Indian Journal of Natural Rubber Research, 7 (1) : 65-67, 1994

ROLE OF Fe IN P FIXATION : A COMPARISON

The rubber growing soils in India are mainly classified under Alfisols and Ultisols. These soils are characterised by leaching of bases and accumulation of oxides of Fe and Al as a consequence of intense weathering. The variations in these oxides, the chief factors of P fixation, will reflect the amounts of P fixed by them. To estimate these changes, a comparative study was taken up with soil samples collected from two different sites, one with granitic and charnokitic parent material under humid tropical climate and the other under humid subtropical climate with secondary formations like sandstones and shales forming the parent material. The inorganic P fractionation and the P fixation capacity of the soil samples were studied to ascertain the role of free Fe in P fixation.

For the present study, soil samples collected horizonwise from two profiles, one from the Central Experiment Station (CES), Kerala and the other from Regional Research Station (RRS) farm, Tripura of the Rubber Research Institute of India, were used. The relevant physico-chemical properties were determined by standard procedures described by Jackson (1973). The mean values of triplicated analyses of pH, organic carbon and Bray II extractable P were recorded. Similarly Fe extracted by neutral normal ammonium acetate, Morgan reagent extracted Ca and Mg and citrate-bicarbonate-dithionate reagent extracted free Fe were determined by atomic absorption spectrophotometry and K by flame photmetry. Soil texture was determined by particle size analysis (Table 1).

P fixation capacities were estimated in triplicate, by the method described by Bass and Sieling (Jackson, 1973). Fractionation of inorganic P was carried out by the procedure given by Peterson and Coney (1966) to estimate the quantities of Al bound P, Fe bound P, Ca bound P and reductant soluble P.

Table 1 shows that the mean pH of the profiles excavated from CES and RRS was 4.74 and 4.68, respectively. Organic carbon decreased down through the profiles gradually. Bray II extractable P, free Fe and exchangeable cations like Ca, Mg and K were observed to be more in CES soil profile than in RRS profile.

The data presented in Table 2 indicate that mean P fixation capacity in CES profile was higher (644 mg100g^{-1} soil) than that of RRS profile (330 mg100g^{-1} soil). This could be attributed to the relatively higher contents of free Fe in CES profile than in RRS profile. Free Fe renders soluble P unavailable by instantly forming binuclear complexes which are less soluble and unavailable (Sanchez and Uehara, 1980). The granitic and charnokitic parent material weathered under humid tropical climate would have resulted in the release of higher amounts of free Fe and Al in CES soil compared to the weathering of the secondary formations in humid sub-tropical climate of Tripura. There was a positive and significant correlation between P fixation and free Fe (r=0.781).

There was a gradual increase in P fixation with depth in RRS soil profile. This