

MICROBIAL BIOFILMS FOR BIOSOLUBILIZATION OF *EPPAWALA* ROCK PHOSPHATE

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Biofilms are complex multi-cellular communities of microbes, some of them have potential to biosolubilize certain nutrients in the substrate. National Institute of Fundamental Studies (NIFS) has developed four biofilm formulations (BF1, BF2, BF3 and BF4) with the potential of solubilizing phosphorus (P) in *Eppawala* Rock Phosphate (ERP) and they have shown promising results in preliminary studies. Thus, this study was designed to evaluate the efficacy of these biofilm formulations in solubilizing ERP. A laboratory tray experiment was conducted under controlled conditions in a completely randomized design with three replicates. Five treatments were tested; the four biofilm formulations were sprayed separately (1.7 L of biofilms per 100 kg of ERP) into trays with a thin uniform layer of autoclaved ERP and also a control tray without a biofilm. Data were statistically analysed using analysis of variance followed by mean separation using Tukey's HSD test. Available P, water soluble P, microbial biomass C and P, pH and other microbial observations were taken in two weeks intervals for three months. Results revealed that BF3 was significantly higher ($p < 0.05$) in releasing cumulative available P (279.9 mg kg^{-1}), water soluble P (160.7 mg kg^{-1}), biomass P (212.9 mg kg^{-1}) with the heaviest microbial biomass (2.3 mg g^{-1}) attached with ERP, compared to the other tested biofilms. All the biofilm treatments showed acidic pH throughout the experiment since they were producing organic acids when solubilizing P. The overall results conclude that the BF3 is the most efficient biofilm formulation in solubilizing ERP. Thus, further studies are recommended to evaluate the potential of using BF3 under field conditions in enhancing the solubilization of ERP.

Keywords: Biofilms, Biosolubilization of phosphorous, *Eppawala* rock phosphate