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

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Biofertilizers (BF) are being popularized over chemical fertilizers (CF) due to BF's positive effects on agroecosystems as well as human health. As a novel concept of BF, Biofilm biofertilizer (BFBF) is reported to increase the grain yield of rice (*Oryza sativa* L.) on average ca. 20%, while cutting down CF up to ca. 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/mineral sources. Here, potential of biofilm-ERP, i.e. biofilm treated Eppawala Rock Phosphate (ERP), as a substitute for Triple Super Phosphate (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 urea, TSP & MOP/ha) + 2.5 L/ha BFBF] and biofilm-ERP practice [65% NK of DOA recommendation (190 kg urea & MOP/ha) + 2.5 L/ha BFBF + 92.5 kg/ha 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 supplementation of molybdenum in particular, among other micronutrients of ERP in the biofilm-ERP practice. Strangely, soil total N (STN) significantly, negatively correlated with the grain yield of the biofilm-ERP practice ($P < 0.05$), indicating a reduction of the yield with an increase of STN. This could be due to suppression of ED with the increased supply of STN, thus opening an avenue to further reduce CF nitrogen. It can be concluded that the biofilm-ERP is a potential candidate to replace TSP in the rice cultivation of the country.

Keywords: Biofilm biofertilizer, Biofilm-ERP, Endophytic diazotrophs, Rice cultivation