

## SOILS UNDER *HEVEA* IN INDIA: PHYSICAL, CHEMICAL AND MINERALOGICAL INVESTIGATIONS

A.K. Krishnakumar, M. Karthikakuttyamma, B. Datta, S.N. Potty, C.P. Mary, M.J. Thomas and Aleyamma Augusthy

Krishnakumar, A.K., Karthikakuttyamma, M., Datta, B., Potty, S.N., Mary, C.P., Thomas, M.J. and Augusthy, A. (2003). Soils under *Hevea* in India: Physical, chemical and mineralogical investigations. *Indian Journal of Natural Rubber Research*, 16 (1 & 2) : 1-20.

The physical, chemical and mineralogical properties of the soils under rubber (*Hevea brasiliensis*) from the south western region of Peninsular India were studied and classified as per soil taxonomy. The texture of the soils varied from sandy clay loam at the surface to clay in the lower solum. The soils in general were deep and profiles exhibited distinct A and Bt horizon indicating clay migration by illuviation. Bulk density showed a decrease with depth while porosity showed an increase. Soils had dominantly kaolinitic mineralogy with lesser amounts of iron oxide, gibbsite along with illite in degraded forms, which warrants attention with respect to potassium nutrition. The soils were acidic in reaction (pH 4.5-5.9) and ApH values suggested that these were near to zero point charge. The mean profile cation exchange capacity (CEC) values ranged from 4.1 to 11.7 cmol (p+) per kg soil. The organic matter content was high and it decreased with depth. The C/N ratio of the surface layer was around 10 suggesting that the organic matter was highly decomposed. The soil analysis for total and available nutrients revealed that they were extremely deficient in available phosphorus and low in available potassium. The available magnesium content was found to be high in some regions calling for rescheduling of K fertilizer recommendation. The soils were classified into three great groups, Kanhaplustults, Kandistults and Kauffilumults.

Key words : Available and total nutrients, C/N ratio, Clay mineralogy, Fertilizer recommendation, *Hevea brasiliensis*, Nutrition, pH, Soil texture.

A.K. Krishnakumar, (for correspondence) Rubber Board, Kottayam-686 002, India; B. Datta, Department of Agricultural Engineering, Indian Institute of Technology, Kharagpur-721 302, West Bengal, India; S.N. Potty, M. Karthikakuttyamma, C.P. Mary, M.J. Thomas and Aleyamma Augusthy, Rubber Research Institute of India, Kottayam-686 009, Kerala, India.

### INTRODUCTION

Natural rubber (NR), nature's most versatile raw material with multifarious uses, is obtained from the latex of the rubber tree, *Hevea brasiliensis*. In India, the development of rubber plantation industry was confined to a narrow tract in the western side of Western Ghats mainly in Kerala state and in the adjoining districts of its neighbouring states, accounting for 90 per cent of the area. The best performance of *Hevea* is in the tropics and it thrives well in the laterites, lateritic and red soils of India formed under wet-dry climate (Pushpadas and Karthikakuttyamma, 1980). Evolution of an appropriate management practice has become all the more essential with the advent of high yielding planting materials, which are sensitive

to soil and agroclimatic factors. At present the gap between the potential and attained yield is too wide. To bridge this gap, agro-management practices are to be substantially improved and refined. Nutrient management has been recognized as the most important agro-management practice for rubber (Potty and Mannothea, 1993). The growth of *Hevea* is greatly influenced by soil physical, chemical and mineralogical properties (Eshett and Omucti, 1989; Kharche *et al.*, 1995). A comprehensive and in-depth study on properties of soil under *Hevea* in the western region of the Indian peninsula is lacking. The present investigation was therefore taken up to study the physical, chemical and mineralogical properties of rubber growing soils in this region to gener-