

STEFAN CEL MARE UNIVERSITY OF SUCEAVA

**Journal  
Food and Environment Safety  
of the  
Suceava University**

---

***FOOD ENGINEERING***

---

*Volume XXII, Issue 1  
31 MARCH 2023*

*Available online  
<http://www.fia.usv.ro/fiajournal>*

©  
**Published by  
University Publishing House of Suceava**



## AIMS AND SCOPE

The scientific journal *Food and Environment Safety* is a quarterly publication (4 issues per year) of the Faculty of Food Engineering, Stefan cel Mare University of Suceava, Romania, that is indexed in the International Databases: Index Copernicus Journals Master List, Ulrich's and Chemical Abstract (CAS). Also, it is acknowledged B+ by the main Romanian funding organization for university and postgraduate research programmes - National University Research Council (CNCSIS).

The purpose of *Food and Environment Safety* journal is to provide a means of rapid publication for significant contributions to the improvement and diversification of specific activities in the field of food engineering, food and environment safety, biotechnologies, chemical engineering, biosensors, agriculture and applied sciences as well. Moreover, the journal assures promotion of research results in the field of food production and, from the nutritional and toxicological point of view, it underlines the importance of applying the best analyzing and control methods for consumer's protection, food technologies, industrial biotechnologies and environment protection as well to increase life quality.

Food Engineering Faculty journal has been published since 2000 like *Analele Universitatii Stefan cel Mare Suceava, Sectiunea Colegiul Tehnic (ISSN 1583-2295)*. Between 2002 and 2004 the journal was published biannually like *Analele Universitatii Stefan cel Mare Suceava, Sectiunea Inginerie Alimentara (ISSN 1583-2295)*, then from 2005 till 2009, it was issued biannually like *ANNALS of Suceava University - Food Engineering (ISSN 1842-4597)*, indexed in Index Copernicus data base and acknowledged by the National University Research Council (CNCSIS), Romania. In 2010, the Food Engineering Faculty journal changed its name in *Food and Environment Safety (ISSN 2068 - 6609)*.

The cover of the journal was made by **Niculai Moroşan**.

Available online: <http://www.fia.usv.ro/fiajournal>  
Address for submission, e-mail [fiajournal@fia.usv.ro](mailto:fiajournal@fia.usv.ro)

### CIP description of National Library

The scientific journal *Food and Environment Safety (ISSN 2068 – 6609)* is published by **University Publishing House of Suceava**, Romania.

Mail address of the University Publishing House of Suceava: Stefan cel Mare University, Suceava, Universitatii str. No. 13, 720229, Suceava, Romania

[www.usv.ro](http://www.usv.ro), <http://www.usv.ro/index.php/ro/1/Editura%20USV/238/3/15>

**Tel:** +40 230 216 147, **Fax:** +40 0230 520 080

### Editorial contact information:

Faculty of Food Engineering, Stefan cel Mare University, Suceava, Universitatii str., No. 13, 720229, Suceava, Romania,

**Phone/Fax:** +40 230 520267, [www.fia.usv.ro](http://www.fia.usv.ro)

### Editor-in-Chief:

Prof. Ph.D, Eng. Sonia AMARIEI (GUTT), [gutts@fia.usv.ro](mailto:gutts@fia.usv.ro)

### Subscription information

**Subscription information can be obtained from:**

- **the e-mails:** [fiajournal@fia.usv.ro](mailto:fiajournal@fia.usv.ro)
- **the postal address:**

*Faculty of Food Engineering, Stefan cel Mare University -Suceava,  
Universitatii str., No. 13, 720229, Suceava, Romania*

**Copyright © University Publishing House of Suceava. All right reserved**



**EDITOR-IN-CHIEF:**

Sonia AMARIEI (GUTT) Ștefan cel Mare University of Suceava, Romania

**EDITORIAL BOARD**

Petru ALEXE Dunărea de Jos University of Galați, Romania

Marcel AVRĂMIUC Ștefan cel Mare University of Suceava, Romania

Șerif BALDIRAN Amasya University, Amasya, Turkey

Elena-Gabriela BAHRIM Dunărea de Jos University of Galați, Romania

Lidija BASA University of Ljubljana, Slovenia

Zoița Mărioara BERINDE Technical University of Cluj Napoca - North University Center of Baia Mare, Romania

Iulian BOBE Tyton Bio Sciences, Darien, USA

Marija BODROŽA-SOLAROV University Novi Sad, Institute for Food Technology, Serbia

Ioan CHEREJI University of Oradea, Romania

Cristina-Gabriela CONSTANTINESCU Ștefan cel Mare University of Suceava, Romania

Călina Petruța CORNEA University of Agronomic Sciences and Veterinary Medicine in Bucharest, Romania

Toshiki ENOMOTO Ishikawa Prefectural University, Nonoichi, Japan

Dirk FLOTTMAN Technical University of Aalen, Germany

José Antonio GABALDÓN HERNÁNDEZ Catholic University of Murcia (UCAM), Spain

Robert GRAVANI Cornell University, Department of Food Science, USA

Oleksii GUBENIA National University of Food Technologies, Kiev

Georg GUTT Ștefan cel Mare University of Suceava, Romania

Nicoleta Gabriela HĂDĂRUGĂ Banat University of Agricultural Sciences and Veterinary Medicine Timisoara, Romania

Cristina-Elena HREȚCANU Ștefan cel Mare University of Suceava, Romania

Elena JOSHEVSKA University St. Kliment Ohridski, Bitola, Macedonia

Süleyman KALELI Sakarya University, Sakarya, Turkey

Nijole KAZLAUSKIENE	Institute of Ecology of Nature Research Center, Vilnius, Lithuania
Ana LEAHU	Stefan cel Mare University of Suceava, Romania
Anna MARAZ	Corvinus University of Budapest, Hungary
Angel MARTINEZ SANMARTIN	Centro Tecnológico Nacional de la Conserva y Alimentación, Murcia, Spain
Carmen MORARU	Cornell University, Department of Food Science, USA
Ileana Denisa NISTOR	Vasile Alecsandri University of Bacău, Romania
Mircea-Adrian OROIAN	Ștefan cel Mare University of Suceava, Romania
Mariana-Atena POIANĂ	Banat University of Agricultural Sciences and Veterinary Medicine Timisoara, Romania
Regina PROSKUVIENE	Vilnius Pedagogical University, Lithuania
Peter RASPOR	University of Ljubljana, Slovenia
Gabriela RÂPEANU	Dunărea de Jos University of Galați, Romania
Adrian RIVIȘ	Banat University of Agricultural Sciences and Veterinary Medicine Timisoara, Romania
Alice ROȘU	Ștefan cel Mare University of Suceava, Romania
Alexandru SZÉP	Sapientia — Hungarian University of Transylvania, Miercurea Ciuc, Romania
Carmen SOCACIU	University of Agricultural Sciences and Veterinary Medicine Cluj - Napoca, Romania
Rodica STURZA	Technical University of Moldova, Chisinau, Moldova
Gagik TOROSYAN	State Engineering University of Yerevan, Armenia
Never TOROSYAN	CSRO Institute, Yerevan, Armenia
Yeva TOROSYAN	European Regional Educational Academy, Yerevan, Armenia
Anka TRAJKOVSKA PETKOSKA	University St. Kliment Ohridski-Bitola, R. North Macedonia
Felicia TUTULESCU DRAGOMIR	University of Craiova, Romania
Igor WINKLER	Bukovina Medical State University, Ukraine
Gheorghe ZGHEREA	Dunărea de Jos University of Galați, Romania