A 23 kDa CHLOROPLAST PROTEIN AS MARKER FOR DROUGHT TOLERANCE IN *HEVEA BRASILIENSIS*

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Climate-resilient smart rubber clones need to be developed for expansion of rubber cultivation to regions where environmental stresses are a limiting factor. In this context physiological responses of young plants belonging to ten clones of *Hevea brasiliensis* were analyzed under soil moisture deficit condition. The relative drought tolerance potential of these clones were evaluated using key physiological parameters such as leaf water potential, photosyntic oxygen evolution rate of leaf, quantum yield of PS II and CO_2 assimilation rates. Clones *viz*. RRIM 600, RRII 208 and RRII 430 were more drought tolerant even as they recorded comparatively less decline in photosynthesis and PS II activity. On the other hand, clones PB 260, RRII 105, RRII 414 and RRII 417 were relatively more drought susceptible in terms of severe inhibition of various photosynthetic activities under moisture stress. Western blot analysis of a low molecular weight (23.8 kDa) chloroplast stress protein indicated its consistent over-expression in the relatively drought tolerant clones when these plants were subjected to water deficit stress. Abundance of this protein was associted with relatively lesser inhibitions in photosynthetic activity in drought stressed young rubber plants. The relative expression level of this protein together with other crucial physiological parameters such as photosynthetic activity can be used as potential screening tools for selection of drought tolerant clones at a young stage.

Key words: Abiotic stress, Chloroplast stress protein, Drought tolerance, *Hevea brasiliensis*, Physiological marker, Screening tool

INTRODUCTION

To meet the increasing global demand for natural rubber and considering its limited scope of expansion in the traditional belts, attempts are being made to extend its cultivation to marginally suitable areas in several countries with varied climatic constraints. In India, cultivation of rubber is being extended to non-traditional areas in the Konkan region, eastern ghat areas and North East India. Adverse environmental conditions such as drought, high and low temperatures, high light and high vapour pressure deficit (VPD), poor soils etc., limit the expansion of rubber cultivation to newer areas in several rubber producing countries including India (Sethuraj *et al.*, 1989; Samarappuli and Yogaratnam, 1998; Jacob *et al.*, 1999). Climate change as a result of global warming can influence the growth and productivity of natural rubber (Satheesh and Jacob, 2011). Abiotic stresses affect every aspect of plant growth, anatomy, physiology, biochemistry and gene expression. Drought

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