

VARIATION IN MINERAL COMPOSITION OF LEAVES AND ITS RELATIONSHIP WITH PHOTOSYNTHESIS AND TRANSPIRATION IN POLYCLONAL SEEDLINGS OF *HEVEA BRASILIENSIS*

P.Sobhana, S.K.Dey, Elsie S.George, James Jacob and M.R.Sethuraj

Sobhana, P., Dey, S.K., George, E.S., Jacob, J. and Sethuraj, M.R. (1996). Variation in mineral composition of leaves and its relationship with photosynthesis and transpiration in polyclonal seedlings of *Hevea brasiliensis*. *Indian Journal of Natural Rubber Research*, 9(1) : 48-54.

Polyclonal seedlings of *Hevea brasiliensis* were examined for differences in major nutrient contents of leaves, photosynthetic CO₂ exchange rate (CER) and associated characteristics and biomass production. In spite of the application of equal doses of N,P and K to all the plants, considerable variations were observed in leaf N,P and K contents indicating the genotypic variation in absorption of mineral nutrients. Leaf N,P and K per unit leaf area exhibited significant positive correlations with CER, stomatal conductance (gs) and transpiration rate. Leaf nutrient content showed positive relationship with the instantaneous water use efficiency of leaves. Leaves of the polyclonal seedlings also showed appreciable variation in mineral composition, photosynthetic rate and water use efficiency.

Key words: *Hevea brasiliensis*, Shoot biomass, Transpiration, Water use efficiency.

P. Sobhana (for correspondence), S.K. Dey, Elsie S. George, James Jacob and M.R. Sethuraj, Rubber Research Institute of India, Kottayam - 686 009, Kerala, India.

INTRODUCTION

Though photosynthesis is mainly controlled by genetic characteristics, environmental factors also have significant influence. Differences in photosynthetic characteristics are related to light environment, leaf anatomy, physiology, and nutrient status of leaves (Nobel *et al.*, 1973; Boardman, 1977; Barker, 1979). Relationship between leaf nutrient content and leaf photosynthetic capacity has also been reported (Moss and Peaslee, 1965; Ozbun *et al.*, 1965; Bottrill *et al.*, 1970; Natr, 1972; Barker, 1979; Jacob *et al.*, 1990; Jacob and Lawlor, 1992). Significant positive correlation between leaf N content and photosynthetic rate has been well documented in many plant species (Ryle and Hesketh, 1969; Nevins and Loomis, 1970; Brown, 1978; 1981; DeJong,

1982; Sylversten, 1984; DeJong and Doyle, 1985). Most nutrient deficiencies ultimately depress net photosynthesis (Natr, 1972). In higher plants, deficiencies of essential elements often cause visual symptoms on leaves often involving chlorosis or necrosis. When symptoms of elemental deficiency or toxicity are evident, structure of the chloroplasts is usually altered which affects photosynthesis. Relationship of major nutrients (N, P and K) with photosynthesis has not yet been reported in *Hevea*. Polyclonal seedlings were used for the experiment to assess possible relationship of genotypic variation in mineral nutrient composition of the leaves with carbon dioxide exchange rate (CER) and associated characteristics.