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# BOOK OF ABSTRACTS

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The antimicrobial activity of extracts of two moss species (*Atrichum undulatum* and *Physcomitrella patens*) and one liverwort species (*Marchantia polymorpha*) was examined by microdilution method against eight bacterial (*Escherichia coli*, *Pseudomonas aeruginosa*, *Salmonella typhimurium*, *Enterobacter cloacae*, *Listeria monocytogenes*, *Bacillus cereus*, *Micrococcus flavus*, *Staphylococcus aureus*) and five fungal species (*Aspergillus versicolor*, *A. niger*, *A. fumigatus*, *Penicillium funiculosum*, *P. ochrochloron*, *Trichoderma viride*). These three bryophyte species were grown under *in vitro* conditions, either on liquid or solid growth media and under different light conditions (long day - 16h light/8 hours dark, short day - 8h light/16 hours dark, or dark conditions - 24 hours dark). All the investigated bryophyte extracts have been proved to be active against all bacteria and fungi tested, but there were some differences among them recorded. The best antibacterial activity is obtained for extract of the moss *Atrichum undulatum* that was grown *in vitro* under long day conditions, while the lowest antibacterial activity among all extracts tested in here was obtained for extract of the moss *Physcomitrella patens* grown under the same conditions. It is obvious that all the tested bryophyte extracts showed better antifungal activity than antibacterial. The best antifungal activity is obtained for extract of the liverwort *Marchantia polymorpha* grown *in vitro* under the long day conditions, while the lowest antifungal potential is recorded for extract of the moss *A. undulatum* grown *in vitro* under the dark conditions.

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#### ANTIMICROBIAL ACTIVITY OF METHANOL EXTRACT OF LIVERWORTS *CHILOSCYPHUS POLYANTHOS* AND *SCAPANIA ASPERA*

Milan VELJIĆ<sup>1</sup>, Marina SOKOVIĆ<sup>2</sup>, Jasmina GLAMOČLIJA<sup>2</sup>, Danka BUKVIČKI<sup>1</sup>, Petar D. MARIN<sup>1</sup>

<sup>1</sup>Institute of Botany and Botanical Garden "Jevremovac", Faculty of Biology, University of Belgrade, Takovska 43, 11000 Belgrade, Serbia, e-mail: pdmarin@bio.bg.ac.rs

<sup>2</sup>Institute for Biological Research "Siniša Stanković", University of Belgrade, Bul. Despota Stefana 142, 11000 Belgrade, Serbia

Corresponding e-mail: veljicm@bio.bg.ac.rs

In this work, antibacterial and antifungal activity of methanol extract of two liverwort species, *Chiloscyphus polyanthos* (L.) Corda and *Scapania aspera* Bernet & M. Bernet, was tested against G (+) and G (-) bacteria and micromycetes. Following bacterial species were used: *Staphylococcus epidermidis*, *Micrococcus flavus*, *Bacillus subtilis*, *Escherichia coli* and *Salmonella enteritidis* and fungi *Aspergillus flavus*, *A. fumigatus*, *A. niger*, *Penicillium funiculosum*, *P. ochrochloron*, *Trichoderma viride* and yeast *Candida albicans*. For comparison of antimicrobial activity synthetic antibiotic Amoxicillin, while for antifungal activity bifonazol was

used. Slightly stronger antibacterial activity showed methanol extract of *C. polyanthos*, being active against *Staphylococcus enteritidis*, with MIC of 2.5 mg/ml. Using disc diffusion method and concentrations of 1 and 2 mg/disc, the extracts of both species showed activity against all bacteria tested. At the concentration of 0.5 mg/disc the extracts were active against all bacteria except *Micrococcus flavus*. All micromycetes tested were susceptible at the concentrations of 5 mg/ml. Antifungal activity of *Chiloscyphus polyanthos* was also stronger. *Trichoderma viride*, which is known as a resistant species, was sensitive on this extract. Minimal inhibitory concentration of *C. polyanthos* extract against *T. viride* was 1.25 mg/ml, which is similar result to that given for synthetic fungicide bifonazol.

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#### EFFECT OF NaCl ON CHLOROPHYLL AND PROTEIN CONTENT, AND ANTIOXIDANT ENZYMES ACTIVITY IN TWO BRYOPHYTE SPECIES – *ATRICHUM UNDULATUM* (HEDW.) P. BEAUV. AND *MARCHANTIA POLYMORPHA* L.

Milica BOGDANOVIĆ<sup>1,2</sup>, Aneta SABOVLJEVIĆ<sup>1</sup>, Marko SABOVLJEVIĆ<sup>1</sup>, Milan DRAGIĆEVIĆ<sup>2,3</sup>, Jelena PLATIŠA-POPOVIĆ<sup>2</sup>, Dragoljub GRUBIŠIĆ<sup>1,2</sup>

<sup>1</sup>Institute of Botany and Botanical Garden "Jevremovac", Faculty of Biology, University of Belgrade, Takovska 43, 11000 Belgrade, Serbia, e-mail: marko@bio.bg.ac.rs

<sup>2</sup>Institute for Biological Research "Siniša Stanković", University of Belgrade, Bul. Despota Stefana 142, 11000 Belgrade, Serbia, e-mail: platisa@ibiss.bg.ac.rs

<sup>3</sup>Faculty of Chemistry, University of Belgrade, Studentski trg 12-16, P.O. box 158, 11000 Belgrade, Serbia

Corresponding e-mail: milica84bog@gmail.com

Bryophytes are thought to avoid salty substrates, although in few species reported salt tolerance is greater than in non-halophyte tracheophytes. To explore bryophyte salinity tolerance, two species were grown *in vitro* on half-strength MS media with added NaCl (concentrations of 100, 250 and 500 mM). Chlorophyll content was measured spectrophotometrically, and protein content, peroxidase and catalase activities were assayed both spectrophotometrically and by PAGE. Chlorophyll content in *M. polymorpha* decreases rapidly with rising salt concentrations approaching zero at 250 mM, while in *A. undulatum* it remains high at 100 mM of salt above which decreases. Protein content remains high at 100 mM of salt in both species and decreases at higher salt concentrations (in *M. polymorpha* several times compared to control values). Peroxidase activity is much higher in *M. polymorpha* and decreases slightly at high salt concentrations. Catalase activity in *A. undulatum* remains high at all salt concentrations, in contrast with *M. polymorpha* whose activity lowers considerably at 250 mM of salt.

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