

PHYLOGENETIC RELATIONSHIP OF *HEVEA* SPECIES AS REVEALED THROUGH MOLECULAR MARKERS

Ritta Mathew, C. Bindu Roy, Minimol Ravindran, M.A. Nazeer and T. Saha
Rubber Research Institute of India, Kottayam – 686 009, Kerala, India.

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Phylogenetic relationship was studied among three species of rubber available in India, *Hevea brasiliensis*, *H. benthamiana* and *H. spruceana* by employing different molecular marker techniques namely, RAPD, chloroplast DNA (cpDNA) PCR-RFLP and heterologous chloroplast microsatellites. RAPD analysis clearly indicated a high degree of polymorphism among the three species. Using twenty-five arbitrary primers, a total of 305 bands were amplified in the clones RR11 105 and GT 1 belonging to *H. brasiliensis*, *H. benthamiana*, *H. spruceana* and FX 516, an interspecific hybrid of *H. benthamiana* and *H. brasiliensis*, out of which 256 bands were polymorphic. Analysis of the interrelationships among the species clearly revealed that the clones of *H. brasiliensis* (>50% genetic dissimilarity) are closer to *H. benthamiana* than to *H. spruceana* (>70% genetic dissimilarity). Species-specific RAPD markers were identified for each species and their locus specificity was proved through hybridization. RFLP analysis using three hyper variable intergenic spacers, *rbcL-ORF106*, *trnM-rbcL* and *trnG-trnD* could not detect variability. Among different primer-pairs for heterologous chloroplast microsatellites tested, five could successfully be amplified, of which one (ccmp6) was highly polymorphic and could detect both intra- and inter-species polymorphism to prove the maternal mode of inheritance of the chloroplast genome in *Hevea*.

Key words: Chloroplast microsatellite, cpDNA polymorphism, DNA marker, *Hevea brasiliensis*, *Hevea benthamiana*, *Hevea spruceana*, Phylogenetic relationship, RAPD.

INTRODUCTION

The genus *Hevea* (family: Euphorbiaceae), to which the commercially cultivated rubber tree *Hevea brasiliensis* belongs consists of ten species originating in the Amazonian region of South America (Schultes, 1970; Wycherley, 1992; George and Panikkar, 2000). Rubber is now commercially cultivated in the tropical regions of Asia, Africa and America of which the former contributes the major share of the total global production. Among the other nine species, *H. benthamiana* also produces latex of comparable quality but has rarely been used in breeding programme (Lespinasse *et al.*, 2000). Although *H. brasiliensis* is a highly heterogeneous outbreeder, several years of directional selection

for yield and vegetative method of propagation has narrowed down the genetic base of cultivated rubber. The exploitation of genetic resources available in wild species in breeding may be worthwhile in improving resistance to biotic and abiotic stress in *H. brasiliensis*. As only three species of *Hevea* are available in India namely, *H. brasiliensis*, *H. benthamiana* and *H. spruceana* (Varghese and Mydin, 2000), this study is restricted to these species.

Although genetic characterization of *H. brasiliensis* clones and wild germplasm have been attempted (Besse *et al.*, 1993, 1994; Shoucai *et al.*, 1994; Iao *et al.*, 1995; Varghese *et al.*, 1997; Lespinasse *et al.*, 2000; Venkatachalam *et al.*, 2002; Saha *et al.*, 2005), interspecific genetic relationship has