

PHOTOSYNTHESIS AND BIOMASS PRODUCTION OF THREE POPULAR *HEVEA BRASILIENSIS* CLONES AS AFFECTED BY WATER STRESS

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Different soil regimes were imposed by watering at 2, 6 and 9 day intervals for two months on six-month-old plants of three *Hevea brasiliensis* clones viz., RRJ 105, RRIM 600 and GT 1. To study the recovery, the plants were given normal watering for another two months. The peak carbon dioxide exchange rate (CER) was observed at 9.00 h for control and 8.00 h for stressed plants of all clones. A decrease in values of relative water content (RWC) and chlorophyll content with increase in diffusive resistance was observed under water stress. CER also decreased along with transpiration rate. RWC was found to be the major parameter, which affected the CER. Reduction in dry matter production of the above ground biomass observed was 50 per cent in six days and 84 per cent in nine days due to water stress and the reduction was more for clone RRJ 105 (9 days) compared to the other two clones. In another experiment, visual injury like leaf margin drying, shedding of leaves and plant mortality were studied by withholding water for long time. Under severe water stress, highest plant mortality was observed for clone RRJ 105 (75%) followed by RRIM 600 (30%) and GT 1 (25%). Recovery after stress was faster for the clone GT 1 and RRIM 600, compared to RRJ 105. Clone RRIM 600 acquired more percentage of biomass during the rewatering period after the stress.

Key words: Biomass production, Carbon dioxide exchange rate, *Hevea brasiliensis*, Photosynthesis, Water stress.

INTRODUCTION

Water is an important limiting factor for plant growth and productivity (Hsiao, 1973). Physiological processes affected by water stress include stomatal opening, photosynthesis and respiration etc. (Kramer, 1974). Effects of water deficit on photosynthesis have been interpreted as a consequence of stomatal closing (Boyer, 1976) and also non-stomatal components. The effect of drought on photosynthesis is well documented (Kramer, 1974). Much of it has been attributed to the direct effect of water stress on inhibition of CO₂ fixation.

The cultivation of rubber (*Hevea*

brasiliensis) has been extended to non-traditional areas in India, mainly due to the shortage of suitable land in the traditional zone. Potential planting areas were identified in Orissa, Madhya Pradesh, Andhra Pradesh, Karnataka and Maharashtra States. In these non-traditional regions, prolonged dry season cause severe soil moisture deficit accompanied with high temperature. During summer months, dry weather prevails with very high evaporative demand resulting not only in atmospheric drought but also soil drought (Vijayakumar *et al.*, 1988; Mohankrishna *et al.*, 1991; Vijayakumar *et al.*, 1998).

Without irrigation, establishment of