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QUANTITY-INTENSITY RELATIONSHIPS OF POTASSIUM IN TWO RUBBER GROWING SOILS FROM KERALA AND TRIPURA

In soil systems, solution - exchange phase equilibria are studied for determining nutrient availability to plants and to know how readily cations are subject to leaching and chemical or microbiological transformations. K, Ca and Mg are some of the cations that have undergone the most extensive testing in soil systems in terms of solution-exchange phase interactions (Evangelou *et al.*, 1994). Beckett (1964) had put forward the concept of using quantity - intensity (Q/I) relationships to characterise K status of soils. This provides information about the extent of available K in a soil at a given time and the capacity of the soil to maintain adequate supply of available K. *Hevea* is traditionally cultivated in the southwestern India and is now being extended to non traditional regions. The Q/I relationships of K in the rubber growing areas of India are not yet characterised. Considering the importance of generating a data base of Q/I parameters and their influence on the availability of K, a comparative study was conducted in two rubber growing soils one each from the traditional and non traditional regions.

Soils from the Central Experiment Station (CES), Kerala (traditional region) and the Regional Research Station (RRS), Tripura (non-traditional region) of the Rubber Research Institute of India were collected from the surface and subsurface layers. Taxonomically soil from the former represents Paleustalfs and that from the latter Typic Dystrochrults. The samples were air dried and passed through a 2 mm sieve. Available K (Morgan's reagent extracted) and pH (1:2.5 soil-water ratio) were determined by standard methods (Jackson, 1967). Particle size analysis was done by International pipette method and the texture was found from the textural triangle.

For establishing Q/I parameters 5 g of soil was added with 50 ml of 0.01 M $CaCl_2$ solution containing 0, 0.2, 0.5, 1.0, 2.0, 3.0, 4.0 and 5.0 mM KCl. The soil suspension was shaken for 30 minutes in a horizontal shaker, kept intact for 18 h, filtered under suction and the filtrate tested for K (by flame photometer), Ca and Mg (by atomic absorption spetrophotoment). All the estimates were the mean of triplicates on oven dry basis. From these data, activity ratio of K was calculated using the formula

$$AR^K = a_K / \sqrt{a_{Ca} + a_{Mg}}$$

where AR^K is the activity ratio and a_K, a_{Ca} and a_{Mg} are activity coefficients of K, Ca and Mg respectively.

The activity coefficients of individual ions of K, Ca and Mg were calculated using Davis equation (Evangelou and Karathanasis, 1986). ΔK was determined by calculating the gain or loss of K in the extract after equilibration with graded levels of K in 0.01 M $CaCl_2$. The data on AR^K and ΔK were subjected to regression analysis and the best fit was found to be the quadratic equation. For Q/I plot, AR^K and ΔK were taken on X and Y axis respectively.

From the Q/I plots the following