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Effect of sugars, amino acids, hormones and microbial biofilm exudates on dormancy breaking of culturable soil microbial seed bank

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Soil microbial diversity is found to be beneficial for plant growth and productivity. The diversity has decreased to alarming level under stressful soil conditions and microbes form dormant structures like spores to withstand stressful soil conditions. Biofilm Biofertilizer (BFBF) is the most efficient product, newly introduced to the agricultural industry of Sri Lanka, which consists of different compounds like sugars, amino acids and hormones. These compounds assist in breaking the dormancy of microbial seed bank. However, effect of the compounds on the dormancy breaking has been poorly investigated. Therefore in the current study, the effect of glucose, tryphtophan, indole acetic acid (IAA), BFBF exudates on dormancy breaking and growing of culturable soil microbial seed bank was investigated. BFBF exudates and seven types of solutions were prepared by mixing glucose, tryptophan and IAA in different ratios and used them as treatments. Sterile distilled water was used in the control. Sieved (0.5 mm) and air dried garden soil was treated and incubated for 2 months under room temperature. Triplicated treatments were arranged according to completely randomized design. Then the dormancy breaking test was conducted on treated soil following the protocols developed by National Institute of Fundamental Studies. Bacterial colony count and average colony diameters under each treatment were recorded after 1, 2, 4 and 6 weeks. Fourier Transformed Infrared (FTIR) spectra were recorded for exudates and prepared solutions. The highest colony count was observed in BFBF exudate treatment throughout the experiment whereas highest diameter was different among treatments during the incubation period. The lowest colony count was recorded in soil treated by IAA. This implies that the bacterial growth was improved when compounds interacted. The study concludes that colony count and diameter varies among treatments. However, among all treatments, BFBF exudate was the best for microbial seed bank dormancy breaking.

Keywords: Biofilm exudates, FTIR, Microbial biofilms, Soil microbial seed bank