IDENTIFICATION OF SINGLE NUCLEOTIDE POLYMORPHISMS AND HAPLOTYPE STRUCTURING IN RUBBER ELONGATION FACTOR GENE OF *HEVEA BRASILIENSIS*

K.U. Thomas, Minimole Ravindran and Thakurdas Saha

Rubber Research Institute of India, Kottayam-686 009, Kerala, India

Received: 01 June 2023 Accepted: 27 July 2023

Thomas, K.U., Ravindran, M. and Saha, T. (2023). Identification of single nucleotide polymorphisms and haplotype structuring in rubber elongation factor gene of *Hevea brasiliensis*. *Rubber Science*, **36**(2): 154-170.

Rubber elongation factor (*REF*) is a 14.6 kDa stress related family protein, which plays a major role in the chain elongation process of natural rubber biosynthesis pathway in *Hevea*. Due to its significance in rubber biosynthesis, molecular markers developed from *REF* gene will be ideal for genetic analysis and association studies related to yield and rubber quality in *Hevea*. Attempts were made to characterise *REF* gene in different genotypes to identify sequence polymorphisms like SNPs and indels. Phylogenetic analysis was performed to understand their similarity/dissimilarity with homologs in other plant species as well. Genomic region of *REF* gene was amplified and sequenced from five different genotypes to identify nucleotide variations among them and haplotype blocks were constructed using the Single Nucleotide Polymorphisms (SNPs) identified. A total number of 32 novel SNPs were identified with a frequency of 1 in every 53 bases. Five haplotypes were constructed from the SNP data and their impact at the functional level was estimated by gene expression studies. The SNP and generated haplotype data from the study has wide applications in different areas of *Hevea* crop improvement like assessment of genetic diversity, characterisation of cultivated clones and wild accessions, yield related marker development *etc*. Additionally results from this study further ascertain distinctive nature of *REF* gene in *Hevea* which may be partly responsible for its high rubber producing capability.

Keywords: Genetic diversity, Haplotype structuring, *Hevea brasiliensis,* Rubber biosynthesis genes, Single Nucleotide Polymorphisms

INTRODUCTION

Though latex is produced by more than 20,000 plant species, natural rubber latex of high quality in sufficient quantity in an economically sustainable way is produced only by the Para rubber tree (*Hevea brasiliensis*) (Venkatachalam *et al*., 2013). Due to its inimitable and unique physiochemical properties, understanding the molecular mechanisms behind biological synthesis of natural rubber in plants is a topic of active research for the past several decades. In *H. brasiliensis,* natural rubber is synthesized and stored in specialized cells called laticifers and rubber is extracted from the plant as latex, a cytosolic milky white colloidal suspension of rubber molecules, proteins, lipids,

Correspondence: Thomas K.U. (Email: thomasku@rubberboard.org.in)