Botanica SERBICA Vol. 42 (supplement 1) 7BBC Book of abstracts

The Balkan Botanical Congress is an international meeting that has been held nearly every three years, since 1997. It brings together botanists from around the world who perform research on plants in the widest sense, as well as scientists who are engaged in the plant sciences and their applications. We were honored to host such an extraordinary scientific event this year in Serbia.

The 7th Balkan Botanical Congress – 7BBC 2018 took place in Novi Sad from September 10th to 14th 2018. The Congress was organized by the University of Novi Sad, Faculty of Sciences, Department of Biology and Ecology and the "Andreas Wolny" Botanical Society, along with the great help of 7 co-organizers and more than 30 supporters and sponsors. It truly was not possible to happen without exceptional help of our co-organizer - the Institute for Nature Conservation of Vojvodina Province who made this congress not only possible, but totally awesome.

7BBC 2018 placed a special emphasis on plants of the Balkan Peninsula and covered various research fields. The Congress was organized into ten sessions: Plant Anatomy and Physiology, Plant Taxonomy and Systematics, Plant Molecular Biology and Genetics, Floristics, Vegetation and Phytogeography, Conservation Botany and Plant Invasions, Phytochemistry and Plant Resources, Agronomy and Forestry, Botanical Collections and History, Ethnobotany and Cryptogam Biology. These topics were elaborated through five plenary lectures given by eminent scientists, as well as in the form of introductory lectures, oral and poster presentations. With an overall number of 387 abstracts presented on the very latest of botanical science, we shared knowledge, expertise and novel ideas. We welcomed nearly 400 scientists to Novi Sad, and we believe that we succeeded in our joint endeavor to make new networks and new connections among botanists. We hope that we contributed to advancements in the wide and beautiful field of botany, ranging from fundamental botanical research to applied botany.

It is our great pleasure to publish this Abstract Book in Botanica Serbica, in the same year that this international journal, a renamed continuation of the Bulletin of the Institute of Botany and Botanical Garden Belgrade, celebrates its 90 year jubilee.
On behalf of the Scientific and Organizing committee of 7BBC 2018 we would like to express our gratitude to all contributors, colleagues and sponsors for taking part in the 7th Balkan Botanical Congress, as well as for their efforts and contributions to it's successful realization.

Goran Anačkov and Lana Zorić,
Co-presidents of the Scientific Committee of the 7 BBC
and guest editors of Botanica Serbica 42 (supplement 1).

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The 7th Balkan Botanical Congress consists of plenary lectures, introductory lectures of each session, as well as oral and poster presentations on the following topics:
Sessions 1. Plant Anatomy and Physiology
Sessions 2. Plant Taxonomy and Systematics
Sessions 3. Plant Molecular Biology and Genetics
Sessions 4. Floristics, Vegetation and Phytogeography
Sessions 5. Conservation Botany and Plant Invasion
Sessions 6. Phytochemistry and Plant Resources
Sessions 7. Agronomy and Forestry
Sessions 8. Botanical Collections and History
Sessions 9. Ethnobotany
Sessions 10. Cryptogam Biology

Poster presentation 16 07 08

OXIDATIVE STRESS IN SOYBEAN SEEDLINGS INOCULATED WITH *BACILLUS SUBTILIS* FOLLOWED BY MITES (*TETRANYCHUS URTICAE*) ATTACK

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The control of crop pests is one of the main problems in agriculture. Use of chemical pesticides and fertilizers cause serious environmental pollution and health problems. Due to that, modern agriculture is facing new challenges where microbial biocontrol agents are being integrated to achieve higher crop yields with minimizing environmental pollution. Growth-promoting rhizobacteria *Bacillus subtilis* has been documented as biological control agent and elicitor of induced systemic resistance (ISR). *Tetranychus urticae*, well know as mite, is an occasional pest of soybean that cause biotic stress. In response to pest invasion, plants produce reactive oxygen species (ROS) which are highly reactive and can seriously damage vital biomolecules. Plants developed antioxidant protective mechanism against oxidative stress. Phenolic antioxidant molecules have radical-scavenging capacity and play an important role against ROS. This study was conducted in order to assess the effect of inoculation of soybean (*Glycine max* L.) seeds with *B. subtillus*, followed by mites (*T. urticae*) exposure, on the content of total phenolics and tannins. In addition, radical scavenging activity of extracts was investigated using 2,2-diphenyl-1-picryhydrazyl (DPPH) assay. The total phenolic and tannins content was determined according to the Folin–Ciocalteu method and DPPH assay was done according to the method of Lee et al. (1998). The experimental design included inoculated and non-inoculated soybean seedlings – with, and without exposure to mites. It has been shown that *B. subtilis* does not cause oxidative stress in plants and could be used in practice. On the other hand, mites attack triggered oxidative stress in plan leaves and roots and, thus, significant accumulation of total phenolics and tannins. Inoculated soybean seedlings treated with mites had lower content of phenolics and tannins compared to non-inoculated group treated with mites which points to protective role of *B. subtilis*. The highest scavenging activity was detected in inoculated group (DPPH: 45,46±0,51 mg trolox/gdw;), and the lowest activity was in inoculated group treated with mites (DPPH: 27,12±0,90 mg trolox/gdw). The obtained results support the idea that inoculation of soybean seeds with *B. subtillis* improve resistance of soybean seedlings against mites attack. Therefore, *B. subtilis* potentially may be utilized as biopesticides.

KEYWORDS: biotic stress, antioxidants, antioxidant potential, *Glycine max* L., *Bacillus subtilis*, *Tetranychus urticae*

Poster presentation 17 07 09

STORAGE POSSIBILITY OF THE PIMED SOYBEAN SEED (*GLYCINE MAX* (L.) MERR.)

Zlatica Miladinov[1]*, Svetlana Balešević-Tubić[1], Ivana Maksimović[2], Vojin Đukić[1], Vuk Đorđević[1], Jegor Miladinović[1] & Kristina Petrović[1]

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In the technology production, various seed enhancement procedures are often applied to improve the quality of the seed, in particular germination and other properties of the seed after the treatment. Seed priming is the method used by the Old Greeks. Today it is a cheap and simple presowing measure that is primarily used in developing countries. However, the biggest problem in applying this measure is the length of storage of the primed seed. Storage possibility of the primed soybean seed was determined by a temperature of 25 °C during the period of 90 days. The soybean seed was primed with KNO_3 (1%), ASA (100mgl^{-1}) and KCl (1%) solutions, and then stored in paper bags, and its quality is tested every 15 days. The results showed that the reduction in the quality of the primed seed is considerably faster than the no-primed. Primed soybean seed can be stored at a temperature of 25 °C during 60 days after immersion, and after that period the significant reduction in its quality can occurs. After 75 days of immersion germination energy was reduced by 60.33% and germination by 9.33%, while after 90 days the germination energy reduction was 68.33% and germination by 65%. One of the causes for reducing seed quality is an increase in MDA content, especially after 75 and 90 days of storage. Also, the free proline concentration has been reduced while the content of vitamin C increased after 15 days primarily in seeds immersed in ASA and KCl solutions, and after 45 days its content was reduced.

KEYWORDS: seed priming, seed storage, soybean

Poster presentation 18 07 15

ANTIFUNGAL ACTIVITIES OF IONIC LIQUIDS AGAINST PHYTOPATHOGENIC *ALTERNARIA* SPP. STRAINS

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A modern sustainable approach in agricultural practice would be a replacement of synthetic and toxic substances in the treatment of crop with benign and environmentally friendly compounds, by using principles of green chemistry. One of the possible directions could be using of ionic liquids (ILs), salts with melting points below 100 °C, which are well-known for manifesting antimicrobial activity. ILs can be used in the development of novel sources of antimicrobial agents such as antiseptics, biocides and antifungal agents. Furthermore, ILs have already been reported as alternative 'green' solvents for a wide range of reactions and technological processes. Considering the importance of research in the area of bioactivity of ILs for discovery of new green ILs for different purposes, the aim of this study was to examine antifungal activity of nine newly synthesized ILs against phytopathogenic *Alternaria* strains isolated from from rice (*A. padwickii*), carrot (*A. dauci*) and linseed (*A. linicola*). Antifungal effect was estimated by micro-plate microdilution method for establishing minimum inhibitory (MIC) and minimum fungicidal concentration (MFC). All ionic liquids showed strain specific but good antifungal activity on *Alternaria* strains with MIC and MFC detected at the range from 9.23 mg/ml to 75.89 mg/ml. Only in case of the 1-(4-hydroxy-2-oxy)butyl -3-methylimidazolium chloride [OHC2OC2mIm][Cl], no antifungal effect on *A. dauci* were observed. Comparing to *A. padwickii* and *A. dauci., A. linicola* showed higher sensitivity to all tested ILs. The obtained results indicate the possibility of usage of ILs in biocontrol of plant diseases, representing their application in crop protection. However, further research is necessary in order to examine their toxicity and biodegradability in the environment.

KEYWORDS: agriculture, *Alternaria,* antifungal activity, green chemistry, microdilution method, phytopathogenic fungi

Poster presentation 19 07 14

BACILLUS STRAINS AS POTENTIAL AGENTS FOR THE BIOCONTROL OF PHYTOPATHOGENIC FUNGI *ALTERNARIA* SPP.

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Plant diseases caused by fungal pathogens can lead to major economic losses in agriculture. The genus *Alternaria* includes saprobic, endophytic and pathogenic species that may cause various plant diseases such as blight disease. Symptoms of *Alternaria* blight include the presence of irregular, often circular, brown to dark brown coloured leaf spots. *Alternaria* spp. also cause collar rots, stem lesions, tuber and fruit rots of their respective hosts. In addition, bacteria are one of the most frequently biocontrol agents used to protect plants from diseases. *Bacillus* species control disease through a variety of mechanisms. Bacterial antagonists might act as inhibitors of growth, development and reproduction of pathogen, or as inducers of host resistance in plant. The objective of this study was to examine *in vitro* antifungal activity of ten antagonistic *Bacillus* strains from collection of Department for Microbiology of Institute of Field and Vegetable Crops, Novi Sad. Strains were originally isolated from the soil samples collected from several localities of Vojvodina Province. Antifungal activity of *Bacillus* strains against *Alternaria padwickii, A. dauci* and *A. linicola*, obtained from rice, carrot and linseed, respectively was tested using a dual plate assay. The results confirmed that all tested *Bacillus* strains showed antifungal acivity against *Alternaria* spp. The highest antagonistic activity was exhibited by *B. pumilus* B11 (45.71% to 51.25%), *B. subtilis* B13 (45.71% to 49.37%) and *B. subtilis* B32 (45.71% to 52.08%), while *B. pumilus* B23 had the weakest antifungal activity. *B. safensis* B2 (35.24% to 48.33%), *B. pumilus* B21 (40.95% to 48.75%) and *B. pumilus* B22 (33.50% to 49.17%) also demonstrated good antifungal potential. *A. dauci* was the most sensitive fungus, while the most resistant was *A. linicola.* Obtained results indicate the possibility of usage of the most effective *Bacillus* strains as potential biocontrol agents of plant diseases caused by *Alternaria* spp.

KEYWORDS: agriculture, *Alternaria,* antifungal activity, *Bacillus*, biocontrol, phytopathogenic fungi