MULTIVARIATE ASSESSMENT OF COLD TOLERANCE IN *HEVEA BRASILIENSIS* FOR NORTH EAST INDIA

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Identifying *Hevea brasiliensis* clones for abiotic stress tolerance in non-traditional rubber growing tracts need a pragmatic approach comprising a combination of adaptation and agronomic performance. In this context, the present study was undertaken in two clonal nurseries laid out in a cold prone region and a traditional region (for comparison) with the objective of screening for cold tolerance based on growth, yield and major yield components including anatomical and biochemical traits. Each trial comprised a total of 45 new clones in the pipeline along with popular check genotypes evaluated at Agartala (Tripura), representing a cold-prone environment and Chethackal (Central Kerala), the traditional rubber-growing region. Observations on girth and latex yield were recorded in all the clones during the 10^{th} and 11^{th} year after planting. In terms of growth and yield, twelve and eleven promising genotypes were identified from Agartala and Chethackal, respectively, which were subsequently evaluated for latex biochemical parameters and bark anatomical traits. Results revealed considerable genotypic variability at both sites. Under cold stress conditions at Agartala, genotypes P 21, P 78, P 102 and P 107 attained girth over 40 cm, while P 78, P 44, P 17 and P 61 along with standard checks, RRII 414, RRII 430 and PB 260, had superior girth (>45 cm) at Chethackal. In terms of yield, genotype P 99 followed by RRII 429, P 21, P 73, P 53, P 26 and P 78 were superior at Agartala while P 17, P 44, RRII 105, RRII 430 and RRII 414 were superior at Chethackal. The anatomical traits such as bark thickness ranged between 6.2 and 9.5 mm and latex vessel rows between 8.6 and 17 at Agartala while at Chethackal, these traits ranged between 6.5 and 9.9 mm & 7.6 and 26.5, respectively. Latex ATP and sucrose levels were also lower under cold stress at Agartala than at Chethackal. Rank sum analysis based on overall performance identified P 99, P 21, P 60, P 26 and P 17 as promising for cold-prone regions, while P 17, P 26 and P 44 were found to be suited to traditional climates. Notably, clone P 17 demonstrated consistent performance across both environments. A comprehensive screening of experimental genotypes could identify genotype/s that combine growth, yield and other desirable component traits suitable for further large-scale evaluation in cold stress prone NE India. The study also underscores the importance of extended evaluation in clonal nurseries established in non-traditional regions to enhance selection efficiency under prevailing agro climatic conditions.

Keywords: Bark anatomy, Cold stress tolerance, Girth, *Hevea brasiliensis*, Latex biochemical analysis, Rubber yield

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