

POTENTIAL OF BIOFILMS ON BIOSOLUBILIZATION OF EPPAWALA ROCK PHOSPHATES

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At present, Eppawala Rock Phosphate (ERP) has been identified as a virtuous alternative for Triple Super Phosphate (TSP). However, its application is limited due to low solubility. Through enhancing the biosolubility, ERP has a great potential to be used as a phosphorous (P) fertilizer for annual crops. National Institute of Fundamental Studies (NIFS) has developed biofilm formulations with the potential of biosolubilization of ERP. Hence this study was designed to assess the potential of certain biofilms on biosolubilization of ERP. Three experiments were conducted as: cultural broth study, leaching tube study and a pot experiment under laboratory condition. All experiments were conducted in a completely randomized design (CRD) with three replicates. Data were statistically analyzed using analysis of variance (ANOVA) followed by mean separation using Tukey's HSD test. In broth study, five treatments; four biofilm cultures denoted as BF1, BF2, BF3 and BF4 in liquid low cost medium (LCM) with ERP particles, and a control without biofilms were tested. Available P, water soluble P, microbial biomass carbon and P, pH and other microbial observation were taken after two weeks incubation. In the other experiments; five treatments were tested having combined application of BF1, BF2, BF3 and BF4 biofilms with P reformulated by replacing TSP of the Department of Agriculture (DOA) rice fertilizer recommendation from ERP and a control without biofilms. Solubilized P was recovered by leaching in every two weeks for three months and available soil and plant P were analyzed at the end of the pot experiment. The results of the broth study revealed that BF3 was significantly higher ($p < 0.05$) in releasing available P, water soluble P, biomass P with the heaviest microbial biomass compared to the other tested biofilms. In leachates, the highest amount of solubilized P was recovered in both BF1 and BF3 and at the end of the pot experiment, significantly the highest P dynamics were observed ($p < 0.05$) in BF3. Based in the results, it can be concluded that the BF3 is the most outstanding biofilm formulation on biosolubilization of ERP. Thus, further studies are needed to evaluate the potential of BF3 under field conditions in enhancing the solubilization of ERP.

Keywords: Biofilms, Eppawala rock phosphate, Phosphorous solubilization, Triple super phosphate