

BIOFILM TREATED EPPAWALA ROCK PHOSPHATE AS A SUBSTITUTE FOR TRIPLE SUPERPHOSPHATE IN RICE CULTIVATION

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Biofertilizers (BF) are being popularized over chemical fertilizers (CF) due to many positive effects on the agroecosystems. As a novel concept of BFs, Biofilmed biofertilizer (BFBF) is reported to increase the grain yield of rice (*Oryza sativa* L.) on average 20% while cutting down CF up to 50%, a paradigm change in Sri Lankan agriculture. However, to make BFBF practice 100% organic, further studies are needed to replace the balance CF from organic or mineral sources. In this study, the potential of biofilm-ERP, i.e. biofilm treated Eppawala Rock Phosphate (ERP), as a substitute for triple superphosphate (TSP) in rice cultivation was evaluated by conducting farmer field trials in three major rice-growing districts having variable soil types and climatic conditions in Sri Lanka. The BFBF practice [65% NPK of DOA recommendation (225 kg ha⁻¹ urea, TSP & MOP) + 2.5 L ha⁻¹ BFBF] and biofilm-ERP practice [65% NK of DOA recommendation (190 kg ha⁻¹ urea & MOP) + 2.5 L ha⁻¹ BFBF + 92.5 kg ha⁻¹ biofilm-ERP] were compared for soil, plant and microbial parameters using descriptive statistics and network analysis. Results showed increasing trends of grain yield as well as Endophytic Diazotrophs (ED) in the biofilm-ERP practice over the BFBF practice. This could be attributed to enhanced endophytic nitrogen fixation by the increased ED due to molybdenum supplementation, particularly among other micronutrients of ERP in the biofilm-ERP practice. A negative correlation was identified among the grain yield and soil total N (STN) from biofilm-ERP practice. It reduces the yield with increasing STN, possibly due to the suppression of ED with an increased supply of STN, thus opening an avenue to reduce CF nitrogen further. It can be concluded that the biofilm-ERP is a potential candidate to replace TSP for rice cultivation in major rice-growing soils of Sri Lanka.

Keywords: Biofilmed biofertilizer, Biofilm-ERP, Endophytic diazotrophs, Rice cultivation, Triple superphosphate