



ICGEB Meeting and
Courses 2023

ICGEB WORKSHOP

TRENDS IN MICROBIAL SOLUTIONS FOR SUSTAINABLE AGRICULTURE

13 – 15 September 2023. Belgrade, SERBIA



BOOK OF ABSTRACTS

ICGEB WORKSHOP

Trends in microbial solutions for sustainable agriculture

13 – 15 September 2023. Belgrade, Serbia

Edition

Collection of the Faculty of Biology

ISSN 3009-3740 (Online)

Publisher

University of Belgrade, Faculty of Biology
Studentski Trg 16, 11158 Belgrade, Serbia
www.bio.bg.ac.rs

For publisher

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Technical Editor & Cover design

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International Standard Book Number

ISBN 978-86-7078-178-8



ICGEB Workshop

Trends in microbial solutions for sustainable agriculture

13 – 15 September 2023. Belgrade, SERBIA

ORGANIZED AND HOSTED BY



University of Belgrade,
Faculty of Biology, Serbia



International Centre for Genetic Engineering
and Biotechnology (ICGEB), Italy



FERTICO,
Serbia

SUPPORTED BY



Federation of European
Microbiological Societies

Federation of European
Microbiological Societies (FEMS)



Serbian Society
of Microbiology



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науке и технолошког развоја

Ministry of Science, Technological
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ICGEB MEETINGS & COURSES 2023

WORKSHOP

„Trends in microbial solutions for sustainable agriculture“

BOOK OF ABSTRACTS

September 13 – 15, 2023
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Message from the scientific organizers

Dear colleagues and friends,

It is our great pleasure to welcome you to the Workshop "Trends in microbial solutions for sustainable agriculture" to be held in Belgrade, Serbia, September 13-15, 2023. This meeting is organized by the University of Belgrade - Faculty of Biology, Belgrade, Serbia, and co-organized by the International Centre for Genetic Engineering and Biotechnology (ICGEB), Trieste, Italy, and our friends from the Serbian company FERTICO. The Workshop is organized with the support of the Federation of European Microbiological Societies (FEMS), the Ministry of Science, Technological Development and Innovations of the Republic of Serbia and the Serbian Society for Microbiology. We thank the sponsors for their recognition of the importance of the event, their participation and support. We are pleased to inform you that Workshop Belgrade, Serbia - Book of Abstract will appear in the Collection of the Faculty of Biology, published by the University of Belgrade - Faculty of Biology.

This Workshop is dedicated to our colleague and friend Professor Djordje Fira, who was one of the chairs of the Scientific and Organizing Committee. Unfortunately, he is no longer with us. Professor Fira, with his ideas and enthusiasm, had an innovative approach to the use of bacteria in biological pest control and its application in sustainable agriculture. We are sad but joyful because we had the opportunity to live, work and learn from the man who was professor, head of department, colleague and friend. Professor Fira was the embodiment of a good, honest, sincere and careful person. We had the privilege of sharing our lives with professor Fira - your presence we miss, your memories we treasure.

This Workshop, covering all major topics of the use of microbial solutions in sustainable agriculture, is in perfect harmony with the Serbian Smart Specialization Strategy, the European Green Deal and FOOD 2030 research and innovation policy in the field of applied microbiology. Indeed, the environmental and ethical unsustainability of the continued use of chemical pesticides, coupled with the need for yield increases due to population growth and the simultaneous reduction of land under food crops, is leading to a general awareness of the need to drastically reduce the use of chemical pesticides, as well as radical changes in current agricultural practices. Interest in biological control of phytopathogens has particularly increased in the last decade, mainly because of the importance of using environmentally friendly alternatives to the extensive use of chemical pesticides to control pest diseases.

The extensive microbiome research in the field of plant microbiome structure and function, the pivotal role of plant-associated microbes in plant health and productivity, and the new "state-of-the-art" methods available today should expand our knowledge and pave the way from laboratory data to practical applications in sustainable agriculture. Plant-associated microbial communities play a key role in biotic and abiotic stress tolerance as well as nutrient acquisition and carbon and nitrogen cycling. The idea of developing environmentally

friendly biofertilizers and other agricultural biotechnologies, along with molecular studies of plant resistance to biotic and abiotic stresses, the study of interkingdom signalling between plants and plant-associated bacteria, with special attention to emerging phytopathogens, will be the main activities and outcomes of the Workshop.

We strongly believe that the Workshop is an excellent place to exchange and combine scientific ideas among experts and participants, with great opportunities to start new international collaborations and joint scientific projects. We have received an overwhelming response to our call, with numerous talented applicants, more than 160 participants from 41 countries (Argentina, Bangladesh, Brazil, British Indian Ocean Territory, Burundi, Cameroon, China, Colombia, Côte d'Ivoire, Croatia, Ecuador, Egypt, Ethiopia, Ghana, Greece, Hungary, India, Iraq, Italy, Kenya, Libya, Malawi, Mexico, Montenegro, Namibia, Nigeria, Pakistan, Papua New Guinea, Peru, Russian Federation, Serbia, Slovenia, Somalia, South Africa, Sri Lanka, Sudan, Tunisia, Turkey, United Republic of Tanzania, Zimbabwe, and the United States) to compete for the limited number of available grant awards. In addition to the invited speakers' presentations, the programme also includes poster presentations by a number of early career scientists and PhD students, many of whom are supported and funded by ICGEB and FEMS grants (we selected more than 30 fellows from 16 countries). We were honoured to welcome 30 speakers from 15 countries (Austria, Belgium, Croatia, Germany, Hungary, India, Italy, Japan, Romania, Saudi Arabia, Serbia, Slovenia, South Africa, Spain and the Netherlands). We thank all participants for their scientific commitment, which will contribute significantly to the success of the Workshop.

We hope you enjoy the Workshop programme and find it stimulating and informative. We also hope that you will enjoy the beauty of Belgrade and the Serbian hospitality. We sincerely wish you health, love and happiness and look forward to the new meetings.

Sincerely,



Ivica Dimkić, PhD
Scientific & Organizing Committee
Chairperson

A handwritten signature in blue ink, appearing to read "Ivica Dimkić".



Vittorio Venturi, PhD
Scientific & Organizing Committee
Co-Chairperson

A handwritten signature in black ink, appearing to read "Vittorio Venturi".

General information

SYMPOSIUM VENUE

The meeting will be held in the Great Hall of the Municipality of Stari Grad, Makedonska 42, Belgrade, Serbia, and in the Hotel Palace 4*, Topličin Venac 23, Belgrade, Serbia.

REGISTRATION OF PARTICIPANTS

Registration desk will be opened on Wednesday, September 13 from 08:00 to 9:00 in front of the Great Hall of the Municipality of Stari Grad and on Thursday, September 14 from 08:30 to 9:00 in front of the hall „Beogradska Panorama“ of the Hotel Palace. Daily updated information about the workshop sessions and social events will be available at the registration desk. All participants and accompanying persons are requested to wear their accreditation badges during the scientific sessions and social events of the workshop.

LANGUAGE

The official language of the workshop is English.

SOCIAL EVENTS

A group photo in front of the Vojvoda Vuk monument in Topličin venac square (17:45), a „Poster Party“ (18:00) and a Welcome reception (19:30) will take place in and around the Palace Hotel on Wednesday, September 13.

The Gala Dinner will be held at the Botanical Garden „Jevremovac“, Takovska 43, Belgrade, on Thursday, September 14, from 19:00 to 23:00.

For the last day, Friday, September 15, is planned a visit to FERTICO company with lunch break (8:00) and a visit to Belgrade Fortress „Kalemegdan“ with professional guide and free evening (17:30). All participants are asked to register at the registration desk for the facultative Danube and Sava cruise, which will be charged extra (19:00).

INFORMATION FOR PRESENTERS

Oral presentations will be held on September 13 in the Great Hall of the Municipality of Stari Grad and on September 14 and 15 in the hall „Beogradska Panorama“ of the Palace Hotel. LCD projections will be available during all sessions. Please send your PowerPoint presentation to workshopserbia@gmail.com and katarina.krusic@bio.bg.ac.rs no later than September 10.

Posters will be displayed during the „Poster Party“ on Wednesday, September 13 from 18:00-20:00 in a garden at the Palace Hotel. Poster presenters are asked to be at their posters and available for discussion. They should mount their posters at 17:30 and to dismount them immediately after the „Poster Party“.

Characterization of outer membrane vesicles of plant growth promoting bacteria *Paraburkholderia phytofirmans* PsJN

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Plant growth promoting bacteria (PGPB) are microorganisms present in plant rhizosphere that stimulate plant growth, as well as prime plants against abiotic and biotic stress. PGPB are also located in plant intercellular space and can directly interfere with plant pathogens. Many different mechanisms of interaction between plants and PGPB has been shown, but the interaction through outer membrane vesicles (OMVs) has only been proposed. OMVs are membrane-enclosed nanostructures produced by Gram-negative bacteria. Size of OMVs can range from 20 to 300 nm, depending on the strain. In this research, we determined optimal method for isolation of OMVs produced by *Paraburkholderia phytofirmans* PsJN, characterized the size range of OMVs, their concentration and origin. OMVs from PGPB PsJN have been isolated using two methodological approaches: 1) differential centrifugation, ultrafiltration, and purification using Optiprep density gradient, and 2) OMV isolation by the commercial ExoBacteria OMV Isolation Kit that uses an affinity-based column system. Size and concentration of isolated OMVs were analyzed using Nanoparticle Tracking Analysis (NTA). As the OMVs are derived from outer membranes of bacteria, their origin has been proven using an assay for detection of lipopolysaccharides. In addition, protein profiles of OMV from PsJN were visualized by SDS-PAGE. Comparing different methods for isolation and purification of vesicles from PsJN we concluded that for our PGPB strain the commercial ExoBacteria OMV Isolation Kit provides the highest yield. Quantification of OMV using NTA of OMVs produced by *P. phytofirmans* PsJN, isolated with the commercial kit, showed a mean particle numeration of $4.05 \cdot 10^9$ particles/ml. Size of OMVs isolated from PsJN ranged from 50 to 200 nm. Detection of lipopolysaccharides confirmed that isolated vesicles originated from outer membranes of PsJN. These findings are the important first step in our research of the role of OMVs in PGPB interaction with plants.

Keywords: PGPB; extracellular vesicles; outer membrane vesicles; OMV.



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Evaluation
Questionnaire

ISBN 978-86-7078-178-8



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