

PHOTOSYNTHETIC RATE AND ITS RELATION WITH LEAF CHARACTERISTICS IN SEEDLINGS OF *HEVEA BRASILIENSIS*

Selection of genotypes with high leaf carbon dioxide exchange rate (CER) is important for improving crop yield. In view of this, several workers have attempted to relate CER with yield of crop and select plants for high CER to improve yield. A poor and sometimes negative relationship of CER with yield of crop has been reported by Evans (1975) and Ozbun (1978). However, relationship of CER with yield of *Hevea* was reported to be positive, though the correlation was weak (Samsuddin *et al.*, 1987). Various physiological, biochemical and anatomical characteristics are related to variations in CER. Evidence suggests that leaf area index, leaf angle, leaf duration and other factors influence radiation harvesting process. The relation of leaf area, number and thickness with CER which has not been studied to date is also important for *Hevea* productivity. The objective of the present study is to examine the relationship of CER with a few leaf characters such as leaf area, length, breadth, number and thickness.

The experiment was conducted at the Rubber Research Institute of India, Kottayam. Eighteen month old polyclonal seedlings of *Hevea brasiliensis* were used for the study. These seedlings were grown in pots under well watered conditions by following standard cultural practices. Seventy seedlings were selected for the experiment. Carbon dioxide exchange rate was measured by a closed system of infrared gas analyser (Portable photosynthesis system, LI 6200 LICOR, USA). Fully expanded

mature leaf was inserted into the chamber as identical to natural position and exposed to sunlight for measurement. All measurements were done between 08.30 and 09.30 hrs. in the second half of January. The ambient temperature was $27 \pm 2^\circ\text{C}$, relative humidity approximately 60% and light intensity $1000 \pm 200 \mu\text{mol m}^{-2} \text{s}^{-1}$. After gas exchange measurements, leaves were detached from each plant and the area was recorded using leaf area meter (LI 3000, LICOR, USA). Leaves were later dried in an Oven for 72 hours at 80°C and dry weights were recorded. Girth at 5 cm above the ground, leaf length, leaf breadth and leaf number per plant were also recorded.

Frequency distribution of CER in the polyclonal population of seventy seedlings is presented in Figure 1. Values of CER ranged from 4.1 to $14.3 \mu\text{mol m}^{-2} \text{s}^{-1}$ with mean of $8.8 \mu\text{mol m}^{-2} \text{s}^{-1}$ and 24.7 per cent coefficient of variation (Table 1). Considerable variation in CER is indicated by the high coefficient of variation. (More than 20% CV is considered as significant according to Guzhov Yu, 1989). Earlier workers also have reported considerable variation in CER (36% CV) in *Hevea* genotypes (Samsuddin, 1986; Samsuddin and Impens, 1978; 1979; Ceulemans *et al.*, 1984).

Correlation coefficients of CER and other leaf characters are presented in Table 2. An inverse significant correlation of CER with single leaf area was observed. Significant negative correlation is well documented in literature between CER and leaf area in