

Breeding *Melia volkensii* for Improved Commercial Forestry in Drylands of Kenya: Plus Tree Selection, Seed Orchards and Progeny Trials Establishment

T3.34 Tree improvement delivery system: breeding, selection, and seed and seedling production

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Abstract

Melia volkensii is a fast growing drought tolerant and termite resistant tree occurring naturally in drylands of Kenya. The species produces high quality mahogany-grade timber that is harvested in 10-12 years. Overharvesting of trees of good form over time has resulted in reduction in quality of remnant populations. A *Melia* breeding strategy was initiated in 2010 with the aim of improving adaptability, productivity and timber quality. Main activities included: selection of Candidate Plus trees (CPTs), collection of scions and grafting, and establishment of clonal seed orchards. One hundred CPTs were selected between 2010 and 2012 in an 800-km range extending from northern to the Kenyan coast. Two 11-Ha first generation clonal seed orchards were established in 2012. In 2015, seed was collected from the orchards and seedlings raised to establish 8 progeny trials in various sites. Objectives of the progeny trials were to: Test the genetic worth of the CPTs; rank the parent trees based on performance of their progenies; and estimate heritability of traits assessed. Height, diameter at breast height (DBH), tree form and fecundity were assessed bi-annually from planting and annually from 5 years. Five-year family mean height range at different sites was 5.7 to 9.6 m (Marimanti), 4.2 to 9.9 m (Tiva), 4.1 m to 9.1 m (Kibwezi), and 5.4 m to 9.2 m at Kasigau. Mean family DBH was 11.7cm (Marimanti), 12.9cm (Tiva), 11.9 cm (Kibwezi), and 10.9 cm (Kasigau). Ranking showed the best families were CPTs 43, 26, 53 and 49. Family heritability was moderate, 0.48 for height and 0.32 for DBH, suggesting a potential for transmitting desirable characteristics to operational commercial plantations. Progeny of 76 out of 100 CPTs showed a positive General Combining Ability (GCA) for both height and DBH. Gains of 16% in volume were obtained by rogueing first generation orchard using Progeny trial results. Using forward selection, four hundred 2nd generation trees have been selected from the progeny trials. Establishment of second generation clonal seed orchards has been done for provision of further improved seed for commercial forestry in the drylands.

Keywords: Melia volkensii, tree improvement, seed orchard, seed production