

EFFECT OF IRRIGATION ON PHYSIOLOGICAL PERFORMANCE OF IMMATURE PLANTS OF *HEVEA BRASILIENSIS* IN NORTH KONKAN

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Attempts were made to quantify the optimum irrigation requirement of rubber (*Hevea brasiliensis*) plants in North Konkan. Basin irrigation was given at the rates of 0.50, 0.75, and 1.00 and drip irrigation at 0.25, 0.50 and 0.75 of crop evapotranspiration (ETc). Physiological status of irrigated and non-irrigated plants was compared.

Severe inhibition of photosynthesis and transpiration and increased stomatal resistance were observed due to soil moisture stress. A significant increase in absolute growth and relative growth rate was observed in the dry season in the irrigated plants. Maximum growth was obtained with 1.00 ETc irrigation, although it resulted in attaining only fifty per cent photosynthetic rate of wet season. The water use efficiency (WUE), in terms of $\text{CO}_2/\text{H}_2\text{O}$ ratio, decreased with increase in the quantity of water applied. The impact of drought and effect of irrigation on growth and physiological processes are discussed.

Key words:- *Hevea brasiliensis*, Immature rubber, Irrigation requirement, Photosynthetic rate, Stomatal resistance, Water use efficiency, India/Konkan.

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INTRODUCTION

The major constraints in extending rubber cultivation to sub-humid regions such as North Konkan are prolonged drought coupled with high atmospheric temperature, low relative humidity and dry winds. Though the Konkan region receives about 2500 mm rainfall during south-west monsoon period (June to October), the evaporation rate from November to May is of the order of 4 to 9 mm per day. In the dry regions, growth inhibition of *Hevea* in the initial years could be overcome by life saving irrigation (Haridas, 1979; Omont, 1982; Sethuraj, 1985; Sethuraj *et al.*, 1989) which also reduces the immaturity period. Under rainfed conditions the immaturity period is around nine years in this region (Chandrashekar *et al.*, 1990).

Stomata play a significant role in water conservation and soil moisture deficit can influence stomatal closure even though leaf water potentials do not change significantly (Blackman and Davies, 1985; Gollan *et al.*, 1986; Mansfield *et al.*, 1990). Plant water status or physiological activity is a more reliable indicator for fixing the irrigation schedule than soil water status (Turner, 1990). Ashton (1956) demonstrated that in sugar cane, the time for recovery and sensitivity to stress becomes less when plants are subjected to more stress-recovery cycles.

Method of irrigation also plays a vital role. The pattern of soil wetting and its influence on microclimate are different in basin and drip irrigation systems. Drips wet only a portion of the total root zone, whereas basin