

Genetic Structuring of Four *Tectona grandis* L. F. Seed Production Areas in Southern India

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Abstract : Teak (*Tectona grandis* L. f.) is a tree species indigenous to India and other Southeastern countries. It produces high-value timber and is easily established in plantations. Reforestation requires a constant supply of high quality seeds. Seed Production Areas (SPA) of teak are improved stands used for collection of open-pollinated quality seeds in large quantities. Information on the genetic diversity of major teak SPAs in India is scanty. The genetic structure of four important seed production areas of Kerala State in Southern India was analyzed employing amplified fragment length polymorphism markers using ten selective primer combinations on 80 samples (4 populations X 20 trees). The study revealed that the gene diversity of the SPAs varied from 0.169 (Konni SPA) to 0.203 (Wayanad SPA). The percentage of polymorphic loci ranged from 74.42 (Parambikulam SPA) to 84.06 (Konni SPA). The mean total gene diversity index (HT) of all the four SPAs was 0.2296 ± 0.02 . A high proportion of genetic diversity was observed within the populations (83%) while diversity between populations was lower (17%) (GST = 0.17). Principal coordinate analysis and STRUCTURE analysis of the genotypes indicated that the pattern of clustering was in accordance with the origin and geographic location of SPAs, indicating specific identity of each population. A UPGMA dendrogram was prepared and showed that all the twenty samples from each of Konni and Parambikulam SPAs clustered into two separate groups, respectively. However, five Nilambur genotypes and one Wayanad genotype intruded into the Konni cluster. The higher gene flow estimated (Nm = 2.4) reflected the inclusion of Konni origin planting stock in the Nilambur and Wayanad plantations. Evidence for population structure investigated using 3D Principal Coordinate Analysis of FAMD software 1.30 indicated that the pattern of clustering was in accordance with the origin of SPAs. The present study showed that assessment of genetic diversity in seed production plantations can be achieved using AFLP markers. The AFLP fingerprinting was also capable of identifying the geographical origin of planting stock and there by revealing the occurrence of the errors in genotype labeling. Molecular marker-based selective culling of genetically similar trees from a stand so as to increase the genetic base of seed production areas could be a new proposition to improve quality of seeds required for raising commercial plantations of teak. The technique can also be used to assess the genetic diversity status of plus trees within provenances during their selection for raising clonal seed orchards for assuring the quality of seeds available for raising future plantations.

Keywords : AFLP, genetic structure, spa, teak

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