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SOIL NUTRIENT STATUS DURING THE IMMATURE PHASE OF GROWTH IN A *HEVEA* PLANTATION

Growth and development of plants is supported to a great extent by soil nutrients although the quantity of nutrients absorbed differs from one species to another. Though rubber (*Hevea brasiliensis*) is grown under good management practices, the impact its cultivation may have on the physical and chemical properties of soil has not been comprehensively examined. Rubber is a plantation crop, which is cultivated in about 18 per cent of the total agricultural land in Kerala (Chattopadhyay, 1996).

Rubber tree has 30 to 35 years of economic life span and the crop is in the second or third planting cycle in most of the traditionally cultivated areas in India. Monocropping of a species for decades results in depletion of organic matter (Doran *et al.*, 1996). The rubber plantations are mostly located in degraded forests and deforested areas. Studies by Karthikakuttyamma (1997) revealed that in rubber growing soils the organic carbon (OC) content is lower than that in soils of adjacent forests. Potassium (K) and Magnesium (Mg) contents also tended to decrease with continuous rubber cultivation. However, recent investigations showed that most of the rubber growing soils have a medium to high status of OC content (NBSS and LUP, 1999).

The major sources of nutrient addition to rubber growing soils are inorganic fertilizers and leaf litter of rubber and cover crops. Leaf litter is the major organic input. Rubber tree takes about seven years to attain tappable girth in traditional rubber growing areas. During this period the trees do not attain a dense canopy. Hence establishment of cover crops during the immature phase is recommended and practiced by most farmers in Kerala. The change in intensity of soil nutrients due to rubber cultivation is expected to be different during the immature and mature phases because, the quantity of litter differ in the two phases. About three to five tonnes of litter are reportedly added through cover crops during the initial four to five years while the annual litter addition through mature trees is of the order of about six tonnes per hectare per annum (Krishnakumar and Potty, 1992). The soil nutrient status during the immature phase of rubber cultivation has not been carefully examined. Hence this study was taken up in two fields of the Rubber Research Institute of India farm at Kottayam, where the standard of plantation management was good.

The two fields where this investigation was carried out were on gentle slopes. Establishment of cover crops (*Pueraria phaseoloides* in most parts and *Mucuna bracteata* in the periphery of the fields) were satisfactory in both the fields during the initial four to five years. These fields were under continuous cultivation of rubber since 1950s. The first cycle of rubber was completed in 1989 and the trees were felled. Two multiclonal experiments were laid out in these fields, one with 13 clones and seven replications and the other with 13 clones having five replications.

The soil samples (0 to 30 cm) from all the 91 plots of Experiment No.1 and from the 65 plots of Experiment No.2 were collected and analysed separately. Two samples from each plot were collected, pooled and subjected to