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PHOSPHORUS FRACTIONS AND FIXATION OF ADDED P IN RUBBER GROWING SOILS OF KERALA

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The availability of soil applied phosphorus (P) to rubber (*Hevea brasiliensis*) cultivated in Kerala State in India is a major limiting factor as the soils are prone to P fixation due to high content of Fe and Al oxides. Phosphorus fractions and fixation of added P were determined in four major soil series *viz.*, Kanjirapally (Kpl), Thiruvanchoor (Tvr), Kadambanad (Kdb) and Kunnathur (Ktr) representing Central Kerala, where rubber is grown extensively. The relationship of the soil properties with P fractions and P fixation capacity of soil were worked out. The results revealed that total and active P varied and a fairly good P reserve was present in the soil. Iron-P was the dominant P fraction in all the soils and was present in relatively higher amounts in soils of Tvr series. All these soils had appreciable amounts of reductant soluble P (11 to 69 mg/kg) which is regarded as the most difficult fraction to release P. Fixation of added P ranged from 84 to 91 per cent, with a mean value of 86 per cent, indicating a high P retention capacity of these soils. Among the four soil series, the fixation of P in Kpl series (88%) was higher. P fixation had significant positive correlation with clay content, organic carbon, oxalate extractable Al and Fe contents and negatively with Bray II-P.

Key words: *Hevea brasiliensis*, Phosphorus fixation, Phosphorus fraction, Rubber growing soil, Soil property.

INTRODUCTION

Phosphorus (P) nutrition is indispensable for rubber (*Hevea brasiliensis*) as the crop is raised mostly in highly weathered soils in Kerala, the principal rubber growing state in India. Since these soil contain high amounts of sesquioxides (Karthikakuttyamma *et al.*, 2002), the phosphate availability is one of the major problems in the management of soil fertility for rubber cultivation. Bulk of the added P is fixed in such soils due to dominance of Fe and Al oxides and acidic reaction, rendering little change in available phosphorus status of soil. Response to P fertilizer by rubber trees was expected when the amount of Bray II-P was less than 11 mg/g soil (Guha and Yeow, 1966). Pushparajah *et al.* (1976) reported that phosphate fertilizer application not only increased yield but also improved the latex quality. However, in spite of 5 mg/g of Bray II-P content, there was no response to P application for the rubber grown in Kerala. The prediction of response to P fertilizer is generally based on available P status of the soil and on the rate at which the added P is reverted to insoluble forms (Tek Chand and Tomar, 1995). The transformation and reversion of applied P in soil depend on many factors such as duration of contact with soil, prevailing temperature, moisture content, soil texture and organic matter (Vig and Dev, 1984; Borling *et al.*, 2001). Therefore, the present investigation was undertaken to

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