

EVALUATION OF NUTRIENT COMBINATIONS, INCLUDING MICROBIAL BIOFILM TREATED EPPAWALA ROCK PHOSPHATE FOR MAIZE CULTIVATION

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The Government of Sri Lanka has been spending billions of foreign exchange for more than a decade to provide fertilizer subsidy on synthetic fertilizers. Excessive use of chemical fertilizers adversely affects the soil fertility and ultimately crop productivity. Eppawala Rock Phosphate (ERP) is one of the low cost and alternative phosphorous fertilizer sources available in the country. At present, ERP is only used for perennial crops because of the low solubility of P. Since it is evident that low pH conditions increase solubility of ERP, microbes, especially fungi and their biofilms can be used to increase the solubility of ERP as they create acidic conditions. The objective of this study was to select the best nutrient combination including microbial biofilm treated ERP for maize cultivation. Five treatments were applied including a control; soil only (as the control); 100% Triple Super Phosphate, N, K mixed soil; 100% ERP, N, K and ERP solubilizing biofilm mixed soil; 50% ERP, N, K and ERP solubilizing biofilm mixed soil; 50% ERP, N, K, ERP solubilizing biofilm and maize biofilm (commercial biofilm product for maize produced by Lanka Bio Fertilizers Ltd.) mixed soil; 50% ERP, N, K and maize biofilm mixed soil. Maize was used as the test plant. Treatments were arranged according to Completely Randomized Design (CRD) in four replicates. Soil and plant parameters were measured and statistically analyzed. The maize biofilm treated plants, applied with 50% ERP, N and K showed significantly the highest ($p < 0.05$) dry mass production compared to other treatments, including the control. This indicates that maize biofilm is more effective than ERP solubilizing biofilm in improving plant growth and perhaps even in increasing ERP solubilization. This study concludes that maize biofilm coupled with 50% ERP, and 50% N and K is the most appropriate nutrient combination for maize. Further studies under field conditions are needed to understand effects and potentials of the biofilms.

Keywords: Biofilm, Eppawala Rock Phosphate, Phosphorous, *Zea mays*