lab.Syst.*, 72, 219-223, 2004.
15. B. Škrbić, N. Đurišić- Mladenović, J. Cvejanov, Discrimination between linear and non-linear models for retention indices of polycyclic aromatic hydrocarbons in the so-called Lee's scale, *Chemom. Intell. Lab.Syst.*, 72, 167-171, 2004.
16. L. Slavković, B.Škrbić, N.Miljević, A.Onjia, Principal component analysis of trace elements in industrial soils, *Environ. Chem. Lett.*, 2, 105-108, 2004.
17. B.Škrbić, Comparison of methods for prediction of the retention data of aromatic hydrocarbons on UCON LB 550X and on polydimethylsiloxane, *Chromatographia*, 47, 11/12, 721-723, 1998.
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19. B.Škrbić, Lj.Pavić-Suzuki, Application of the unified retention data in environmental analysis, *J.Serb.Chem.Soc.*, 62, 565-573, 1997.
20. B.Škrbić, Unified retention indices of hydrocarbons on dinonyl-phthalate phase, *J.Serb.Chem.Soc.*, 62, 575-579, 1997.



## Selected articles published in journals from the SCI list dedicated to the **application of chemometrics:**

21. B.Škrbić, J.Cvejanov, Lj.Pavić-Suzuki, Contribution to the unified retention data of hydrocarbons on squalane, *Chromatographia*, 42, 660-664, 1996.
22. B.Škrbić, Comparison of correlation for prediction of gas chromatographic separation of alkylbenzenes, *Chromatographia*, 41, 183-186, 1995
23. B.Škrbić, Unified retention indices of some alkylbenzenes and bicyclic aromatic and related compounds on OV-101 and SE-30, *J.Serb.Chem.Soc.*, 59, 153-155, 1994.
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26. B.Škrbić, J.Cvejanov, Unified retention indices of alkylbenzenes on OV-101 and SE-30, *Chromatographia*, 37, 215-217, 1993.
27. B.Škrbić, J.Cvejanov, Unified retention indices of hydrocarbons on BP-1 dimethylsiloxane stationary phases, *Chromatographia*, 34, 83-84, 1992.

**The chemometric tools like  
principal component analysis,  
hierarchical cluster analysis,  
sum of ranking differences and  
artificial neural networks  
have been applied on the large data sets created  
in order to assess ...**

- the hidden correlations among measured variables,
- the pollution sources, and
- to compare the analytical results obtained in different laboratories.

Anal Bioanal Chem (2013) 405:8363–8375  
DOI 10.1007/s00216-013-7206-5

RESEARCH PAPER

### Comparison of multianalyte proficiency test results by sum of ranking differences, principal component analysis, and hierarchical cluster analysis

Biljana Škrbić · Károly Héberger · Nataša Đurišić-Mladenović

Special Issue Article

CHEMOMETRICS

Received: 3 August 2010, Revised: 21 October 2010, Accepted: 19 November 2010, Published online in Wiley Online Library: 17 March 2011

(wileyonlinelibrary.com) DOI: 10.1002/cm.1374

### Chemometric assessment of the semivolatile organic contaminants content in the atmosphere of the selected sites in the Republic of Macedonia

Trajče Stafilov<sup>a</sup>, Biljana Škrbić<sup>b\*</sup>, Jana Klánová<sup>c</sup>, Pavel Čupr<sup>c</sup>

Analytica Chimica Acta 716 (2012) 92–100



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Analytica Chimica Acta

journal homepage: [www.elsevier.com/locate/aca](http://www.elsevier.com/locate/aca)



Ranking and similarity for quantitative structure–retention relationship models in predicting Lee retention indices of polycyclic aromatic hydrocarbons

Károly Héberger<sup>a,\*</sup>, Biljana Škrbić<sup>b</sup>



Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

ScienceDirect

Chemosphere 68 (2007) 2144–2152

CHEMOSPHERE

[www.elsevier.com/locate/chemosphere](http://www.elsevier.com/locate/chemosphere)

### Principal component analysis for soil contamination with organochlorine compounds

Biljana Škrbić<sup>a,\*</sup>, Nataša Đurišić-Mladenović

Faculty of Technology, University of Novi Sad, Bulevar cara Lazara 1, 21000 Novi Sad, Serbia  
Received 27 November 2006; received in revised form 22 January 2007; accepted 30 January 2007  
Available online 13 March 2007

Abstract

In order to investigate the distribution pattern of individual organochlorine compounds in soil samples collected from the sites (Cancer Island – Spain, China, Germany, India, Romania, Russia, Serbia, Swiss, UK) affected by industrial activities to the most remote

Environment International 36 (2010) 862–872

Contents lists available at ScienceDirect

Environment International

journal homepage: [www.elsevier.com/locate/envint](http://www.elsevier.com/locate/envint)



### Principal component analysis of indicator PCB profiles in breast milk from Poland

<sup>a,\*</sup>, Katarzyna Szyrwińska<sup>b</sup>, Nataša Đurišić-Mladenović<sup>a</sup>, Piotr Nowicki<sup>b</sup>, Janina Lulek<sup>b</sup>

University of Novi Sad, 21000 Novi Sad, Serbia  
Poznan University of Medical Sciences, 60-780 Poznan, Poland

INFO

July 2009

ABSTRACT

Principal component analysis (PCA) was applied to a data set containing the levels of indicator polychlorinated biphenyls (PCBs) in human milk of mothers living in the Wielkopolska region, Poland, in order to investigate

## Selected articles published in journals from the SCI list dedicated to the **gaseous and alternative fuels and fuel combustion:**

1. Z. Predojević, B. Škrbić, N. Đurišić-Mladenović, **Transesterification of linoleic and oleic sunflower oils to biodiesel** using CaO as a solid base catalyst, *J. Serb. Chem. Soc.*, 77, 815-832, 2012.
2. Z. Predojević, B. Škrbić, N. Đurišić-Mladenović, Effects of **ethanol and MTBE additives on properties at blends with base gasoline**, *Fresen. Environ. Bull.*, 20, 1401-1405, 2011.
3. Z. Predojević, B. Škrbić, **Alkali-catalyzed production of biodiesel from waste frying oils**, *J. Serb. Chem. Soc.*, 74, 993-1007, 2009.
4. B. Škrbić, J. Cvejanov, Comparative analysis of methods for determination of **calorific values of natural gas mixture**, *Fuel Process Technol.*, 28, 307-314, 1991.
5. B. Škrbić, S. Joksimović-Tjapkin, The effect of **solid particles on burning velocity of premixed flame**: critical review, *Hung. J. Ind. Chem.*, 16, 393-405, 1988.
6. B. Škrbić, Note of inaccuracy of **the particle track methods**, *J. Serb. Chem. Soc.*, 50, 419-425, 1985.
7. B. Škrbić, J. Cvejanov, M. Peruničić, Selection of **mixing rule for the prediction of the laminar burning velocity for multicomponent mixture**, *Hung. J. Ind. Chem.*, 13, 199-208, 1985.
8. B. Škrbić, M. Zlatković, Simple method for **the rapid analysis of natural gas by gas chromatography**, *Chromatographia*, 17, 44-46, 1983. *Analytic Chemistry Application Review '85*, 57 (5) 274 R (1985).



# In domain of gaseous and alternative fuels, the natural gas combustion and biofuel production and usage have been covered.



*J. Serb. Chem. Soc.* 77 (6) 815–832 (2012)  
JSCS–4311

Journal of  
the Serbian  
Chemical Society

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UDC 665.334.9+66.095-13/.14+546.41-31+  
544.478:665.75.000.57  
*Original scientific paper*

## Transesterification of linoleic and oleic sunflower oils to biodiesel using CaO as a solid base catalyst

ZLATICA PREDOJEVIĆ\*<sup>#</sup>, BILJANA ŠKRBIĆ<sup>#</sup> and NATAŠA ĐURIŠIĆ-MLADENOVIĆ

*Faculty of Technology, University of Novi Sad, Bulevar cara Lazara 1,  
21000 Novi Sad, Serbia*



*J. Serb. Chem. Soc.* 74 (8–9) 993–1007 (2009)  
JSCS–3894

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the Serbian  
Chemical Society

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UDC 665.75.000.57+66.095.13/.14:  
665.2.000.68  
*Original scientific paper*

## Alkali-catalyzed production of biodiesel from waste frying oils

ZLATICA J. PREDOJEVIĆ\* and BILJANA D. ŠKRBIĆ

*Faculty of Technology, University of Novi Sad, Bulevar cara Lazara 1, 21000 Novi Sad, Serbia*

## EFFECTS OF ETHANOL AND MTBE ADDITIVES ON PROPERTIES OF BLENDS WITH BASE GASOLINE

By: Predojevic, ZJ (Predojevic, Zlatica J.)<sup>[1]</sup>; Skrbic, BD (Skrbic, Biljana D.)<sup>[1]</sup>; Durisic-Mladenovic, NL (Durisic-Mladenovic, Natasa L.)<sup>[1]</sup>

FRESENIUS ENVIRONMENTAL BULLETIN

Volume: 20 Issue: 6 Pages: 1401-1405

Published: 2011

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## Projects:

**Project of Provincial Secretariat for Science and Technological Development:** *Occurrence of emerging pollutants in the environment and foodstuffs from the Serbian market, 2014.* Coordinator: Prof. Dr. Biljana Škrbić

**Project of Serbian Ministry of Education and Science: No. 172050,** *Development and application of the advanced chromatographic and spectrometric methods in the analysis of xenobiotics and their degradation pathways in biotic and abiotic matrices, 2011-2015.* Coordinator: Prof. Dr. Biljana Škrbić

**Project of Provincial Secretariat for Science and Technological Development:** *Estimation of chemical safety of market basket and population dietary exposure, 2011-2015.* Coordinator: Prof. Dr. Biljana Škrbić

**Bilateral project within Programme of Serbian - Chinese Science and Technology Cooperation,** *Human exposure assessment to heavy elements, phthalic acid esters and persistent organic pollutants through air, water, dust and food, 2013 -2015.* Coordinator of the Serbian team: Prof. Dr. Biljana Škrbić

## Projects:

**Project cofinanced by EU within Hungary-Serbia IPA Cross-border Co-operation programme implemented within the 2007 – 2013 European Union financial framework under the Instrument for Pre-accession Assistance (IPA), *Development of an enzymological (laccase-based) remediation product and technology (LACREMED )*, HU - SRB /1002/214/147, 2012 -2013. Coordinator of the Serbian team (Deputy Research Project Manager): Prof. Dr. Biljana Škrbić**

**Bilateral project within Programme of scientific and technological cooperation between the Republic of Serbia and the Kingdom of Spain, *Advanced chromatographic and mass spectrometric techniques in food chemical safety analysis, 2012-2013*. Coordinator of the Serbian team: Prof. Dr. Biljana Škrbić**

**COST Action TD 1203 – *Food waste valorization for sustainable chemicals, materials and fuels (EUBis)*, 2012-2016, participation**

**COST Action ES 1202 – *Conceiving wastewater treatment in 2020 – Energetic, environmental and economic challenges (Water\_2020)*, 2012-2016, participation**

**COST Action ES 1403 - *New and emerging challenges and opportunities in wastewater reuse (NEREUS)*, 2014-2018, participation**

## Projects:

**FP7 project No . 229629, CEFSEER** - *Reinforcing research potential in the Laboratory for Chemical Contaminants at the Faculty of Technology towards the establishment of the Center of Excellence in Food Safety and Emerging Risks, 2009-2012.* Coordinator: Prof. Dr. Biljana Škrbić

**Bilateral project within Serbian-Portugal intergovernmental S&T programme,** *Polycyclic aromatic hydrocarbons and biogenic amines in smoked dry traditionally manufactured meat products from Serbia and Portugal, 2011-2012.* Coordinator of the Serbian team: Prof. Dr. Biljana Škrbić

**Bilateral project within Serbian–Croatian intergovernmental S&T programme ,** *Inorganic and organic pollutants in urban areas, 2011-2012.* Coordinator of the Serbian team: Prof. Dr. Biljana Škrbić

**Project cofinanced by EU within Hungary-Serbia IPA Cross-border Co-operation programme implemented within the 2007 – 2013 European Union financial framework under the Instrument for Pre-accession Assistance (IPA),** *Development of xenobiotic - degrading bioaugmentation products ( BIOXEN ), HU - SRB /0901/214/150, 2010-2011.* Coordinator of the Serbian team (Deputy Project Manager): Prof. Dr. Biljana Škrbić



## Projects:

**Bilateral project within Serbian– Hungarian intergovernmental S&T programme, *Comparison of various analytical and chemometric methods* , 2010-2011.** Coordinator of the Serbian team: Prof. Dr. Biljana Škrbić

**Bilateral project within Serbian–Slovenian intergovernmental S&T programme , *Heavy metals in the environment as a consequence of the anthropogenic activities* , 2010-2011.** Coordinator of the Serbian team: Prof. Dr. Biljana Škrbić

**Project of Serbian Ministry for Science and Technological Development: No. 152001B, *Sources identification and correlations amongst the elements and organic compounds in abiotic and biotic matrices: risk analysis and a contribution to the monitoring and improvement of the environmental status*, 2008-2010.** Coordinator: Prof. Dr. Biljana Škrbić

**Certificated reference materials – wheat flour and soil certificated contents of polycyclic aromatic hydrocarbons, Carlsberg Srbija d.o.o., 2006/2007.** Coordinator: Prof. Dr. Biljana Škrbić

## Projects:

**Project of Serbian Ministry for Science and Technological Development: No. BTN-321004B, within National Biotechnology and Agriculture Program: *Baked goods and flour confectioneries with addition of industrial plant seed*, 2006-2007. Coordinator: Prof. Dr. Biljana Škrbić**

**Production of new certificated reference materials. Project awarded within competition of The Best Tehnological Innovation, 2007. Coordinator: Prof. Dr. Biljana Škrbić**

**Project of Austrian Federal Ministry of Foreign Affairs within Course development plus program implemented in Support to higher education in Serbia and Montenegro in 2005/2007 (2006). Coordinator: Prof. Dr. Biljana Škrbić**

## Projects:

**Project of Serbian Ministry for Science No. 1775, within Basic Research-Chemistry:** *Development of methods for identification of chemical residues and contaminants in major food crops, 2002-2005. Coordinator: Prof. Dr. Biljana Škrbić*

**Project of Serbian Ministry for Science and Environment, No. 02E31:** *Development of new technologies for wastegas and wastewater purification and methods for gas and water quality control, 1996-2000. Coordinator: Prof. Dr. Biljana Škrbić*

**Project of Serbian Ministry for Science and Environment , No. 0935:** *Development of the ecologically accepted processes and products in oil-petrochemical industry, 1991-1995. Coordinator: Prof. Dr. Biljana Škrbić*

**Through these projects important international collaboration with prestigious institutions from EU has been established:**



**Through FP7 project,  
CEFSEK, No. 229629,  
2009-2012, the  
following links have  
been established:**

- **Department of Environmental Chemistry, Barcelona, Spain**

- **Institute for Environmental Studies, Vrije University, Amsterdam, the Netherlands**

- **Thermo Fisher Scientific, Prague, Czech Republic**

- **Institute of Chemical Technology, Prague, Czech Republic**

- **CHIRON AS, Trondheim, Norway**

- **Catalan Institute for Water Research, Girona, Spain**



## With **University of Szeged** links were established through



- Project within Hungary-Serbia IPA Cross-border Co-operation programme implemented within the 2007 – 2013 European Union financial framework under the Instrument for Pre-accession Assistance (IPA), **Development of an enzymological (laccase-based) remediation product and technology (LACREMED), HU-SRB/1002/214/147, 2012-2013.**



- Project within Hungary-Serbia IPA Cross-border Co-operation programme implemented within the 2007 – 2013 European Union financial framework under the Instrument for Pre-accession Assistance (IPA), **Development of xenobiotic-degrading bioaugmentation products (BIOXEN), HU- SRB/0901/214/150, 2010-2011.**



**Scientific Council of Association of Environmental Health and Protection of Danube-Kris-Mures-Tisza (DKMT) Euroregion, Szeged, Hungary**



Through **BILATERAL PROJECTS** the links were established with the following institutions from:

•**China - College of Environmental Science and Engineering, Nankai University, Tianjin** (*Human exposure assessment to heavy elements, phthalic acid esters and persistent organic pollutants through air, water, dust and food, 2013-2015*)

•**Spain - Department of Environmental Chemistry, Institute of Environmental Assessment and Water Research, Barcelona** (*Advanced chromatographic and mass spectrometric techniques in food chemical safety analysis, 2012-2013*)

• **Portugal - Faculty of Veterinary Medicine – Technical University of Lisbon, Lisbon** (*Polycyclic aromatic hydrocarbons and biogenic amines in smoked dry traditionally manufactured meat products from Serbia and Portugal, 2011-2012*),





- **Croatia - Croatian Geological Survey, Zagreb**

*Inorganic and organic pollutants in urban areas, 2011-2012,*

- **Slovenia - Geological Survey of Slovenia, Ljubljana**

*Heavy metals in the environment as a consequence of the anthropogenic activities, 2010-2011.*

• **Hungary - Chemical Research Centre - Hungarian Academy of Sciences, Budapest**

*Comparison of various analytical and chemometric methods, 2010-2011*

**HUNGARIAN – SERBIAN INTERGOVERNMENTAL S&T COOPERATION PROGRAMME FOR 2010 – 2011**

**Comparison of various analytical and chemometric methods**

Károly Héberger, Chemical Research Center, Hungarian Academy of Sciences

Biljana Škrbić  
Nataša Đurišić-Mladenović  
Miroslav Zorić, Faculty of Technology University of Novi Sad

PROJECT DESCRIPTION

The scientific problem can be outlined as follows: The comparison of modeling methods in their best performance does not correspond to the principle of parsimony. Utilization of much less information, smaller degree of freedom can provide almost the same or even better models. If the systematic errors of a given method is not known, it is expedient to measure the same thing with (many) different methods hoping that the various errors cancel each other. However, many performance indicators indicate different methods as best; hence it is not known which method should be preferred. The novel way of method comparison is to be elaborated. Moreover, the selection of the best method is supported by cross-validation studies.

In the last years novel techniques have been elaborated for comparison of methods in the Chemical Research Center at the Hungarian Academy of Sciences. The chemometric methods to be compared have been reviewed recently. The procedure to be elaborated can be applied for comparing analytical and modeling methods alike. Several analytical and multivariate methods were elaborated and applied in The Faculty of Technology, University of Novi Sad.

It is expedient to join our forces, check the various methods and further develop the procedures for method comparison. The method comparison studies have not only theoretical interest, but they can be utilized to solve many practical problems:

- ❖ To select the best models for prediction of biological activities e.g. toxicities of different compounds;
- ❖ To establish the best column for a given separation task in HPLC
- ❖ To determine the best pattern recognition and/or classification algorithm

EXPECTED RESULTS OF THE PROJECT

- ❖ optimization of predictive models
- ❖ classification studies
- ❖ selection of the best analytical methods
- ❖ teaching students the novel chemometric methods
- ❖ practical applications of the new techniques (pollution sources, authentication and fraud in food sector, prediction of compound toxicity, optimizing chemical processes, chromatography, medical diagnosis, etc.

As a result of the activities within the project "Comparison of various analytical and chemometric methods" under the Serbian–Hungarian Intergovernmental S&T Programme, 2010-2011 article entitled „Chemometric interpretation of heavy metal patterns in soils worldwide“ is in press at Chemosphere journal



**Just recently (July 2014)**  
**Protocol of Scientific Cooperation**  
**has been agreed between**  
**“VasileGoldiș ” Western University of Arad –**  
**Institute for Life Sciences, Arad, Romania, and**  
**CEFSEr**



## **Latest interests:**

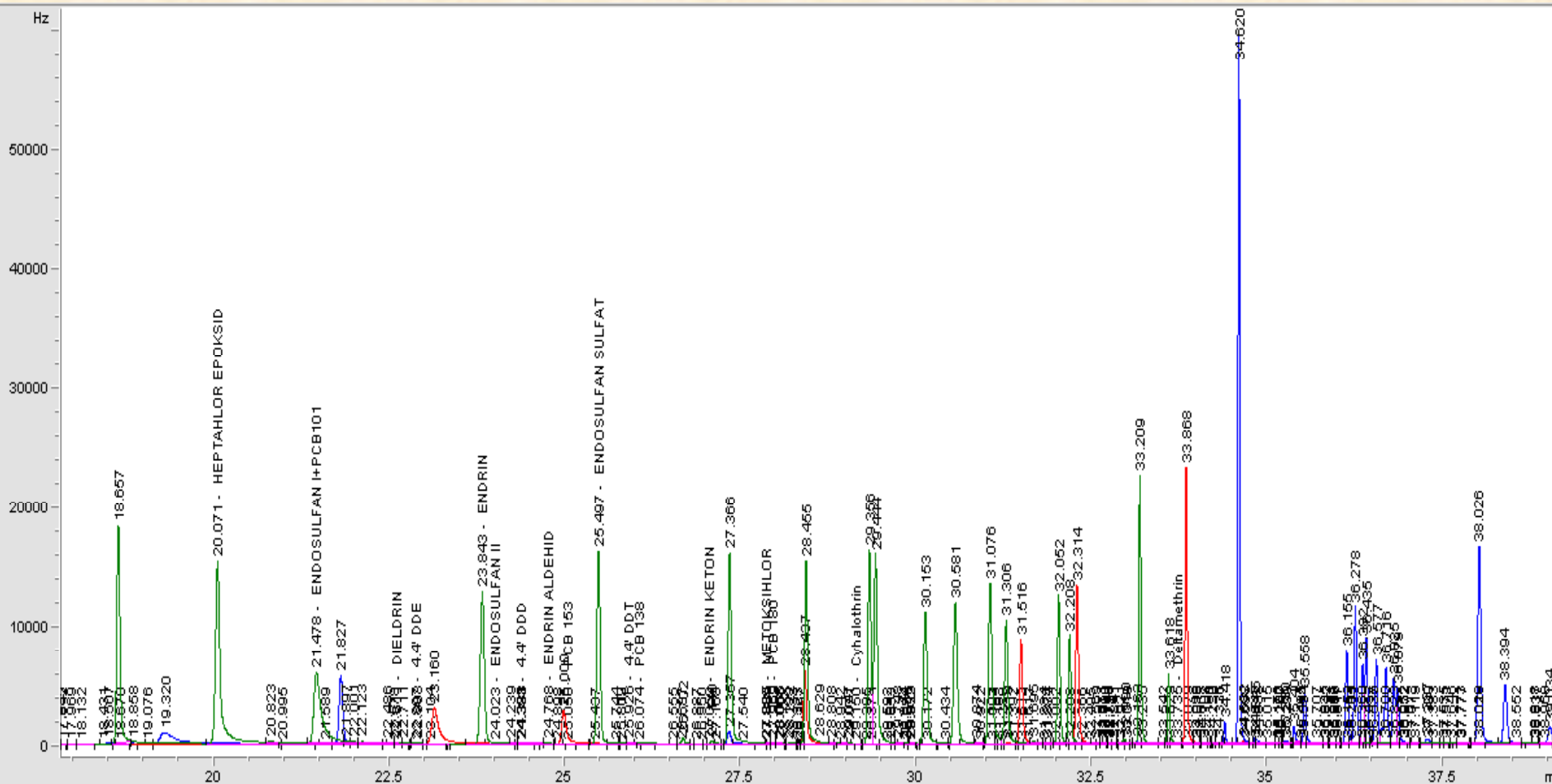
**-mycotoxins in surface waters**

**-chemometric characterization of biomass gasification,**

**and...**



# -pyrethroids in food and environmental samples



Chromatogram of the resolved standard mixture of OCPs, PCBs and PYRETHROIDS by GC- $\mu$ ECD (HP-5, 30 m x 0.25 mm, 0.25  $\mu$ m)

## EXTRACTION AND PURIFICATION

4 ml of milk

Extraction (6 ml ACN)

Shaking, 175 rpm, 30 min

Freezer at -20 °C for 12 h

Filtration (cooled filter paper that contained anhydrous sodium sulphate (2 g))

GC- $\mu$ ECD

Extraction

Purification

*Method for analysis of pyrethroids (quantitative), OCPs and PCB (screening) in milk: developed in CEFSE*

## **The events organized by the CEFSEER team have been attended by numerous researchers from Serbia and Western Balkan Countries:**

### **2014**

**COST Action TD 1203 “EUBis” – Workshop on Vegetable Waste Valorization, 6-7**

August 2014

**Training Course on Chemical Contaminants in the Environment and Food , 21-23**

August 2014

### **2013**

**Course on Perfluorinated Compounds in the Environment and Food, 16 December, 2013**

**Training Course - Novel mass spectrometric techniques in the food safety analysis, 19-**

**20 September 2013**

**15th Danube-Kris-Mures-Tisza (DKMT) Euroregion Conference on Environment and Health with the satellite event LACREMED Conference „Sustainable agricultural production: restoration of agricultural soil quality by remediation“, 16-17 May 2013**

**LACREMED Mid-term Meeting, 18 January 2013**

## 2012

**CEFSEr Closing Event and Final Training, 29-30 July 2012**

**5th CEFSEr Training Course - *Analysis of Chemical Contaminants in Food and the Environment*, 7-11 May 2012**

## 2011

**BIOXEN Closing Event, 26 September 2011**

**BIOXEN Training Course - High Resolution Mass Spectrometry of Xenobiotics, 1-3 June 2011**

**2<sup>nd</sup> CEFSEr Workshop – Persistent Organic Pollutants in Food and Environment, 8-10 September 2011**

**BIOXEN Seminar - *Novel Approaches for Environmental Protection*, 8-10 September 2011**

**4<sup>th</sup> CEFSEr Training Course - Persistent Organic Pollutants in Food and Environment: Risk Assessment, 14-15 November 2011**



**2010**

**1<sup>st</sup> CEFSEER Training Course** – Capabilities of U-HPLC-MS/MS in Analysis of Contaminants and Pharmaceutical Compounds in Food and the Environment, 6-8 April 2010, Novi Sad

**2<sup>nd</sup> CEFSEER Training Course** - Quality Assurance (QA) and Quality Control (QC) Procedures in Analysis of Contaminants and Pharmaceutical Compounds in Food and the Environment, 9 April 2010, Novi Sad

**1<sup>st</sup> CEFSEER Workshop** - *Regional Perspectives in Food Safety*, 14 September 2010, Novi Sad

**12<sup>th</sup> Danube-Kris-Mures-Tisa (DKMT) Euroregion Conference** on Food, Environment and Health, 14-15 September 2010, Novi Sad

**3<sup>rd</sup> CEFSEER Training Course** - *High Resolution Mass Spectrometry in Quantitative Analysis and Screening of Organic Contaminants in Food and Environment*, 16-17 September 2010, Novi Sad

**BIOXEN Opening Event**, 26 October 2010, Novi Sad

**Course** “*Novel Chemometric Methods - An Introduction to Multivariate Statistical Techniques*“, 30 November 2010, Novi Sad

**2009**

**CEFSER Symposium - Communicating Science and Risks, 30 November 2009, Novi Sad**



**The lecturers from the outstanding European institutions,  
including the world well known researchers in the field of  
chemical contaminants in food and the environment,  
contributed to the events,  
recognizing the importance of the CEFSEr Lab in the  
region as well as for the European Research Area:**

Prof. Dr. **Jana Hajšlová**, Department of Food Chemistry & Analysis, Institute of Chemical Technology, Prague, Czech Republic

Prof. Dr. **Karl-Werner Schramm**, Helmholtz Zentrum Munchen, German Research Center for Environmental Health, Institute of Ecological Chemistry, Neuherberg, Germany

Prof. Dr. **Karoly Heberger**, Chemical Research Center, Hungarian Academy of Sciences, Budapest, Hungary

Prof. Dr. **Ivan Holoubek**, RECETOX (Research Centre for Toxic Compounds in the Environment), Masaryk University, Brno, Czech Republic





Prof. Dr. **Mira Petrović**, CSIC-IDAEA, Barcelona, Spain

Dr. **Stefan van Leeuwen**, Institute for Environmental Studies (IVM), Free University, Amsterdam, The Netherlands

Dr. **Jon E. Johansen**, CHIRON AS, Trondheim, Norway

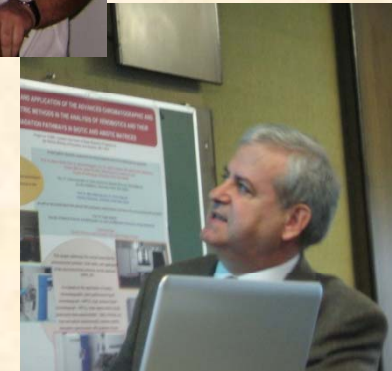
Prof. Dr. **Carmen Cámara**, Dr. Jon Sanz-Landaluze, Faculty of Chemistry, Complutense University of Madrid, Madrid, Spain



Prof. Dr. **Csaba Vágvölgyi**, Department of Microbiology, Faculty of Science and Informatics, University of Szeged, Szeged, Hungary



Prof. Dr. **Trajče Stafilov**, Faculty of Science and Mathematics, Sts. Cyril and Methodius University, Republic of Macedonia



**Dr. Michal Godula**, Food Safety Specialist, Thermo Fisher Scientific, Prague, Czech Republic



**Dr. Philippe Verlinde**, Institute of Reference Materials and Measurements, Geel, Belgium

## Publications: books of abstracts and papers



**1st Center of Excellence for Food Safety and Emerging Risks Workshop**  
"Regional perspectives in food safety"

**12<sup>th</sup> Danube-Kris-Mures-Tisa Euroregion Conference on Food, Environment and Health**

Book of Abstracts



Faculty of Technology, University of Novi Sad  
Novi Sad, Serbia  
14-15.09.2010

### PROCEEDINGS

*2nd CEFSEER (Center of Excellence in Food Safety and Emerging Risks) WORKSHOP*  
"Persistent Organic Pollutants in Food and the Environment"

*26th Symposium on Recent Developments in Dairy Technology*

*BIOXEN seminar*  
Novel approaches for environmental protection




Faculty of Technology,  
University of Novi Sad  
Novi Sad  
Serbia

8-10 September

### 15th Danube-Kris-Mures-Tisza (DKMT) Euroregion Conference on Environment and Health

with satellite event

**LACREMED Conference**  
"Sustainable agricultural production: restoration of agricultural soil quality by remediation"




Novi Sad

### BOOK OF ABSTRACTS

*2nd CEFSEER (Center of Excellence in Food Safety and Emerging Risks) WORKSHOP*  
"Persistent Organic Pollutants in Food and the Environment"

*26th Symposium on Recent Developments in Dairy Technology*

*BIOXEN seminar*  
Novel approaches for environmental protection




Faculty of Technology,  
University of Novi Sad  
Novi Sad  
Serbia

8-10 September 2011

### 15th Danube-Kris-Mures-Tisza (DKMT) Euroregion Conference on Environment and Health

with satellite event

**LACREMED Conference**  
"Sustainable agricultural production: restoration of agricultural soil quality by remediation"

## BOOK OF ABSTRACTS




University of Novi Sad  
Faculty of Technology Novi Sad  
NOVI SAD  
16-17 May 2013



# Publications: CEFSEr newsletters



After the 1<sup>st</sup> year: CEFSEr in 2009

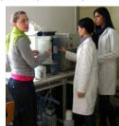
*CEFSEr is the FP7-REGPOT-2008-1 project dedicated to the reinforcement of research capacities at the Laboratory for Chemical Contaminants in Food and the Environment at the Faculty of Technology, University of Novi Sad, Serbia, in order to become a unique Western Balkan Country (WBC) Centre of Excellence in Food Safety and Emerging Risks. It started on Feb 01, 2009, and will last 36 months. The summary of the realized activities and outcomes of CEFSEr in the first project year is given hereafter.*



CEFSEr celebrated the first year anniversary

**REINFORCEMENT OF THE MATERIAL RESOU**  
Two outstanding instruments are arriving at the CEFSEr lab. This is the result of the negotiation of the CEFSEr coordinator, Prof. Dr. Biljana Škrbić with the representatives of the world companies for the separation instruments and mass spectrometric detectors, conducted during 2009.

Prof. Dr. Biljana Škrbić explained: "In order to perform the procurement of the instruments as successful as possible in terms of the CEFSEr sustainability and attractiveness for the future international research activities, it was decided to try to extend the project budget share allocated to the reinforcement of the material resources in a way to purchase two instruments with complementary application ranges in the field of food and environmental safety instead of one instrument originally planned to be bought". She further said that the CEFSEr supporting partners agreed to have ultra performance liquid chromatography (UPLC) with high resolution mass spectrometer (MS) together with UPLC coupled to triple quadrupole mass spectrometer (MS/MS), originally planned to be bought. Laboratory with such systems is fully equipped for targeted analysis and also for the screening of unknowns, both very important aspects in the food safety analysis, particularly in the analysis of emerging pollutants.



During the installation of Thermo Fisher Scientific UHPLC-Accela - TSQ Vantage™ MS/MS in the CEFSEr lab

Thermo Fisher Scientific UHPLC Accela - Exactive MS

Accela UHPLC with TSQ Vantage MS/MS in the CEFSEr lab



CEFSEr in 2010



*The FP7-REGPOT-2008-1 proje the second year of implement 2010. This year is very importa because of the arrival of 4 analytical instruments in the intensive training activities a promotion.*

## NEW EQUIPMENT AND ANALYTICAL CHALLA

Two outstanding analytical instruments arrived at the Faculty of Technology from the University of Novi Sad during February and March 2010 and are now operational at the Center of Excellence for Food Safety and Emerging Risks (CEFSEr) enabling it to be in line with the newest trends in the analysis of organic contaminants.

They are Accela UHPLC with TSQ Vantage MS/MS and Accela UHPLC with Exactive MS Orbitrap, Thermo Fisher Scientific, USA. "These two instruments are unique for the whole Western Balkan region and even wider for now, making it into an attractive partner for the joint research considering the occurrence of organic contaminants in food and environmental matrices as well" said prof. Biljana Škrbić, the project coordinator, explaining further that new analytical tasks set in the CEFSEr lab for the next period deals with the latest analytical challenges in the field of food safety: "It is very challenging to develop analytical methods for the simultaneous determination of as many as possible contaminants in only one run of the instrument. This is also important from the aspect of economical running of analysis and also for the quick determination of reliable data necessary for the assessment of the possible risks as a consequence of the contaminants presence in food. We will focus our attention to the mycotoxins and pesticides, and we are going to include both instruments in developing of the methods for the analysis of these two classes of food contaminants."



Accela UHPLC with Exactive MS in the CEFSEr lab

Members of the CEFSEr team, Includ employed at the Faculty of Technology thro, were trained on both instruments by a spec Scientific company, learning all from basic troubleshooting, to method development, calibration, to running real samples and pin data. The training sessions we have with the Michal Godula, were very fruitful, as we ba basics from the trainer with large practical ex Jelena, and Sanja, the CEFSEr youngsters front of us, and we already have had a well i in our every day practice in the CEFSEr la that the team already participated in it organized by EC-JRC Institute for Re Measurements, Geel, Belgium.



After the 2<sup>nd</sup> year: CEFSEr in 2010



CEFSEr team celebrated the second anniversary of the project

*The second year of FP7-REGPOT-2008 209629) was ended. It was very dynam team members, be the development instruments techn project and the transfer activities. CEFSEr activities year is given hereafter.*

## WIDENING OF RESEARCH ACTIVITIES IN TH

Two outstanding instruments arrived at the Faculty of Technology, University of Novi Sad, in the beginning of 2010, delivery of the third instrument on Feb 01, 2011, has become as a birthday present for the successful project implementation in the second year. The procurement of the instruments was performed in line to the suggestions of the CEFSEr Advisory Committee (AC) that gathers the key personnel of four supporting institutions from EU and it considered the CEFSEr sustainability and attractiveness for the future international research activities.



The reinforcement of the material resources in the Laboratory for Chemical Contaminants (Lab CHEMCONT) at the Faculty of Technology, University of Novi Sad, through the CEFSEr project was completed during the project second year of implementation. The CEFSEr Lab now possesses two outstanding instruments: ultra high performance liquid chromatograph (UHPLC) Accela, Thermo Fisher Scientific) coupled to triple quadrupole mass spectrometer (TSQ Vantage MS/MS, Thermo Fisher Scientific) and UHPLC with high resolution mass spectrometry technology Orbitrap technology (Exactive, Thermo Fisher Scientific). These two instruments are unique for the whole Western Balkan Countries (WBC) region and even wider for now, particularly due to their mass spectrometers with features that separated them from the similar instruments available in the region. The project coordinator, Prof. Biljana Škrbić, clarified the extended research scope of the CEFSEr Lab: "Laboratory with such systems, together with the instruments pre-



"With all these systems, the lab has been broadened, and it new analytical challenges in it of multicomponent mixture of issues are new and have ne even wider in the WBC region"

## CEFSEr research

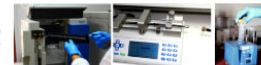
*Reinforcement of the material and human resources of the Laboratory for Chemical Contaminants in Food and the Environment at the Faculty of Technology, Novi Sad, through the FP7-REGPOT-2008-1 project CEFSEr (GA 229629) is almost fully completed and the Lab capacities have been directed towards gathering of new knowledge on the chemical pollutants in various food and environmental samples. The research agenda of the Lab is broadened and some of the latest challenges in food safety and environmental protection have been tackled, covering the topics of several national and international projects running and coordinated by the CEFSEr Project Coordinator. Through these projects new collaborations with research institutions from EU have been established, proving the attractiveness of the CEFSEr Lab. Description of the Lab material resources and the list of recent projects, developed methods and those under development are presented hereafter, and all this could be regarded as a direct indicator of successful project implementation and, in fact, a domino effect caused by CEFSEr.*

### MATERIAL RESOURCES OF CEFSEr LAB

- Ultra high performance liquid chromatography (UHPLC) with triple quadrupole mass spectrometer (MS/MS) Thermo Scientific Accela - TSQ Vantage;
- UHPLC with high resolution mass spectrometry with Orbitrap technology Thermo Scientific Accela - Exactive;
- Atomic absorption spectrometer with a graphite tube Varian AAS240G(A120);
- Gas chromatograph equipped with electron capture detector Agilent 7890;
- Gas chromatograph equipped with flame-ionization detector DANI1000;
- Various sample prep equipment: centrifuge..., MillQ system for ultrapure water, vacuum rotary evaporator, sample concentrator, shaker, ultrasonic bath, ...

### METHODS (developed/under development in CEFSEr Lab)

- Multicomponent analysis of principal mycotoxins in crude extracts of different food commodities (flours, cereal grains, spices, green coffee) by UHPLC-MS/MS
- Multicomponent analysis of selected pesticides in soil and water extracts by UHPLC-MS/MS
- Multicomponent screening of food and environmental extracts by UHPLC-HRMS
- Multicomponent analysis of organochlorine pesticides and pyrethroids in food and environmental matrices by GC/MS
- Multicomponent analysis of priority (EPA and 15+1 EU) polycyclic aromatic hydrocarbons in food and environmental matrices by UHPLC-APPI-MS/MS
- Analysis of perfluorinated compounds in food and environmental matrices by UHPLC-MS/MS
- Analysis of mineral oil in food and environmental matrices by GC/FID
- Analysis of heavy elements in food and environmental matrices by AAS



RUNNING PROJECTS IN CEFSEr LAB

- Development and application of the advanced chromatographic and spectrometric methods in the analysis of xenobiotics and their degradation pathways in biotic and abiotic matrices; Serbian Ministry of Education and Science, No. 172050, 2011-2014.
- Estimation of chemical safety of market basket and population dietary exposure; Secretariat of the Vojvodina Province for Science and Technological Development, 2011-2014.
- Inorganic and organic pollutants in urban areas; bilateral project within Serbian-Croatian intergovernmental S&T programme, 2011-2012.
- Polycyclic aromatic hydrocarbons and biogenic amines in smoked dry traditionally manufactured meat products from Serbia and Portugal; Serbian-Portugal intergovernmental S&T programme, 2011-2012.
- Development of xenobiotic-degrading biotransformation products (BXNEX); Hungary-Serbia IPA Cross-border Co-operation programme implemented within the 2007 - 2013 European Union financial framework under the Instrument for Pre-accession Assistance (IPA) 2010-2011.
- Comparison of various analytical and chromatographic methods, multiresidue analysis of pesticides in food and environmental matrices; bilateral project within Serbian-Hungarian intergovernmental S&T programme, 2010-2011.
- Heavy metals in the environment as a consequence of the anthropogenic activities; bilateral project within Serbian-Slovenian intergovernmental S&T programme, 2010-2011.





# Publications: LACREMED newsletters and guidelines



**Good neighbours creating common future** ✓  
**Dobri susedi stvaraju budućnost** ✓  
**Jó szomszédok a jövőért** ✓

The project is co-financed by the European Union  
 Projektatufinansira Evropska unija  
 A projekt az Európai Unió társfinanszírozásával valósul meg

**Newsletters Bilten 1 Hírlévlé**

University of Novi Sad, Faculty of Technology Novi Sad, Serbia  
 Univerzitet u Novom Sadu, Tehnički fakultet Novi Sad, Srbija  
 Quidam Agencem, Tehnologija Sa

2013

The project „Development of an enzymological (laccase-based) remediation product and technology (LACR-BIO)” (HU-SRB/002/21-41/47 (1. January 2012 - 31. December 2013), is implemented under the Hungary-Serbia (RA Cross-border Co-operation Programme). The Programme's objective is to facilitate the joint development of the Hungary-Serbia border areas with the support of the European Union in order to achieve a harmonic and co-operating region with sustainable and safe environment. The aim of the LACR-BIO project is the development of a cheap microbial laccase mixture, which will be able to detoxify a wide range of xenobiotics belonging to the groups of phenol and amine derivatives in polluted soils and waters. Such product will be easily applied in water-treating plants and on soil by end-users, enabling the preservation of the soil quality in the region known for its rich agricultural tradition. The activities and outcomes of the first project year are presented hereafter.

Projekt „Razvoj proizvoda i tehnologije za remedijaciju na bazu primene enzima (lakaaza-LACR-BIO)” (HU-SRB/002/21-41/47 (01. januar 2012 - 31. decembar 2013)) realizuje se u okviru IPA (Prekograničnog programa Mađarske-Srbija, C) programa je da potpomogne zajednički razvoj mađarsko-srpskih pograničnih područja uz podršku Evropske unije u cilju postizanja harmoničnog i kooperativnog regiona sa održivim i bezbednim okruženjem. Cilj LACR-BIO projekta je razvoj lako dostupnih smesa mikrobioloških lakaaza, sposobnih za razgradnju i detoksikaciju širokog spektra ksenobiotika u grupi fenolnih i aminskih derivata u zagađenim zemljištima i vodama. Jednako važnom primenom ovog proizvoda u postrojenjima za obradu otpadnih voda ili direktno na zemljištu, održivi razvoj, čuvanje sredine regiona i njegova bogata tradicija poljoprivredne proizvodnje biće omogućeni. Aktivnosti i rezultati ostvareni u prvom projektnom godini predstavljamo u sledećem tekstu.

Az „Enzim (lakkáz) alapú bioremedicációs termék és technológia kifejlesztése” című projekt a Magyarország-Szerbia IPA Határon Átívelő Együttműködési Program keretében valósul meg (LACR-BIO), HU-SRB/002/21-41/47 (2012. január 1. – 2013. december 31.). A Program fő célja, hogy az Európai Unió támogatásával lehetővé tegyék a magyar-szerb határvetők közti fejlesztéseket egy harmonikus, együttműködő, fenntartható és biztonságos környezeti rendelkezési régió kialakítására. A LACR-BIO projekt célja olyan olcsó, mikrobiale eredetű lakkáz keverékek kifejlesztése, melyek képesek lesznek széles körű ksenobiotikus szennyező anyagok (fenolok és aminok származékai) szétválasztására és detoksikációjára szennyezett talajokon és vízeken. Az ilyen termék könnyen használható szennyvízkezelési és talajkezelési célokra, lehetővé téve a talaj minőségének megőrzését a régióban ismert gazdag mezőgazdasági hagyományairól és a projekt első évének munkatapasztalatairól és eredményeiről olvashatunk ebben a hírlévlében.



**Good neighbours creating common future** ✓  
**Dobri susedi stvaraju budućnost** ✓  
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 Projektatufinansira Evropska unija  
 A projekt az Európai Unió társfinanszírozásával valósul meg

**LACREMED**

**Newsletters Bilten 2 Hírlévlé 2**

University of Szeged, Faculty of Science and Informatics, Szeged, Hungary  
 Szegedi Tudományegyetem, Természettudományi és Informatikai Kar, Szeged, Magyarország

The project „Development of an enzymological (laccase-based) remediation product and technology” is implemented under the Hungary-Serbia (RA Cross-border Co-operation Programme (http://www.hu-srb-ipa.com). The Programme's objective is to facilitate the joint development of the Hungary-Serbia border areas with the support of the European Union in order to achieve a harmonic and co-operating region with sustainable and safe environment.

Az „Enzim (lakkáz) alapú bioremedicációs termék és technológia kifejlesztése” című projekt a Magyarország-Szerbia IPA Határon Átívelő Együttműködési Program keretében valósul meg (LACR-BIO), HU-SRB/002/21-41/47 (2012. január 1. – 2013. december 31.). A Program fő célja, hogy az Európai Unió támogatásával lehetővé tegyék a magyar-szerb határvetők közti fejlesztéseket egy harmonikus, együttműködő, fenntartható és biztonságos környezeti rendelkezési régió kialakítására. A LACR-BIO projekt célja olyan olcsó, mikrobiale eredetű lakkáz keverékek kifejlesztése, melyek képesek lesznek széles körű ksenobiotikus szennyező anyagok (fenolok és aminok származékai) szétválasztására és detoksikációjára szennyezett talajokon és vízeken. Az ilyen termék könnyen használható szennyvízkezelési és talajkezelési célokra, lehetővé téve a talaj minőségének megőrzését a régióban ismert gazdag mezőgazdasági hagyományairól és a projekt első évének munkatapasztalatairól és eredményeiről olvashatunk ebben a hírlévlében.

Projektatufinansira Evropska unija  
 Projektatufinansira Evropska unija

**Bilten 2**

Departman za mikrobiologiju, Fakultet prirodnih nauka, Univerzitet u Segedinu, Segedin, Mađarska

„Razvoj proizvoda i tehnologije za remedijaciju na bazu primene enzima (lakaaza)” je projekat koji je realizuje u okviru IPA (Prekograničnog programa Mađarske-Srbija (http://www.hu-srb-ipa.com). Cilj programa je da potpomogne zajednički razvoj mađarsko-srpskih pograničnih područja uz podršku Evropske unije u cilju postizanja harmoničnog i kooperativnog regiona sa održivim i bezbednim okruženjem.

November  
 November

<http://www.hu-srb-ipa.com>

2013



**Good neighbours creating common future** ✓  
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**LACREMED**

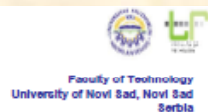
Development of an enzymological (laccase-based) remediation product and technology  
 Razvoj proizvoda i tehnologije za remedijaciju na bazu primene enzima (lakaaza)  
 Enzim- (lakkáz) alapú bioremedicációs termék és technológia kifejlesztése

Analytical methods for xenobiotics determination developed within the LACREMED project  
**Guideline**  
 Analitičke metode za određivanje ksenobiotika razvijene u okviru LACREMED projekta  
**Smernice**  
 A LACREMED projekten belül kifejlesztett, xenobiotikumok meghatározására szolgáló analitikai módszerek  
**Utmutató**

University of Novi Sad, Faculty of Technology Novi Sad, Serbia  
 Univerzitet u Novom Sadu, Tehnički fakultet Novi Sad, Srbija  
 Quidam Agencem, Tehnologija Sa



## Publications: projects' brochures



Reinforcing research potential in the Laboratory for Chemical Contaminants at the Faculty of Technology towards the establishment of the Center of Excellence in Food Safety and Emerging

Food safety is currently one of the most important challenges confronting consumer, produce. It is also an issue that is in the centre of interest of scientists and experts because it has great legal consequences. Frequent dramatic food emergencies occurred in Europe focus the safety in order to manage the risks for human health that could occur in any point of the food environmental pollution, rapid expansion in international trade of food and in tourism sector increased risk of higher intake of food chemical contaminants through diet and diet. Furthermore, the issue of emerging pollutants has risen to the forefront of the food safety a decade. Emerging contaminants are previously unknown or unrecognized pollutants. Most present in the environment for a long time, but their significance and presence are only now being therefore, here is a need for reliable data on their occurrence in food in order to perform a assessment of human exposure. Food safety is a global challenge, too large to be met by coun

### The Project

CEFSEK is the FP7 project dedicated to the reinforcement of research capacities at the Laboratory for Chemical Contaminants in Food and the Environment (LabCHEMCONT) at the Faculty of Technology, University of Novi Sad, Serbia, in order to become a **unique Western Balkan Country (WBC) Centre of Excellence in Food Safety and Emerging Risks**. Through postulated general objectives such as capital investments in a highly sophisticated analytical instrument, upgrading of the existing equipment, reinforcement of the human resources (hiring, mobility, etc), and networking with advanced EU institutions, CEFSEK integrates LabCHEMCONT and the Faculty of Technology within the European Research Area, contributing to general harmonization of R&D within the food safety and emerging risks research. The EC reviewers evaluated the CEFSEK proposal with the highest score, 15/15.

### Resource

The LabCHEMCONT is established of Technology in the last two achievements of its staff are recognized for expertise on contaminants in the food and LabCHEMCONT team has background in chemical control and risk assessment regarding elements. The laboratory absorption spectrometer with (GTAAS), gas chromatography flame-ionization detector (GC mass spectrometry detector (chromatograph with UV and (HPLC/UV-DAD). Through equipment is substantially improved with installation of the high ultraperformance liquid chromatography triple quadrupole mass spectrometry (MS/MS). In this way, LabCHEMCONT equipped for the analysis of chemical contaminants in food and representing a modern analytical attractive partner for the joint



FP7-REGPOT-2008-1  
GA no. 229629  
01 Feb 2009-31 Jan 2012



Unique and Modern  
WBC Centre for Joint  
Research on the  
Chemical Contaminants  
in Food and the  
Environment



HU-SRB/0801/214/180

**BIOXEN**

Razvoj bioproizvoda za degradaciju **ksenobiotika**

Development of **xenobiotic-degrading bioaugmentation products**

**Xenobiotikum-bontó bioaugmentációs termékek kifejlesztése**



The project is co-financed by the European Union through the Hungary-Serbia IPA Cross-border Co-operation Programme



Hungary-Serbia  
IPA Cross-border Co-operation Programme

**LACREMED**

Development of an enzymological (laccase-based) remediation product and technology

Enzim- (lakkáz-) alapú bioremediációs termék és technológia kifejlesztése

Razvoj proizvoda i tehnologije za remedijaciju na bazi primene enzima (lakaze)



The project is co-financed by the European Union

## Publications: CEFSEK monograph

 **CEFSEK**  UNIVERSITET U NOVOM SADU  
TEHNOLOŠKI  
FAKULTET  
NOVI SAD

**FP7 Centar izvrsnosti za bezbednost hrane i nove rizike**  
Laboratorija za analizu zagađujućih materija  
Laboratorija za masenu spektrometriju  
Univerzitet u Novom Sadu, Tehnološki fakultet Novi Sad

**FP7 Center of Excellence in Food Safety and Emerging Risks**  
Laboratory for Chemical Contaminants  
Laboratory for Mass Spectrometry  
University of Novi Sad, Faculty of Technology Novi Sad

 Ova brošura je štampana za potrebe EU FP7 projekta CEFSEK, 229629, finansiranog u okviru FP7 programa „Capacity-Research Potential“.  
This brochure is an outcome of EU FP7 project CEFSEK, GA 229629, funded under the Programme's Capacity header „Research Potential“.





## CEFSEER website:

[www.tf.uns.ac.rs/CEFSEERweb/CEFSEERindex.html](http://www.tf.uns.ac.rs/CEFSEERweb/CEFSEERindex.html)



**News**

**August 2014**

- Update of the reference list ([link](#))  
CEFSEER is the local organiser of the Workshop on Valorization of Vegetable Waste organized within COST Action TD1203 "EUBis", Novi Sad, August 6-7, 2014; Programme of the Workshop is here [REPORT](#) [REPORT on the Workshop](#)

**July 2014**

- Protocol of Scientific Cooperation has been agreed between "VasileGoldis" Western University of Arad – Institute for Life Sciences, Arad, Romania, and University of Novi Sad – Centre of Excellence in Food Safety and Emerging Risks - CEFSEER, Faculty of Technology, Novi Sad, Serbia [photos](#)
- Training Course on Chemical Contaminants in the Environment, July 21-23, 2014: The Book of Abstracts [photos](#)
- CEFSEER team joined COST Action ES1403

**June 2014**

- Announcement and program of the Training Course on Chemical Contaminants in the Environment, July 21-23, 2014 [photos](#)

**December 2013**

- Update of the ongoing projects ([link](#))
- Announcement and program of the Course on Perfluorinated Compounds in the Environment and Food, December 16, 2013 [photos](#)
- Publication on CEFSEER in "Catalogue of research and innovation potential of the University of Novi Sad", pp.40-41 [photos](#), <http://www.bsons.uns.ac.rs/index.php?tb=entity&page=view&id=40>  
The list of publications of the CEFSEER team members has been updated ([link](#))

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FOOD CLUSTER

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FS & ER

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ChemContDATABASE





*a point of joint research in domain of chemical  
contaminants in food and the environment  
is opened for collaboration  
with every interested researchers  
and institutions:*

*E-mail: [biljana@tf.uns.ac.rs](mailto:biljana@tf.uns.ac.rs)*

*Thank you for your kind attention!*

## **Acknowledgement:**

The visit of Prof. Dr. Biljana Škrbić to Japan was approved and supported by **Japan Society for the Promotion of Science Fellow Program for Research in Japan, 2014.**

*Sincere thank to Prof. Dr. Kiwao Kadokami,  
Faculty of Environmental Engineering,  
The University of Kitakyushu,  
who kindly accepted to be the host.*