

PHYSICO-CHEMICAL PROPERTIES OF SOILS UNDER RUBBER WITH DIFFERENT NUTRIENT MANAGEMENT PRACTICES : A CASE STUDY

Annual defoliation of rubber (*Hevea brasiliensis*) trees results in the addition of about six tonnes of leaf litter per hectare every year in rubber plantations (Krishnakumar and Potty, 1992). Nutrient removal from the system is only through latex and is very limited. But rubber trees immobilise large quantities of soil nutrients during their life span (Aweto, 1987) which will be removed through wood at the end of a cropping cycle.

Once the rubber trees attain maturity, nutrient recycling through leaf litter is enhanced, which influences response to chemical fertilizers. No work has been done to study the effect of the different nutrient management practices on the properties of rubber growing soils. Hence, a survey was conducted to identify a few existing nutrient management systems and to study the soil physical, chemical and biological properties.

Three tapping blocks which received different fertilizer management practices for 14 years were selected for the study from one area. Soil of the area was lateritic. All the fields were planted with the clone RR II 105 in 1978. One of the blocks received 44 kg each of N and P, 18 kg of K and 6 kg of Mg per hectare per year during the immature phase and 30 kg each of N, P and K during the mature phase as chemical fertilizers. The second area received an additional dose of 180 kg bone meal and 660 kg cowdung per hectare per year. The bone

meal contained 3.5 per cent N and 21 per cent P and cowdung had 0.4 per cent N, 0.3 per cent P and 0.2 per cent K. The third block did not receive any fertilizer or organic manure during immature and mature phases.

Soil samples were collected from five sites in each block at two depths (0-30 cm and 30-60 cm) at the 14th year and each sample was considered as a replication. Organic carbon was determined by Walkley and Black's method as described by Jackson (1973). Available P and K were estimated using Bray II (Bray and Kurtz, 1945) and Morgan's reagent (Morgan, 1941) respectively. Mg was estimated using colorimetric method (Vogel, 1969). A soil solution ratio of 1:2.5 was used for pH determination. Bulk density and particle density were determined from core samples. Composite samples were collected for leaf analysis and N, P and K were estimated as described by Piper (1966). Analysis of variance was done to compare the treatments. The population of different groups of micro organisms like bacteria, fungi, actinomycetes, phosphate solubilizers and *Beijerinckia* spp. were estimated following the serial dilution plate method (Timonin, 1940) using refrigerated samples. Since already existing fields were selected for the study pretreatment evaluation of chemical and biological properties of soil could not be done.

Application of organic manures improved all the soil physical properties