



Proceedings of the YOUNG SCIENTISTS' CONFERENCE ON MULTIDISCIPLINARY RESEARCH

VIRTUAL INTERNATIONAL CONFERENCE





Paper ID: CMT-217

Probiotic fungal-bacterial biofilms as cell factories for postbiotics production

<u>R. Pathirana</u>¹, M. Premarathna^{1*}, G. Seneviratne¹

¹Microbial Biotechnology Unit, National Institute of Fundamental Studies, Kandy, Sri Lanka

*mahesh.pr@nifs.ac.lk

Postbiotics bioactive compounds like enzymes, organic acids, peptides, short-chain fatty acids, etc. produced by probiotic microorganisms offer health benefits including enhanced immune function, anti-inflammatory effects, improved gut barrier function, and potential protection against pathogens and certain chronic diseases. The study aimed to develop in-vitro biofilms to optimize and enhance the production of beneficial postbiotics for various biotechnological applications. A fungal-bacterial biofilm was produced using four probiotic bacterial strains viz. Bacillus subtilis, Bacillus clausii, Lactobacillus sporogenesis and Lactobacillus reuteri, and one fungal strain i.e. Aspergillus niger. Once the biofilm development was confirmed under light microscope, the exuded biochemicals were extracted using a heating and ultrasonication method. The biofilm exudates were separated and analyzed using Liquid Chromatography-Mass Spectrometry (LC-MS), and identified using NIST mass spectral library database (National Institute of Standards and Technology, Gaithersburg, MD, USA). Results revealed that there were diverse bioactive compounds in the biofilm exudates. Five bioactive compounds i.e. Hesperidin, Sucrose octabenzoate, Naringin, Terbutaline, and Nonahexacontanoic were identified in the first 25% of the LC-MS spectrum with a match factor of 999 and probability of 100% when compared with the NIST library. The biochemicals have the potential to be used as antioxidants, cosmetic products, anti-cancers, bronchodilators, and anti-fungal, respectively. It can be concluded from these results that the biofilms developed *in-vitro* have a promising potential to be used as "microbial cell factories" for enhanced production of diverse postbiotics. Further research is needed to develop more productive biofilm formulations in terms of the diversity and quantity of the postbiotic products produced.

Keywords: Biofilms, gut microbiota, LC-MS, postbiotics, probiotics