

184B

Forms of Phosphorus in soils fertilized with Eppawala Rock Phosphate as measured by chemical fractionation

B C Walpola*¹, A K N Zoysa² and S D Wanniarachchi¹

¹University of Ruhuna, Faculty of Agriculture, Mapalana, Kamburupitiya

²Tea research Institute, Talawakelle

Residues of rock phosphate remaining in the soil in the years after the application of fertilizers can be effective sources of P for plant species that have relatively low external P requirements. Soils that have been fertilized with rock phosphate (RP) fertilizer contain undissolved RP for many years after application, because only a portion dissolves quickly and the remainder dissolves slowly. Consequently, appreciable amounts may be present in soils for many years after application. Therefore, the purpose of the study was to identify the forms of P in fertilized soils with ERP.

The soil used in this study belongs to the Rhodustult collected from a long-term phosphate fertiliser field trial started in 1994. The trial comprised annual application of P fertiliser treatments applied at six rates i.e. 20, 40, 60, 80, 100 and 120 kg P₂O₅ ha⁻¹ y⁻¹ with a control treatment. The P fertiliser was provided in the form of Eppawala phosphate rock (EPR) and the P treatments were applied by two methods i.e. broadcasting to the soil surface and incorporation to a depth of 15-20 cm.

The results of P fractionation showed that the applied EPR had transformed in to other P forms i.e. resin-P, NaOH-P_i, NaOH-P_o in the soil. At the end of the field trial (after 8 years) at least 50% of the EPR (apatite-P) was transformed in to other P-forms. In both methods of P fertiliser (surface application and incorporation to the soil), that magnitude of NaOH-P_i, NaOH-P_o and H₂SO₄-P_i were much larger than that of the resin-P fraction.

The addition of EPR fertiliser at increasing rates increased the resin-P, NaOH-P_i (Fe and Al bound P), NaOH-P_o and H₂SO₄-P_i (Ca bound P) fractions in the soils. The concentration of resin-P was much lower compared to all other P fractions. There is a significant effect of the method of EPR application on soil P fractions. The concentrations of all P fractions were significantly higher at all P rates when P was deep placed compared to the broadcasting to soil surface.