Rubber Science, 28(2): 147-158, 2015 RESEARCH ARTICLE

IN SILICO CHARACTERIZATION OF A CALCIUM-DEPENDENT PROTEIN KINASE FROM *HEVEA BRASILIENSIS* REVEALS PROSPECTIVE FEATURES FOR CONFERRING MULTIPLE STRESS TOLERANCE

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Identifying potential genes imparting stress tolerance is an important step for developing rubber clones that can survive in stress-prone geographical locations. This will help in increasing rubber production by extending the area under *Hevea* plantations. Calcium-dependent protein kinase (*cdpk*) is one such gene involved in multiple stress signaling pathways. In the present study, a *cdpk* gene and its promoter region were isolated from the high latex-yielding *Hevea* clone RRII 105 and characterized. The intron pattern analysis of the genomic sequence classified the gene into Group II subfamily of CDPK proteins. The *in silico* analysis predicted the myristoylation site, palmitoylation sites, presence of nuclear localization signal and subcellular localization, hinting its role in signal transduction, protein-protein interactions and shuttling mechanisms during stress. The sequence analysis of the promoter region showed stress-responsive *cis*-elements that help in regulating gene expression. The sequence alignment and 3D modeled protein structure superposition of the isolated *cdpk* with *Arabidopsis cdpk21* is also predicted which is useful in identifying the orthologous nature between the two proteins, contributing to their functional similarity involved in multiple stress signaling. These results suggest that the isolated *Hevea cdpk* gene confers features for imparting multiple abiotic stress tolerance.

Keywords: Abiotic stress, Calcium-dependent protein kinase, *Hevea brasiliensis*, Natural rubber, Protein superposition

INTRODUCTION

Natural rubber is used in the manufacture of more than 35,000 products (Parthasarathy *et al.*, 2006) making it a "hot" commodity (Fox and Castella, 2013). The perennial tree, *Hevea brasiliensis* is the exclusive commercial source of natural rubber (NR) owing to its abundance in the tree, good quality and ease of harvesting (Oh *et al.*, 2000) compared to other latex producing plants. However, the high

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