RELATIONSHIP BETWEEN LEAF WATER STATUS, LEAF GAS EXCHANGE AND INTRINSIC WATER USE EFFICIENCY (iWUE) UNDER DROUGHT IN NATURAL RUBBER PLANTS

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The drought tolerance potential of clones of *Hevea* (RRII 400 series) was assessed by examining the effect of progressive water stress imposition on photosynthesis related to water stress. Seven-month-old polybag plants of five modern *Hevea* clones and three check clones growing under natural condition were used as experimental material for the study. Stress was imposed by withholding irrigation. Water stress limited plant growth and induced a significant reduction in assimilation rate (*A*). Decline in the rate of photosynthetic CO_2 assimilation was lesser in RRIM 600 (46%) followed by RRII 430 (73%) while RRII 414 was severely affected. The initial response to water stress was the drop in stomatal conductance (g_s) and it was found to decrease as a function of leaf water potential in all clones. RRIM 600 showed 75% reduction followed by RRII 430 (88%) and maximum reduction was observed in RRII 105 and RRII 414 (100%). The clones RRIM 600 and RRII 430 had relatively high *A* per unit of g_s. There was an increase in intrinsic water use efficiency (iWUE) indicating efficient CO_2 utilization in RRIM 600 and RRII 430 which were physiologically better adapted (in terms of WUE) to drought conditions. The present study indicated that a better WUE and ability to maintain stable photosynthesis under stress condition is a desirable character for selecting clones with drought tolerance.

Keywords: Drought tolerance, Leaf water potential, Natural rubber, Photosynthesis, Stomatal conductance, Water use efficiency

In India, 85 per cent of the natural rubber cultivated area is in the traditional region where rainfall and other agro climatic conditions are better suited for rubber cultivation than in the non-traditional areas. Water deficit adversely influenced growth and metabolism of many plants and the responses depended on severity and duration of the stress, plant genotype, development stage and environmental factors (Bray, 1993). Rubber cultivation is being extended to marginal areas of western and eastern parts of India with varied climatic constraints like moisture stress, high and low temperatures, drought and cold stresses, which limit growth and productivity of rubber in these regions (Devakumar *et al*., 1988; Chandrashekar *et al*., 1998; Devakumar *et al*., 1998; Jacob *et al*., 1999).

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