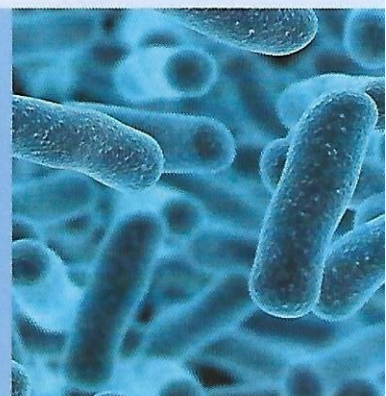


**International Academic Symposium on  
Microbial Stress Tolerance and Response**

**CONFERENCE  
PROGRAM**



**October 20-22, 2023  
Guangzhou, China**



**Oct 21<sup>st</sup> 16:50-17:20**

**Mahesh Premarathna**

**Post-Doctoral Research Fellow**

**National Institute of Fundamental Studies, Kandy**



Dr. Mahesh Premarathna obtained a B.Sc. Hons. of Agriculture (Special) in Biotechnology Degree from Wayamba University of Sri Lanka, in 2019., and a Ph.D. degree from the University of Peradeniya in 2023, with a thesis titled “Microbial biofilms and their network interactions”. He is a member of the pioneering group of Biofilm-based Biofertilizers (BFBF) at the NIFS, and he has contributed to the novel applications of microbial biofilms. His research interests include Molecular Biology and Biochemistry, Biotechnology, Microfluidics, Soil carbon sequestration, Astrobiology, Agriculture, Ecosystems and Environment, Biofilm Medicines, and Philosophy.

**Title: Biofilm biochemicals as the next-generation biofertilizers and medicines / nutraceuticals**

**Abstract:** Microorganisms respond to environmental stressors, evolving coping mechanisms. Understanding these responses is vital for addressing environmental and health issues. Stress can lead to dormant microbial states, reducing diversity and ecosystem functioning. Alternatively, stress can induce virulence and harm to ecosystems. We aim to produce biofilm biochemicals (BBCs) via in-vitro development to break microbial dormancy, enhancing diversity, abundance, and sustainability. These biochemicals are poorly understood but crucial for biotechnological applications like biofilm biofertilizers (BFBF) and biofilm medicines/nutraceuticals. We have performed a cross-disciplinary study by applying productive biofilms to degraded agroecosystems and simulated gut environments. Results showed that the BFBF improved plant immunity, soil quality, and sequestered carbon up to 30% with its subsequent stabilization, increased crop quality and yields up to 25%, while cutting down chemical fertilizers up to 50% when compared to the chemical fertilizer alone application. Due to these beneficial effects, the BFBF practice has expanded up to 16% of total paddy cultivation in Sri Lanka. As a next step, 69 industrially and medicinally important BBCs were identified, indicative of ecosystem restoration, including the human gut. In addition, BBCs were non-toxic and promoted gut microbiota restoration. These studies suggests that the biofilms with BBCs have a potential as the next-generation biofertilizers and medicines / nutraceuticals.