

Development of Drought Tolerant Indigenous Trees for Enhances Productivity and Adaption to Climate Change in Kenya: A case study of *Acacia tortilis* and *Melia volkensii*

Theme: T3.14: Forest Tree Breeding in the context of climate change and bioeconomy

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Abstract

Drylands of the world-over are more affected by impacts of climate change. In Kenya, arid and semi-arid lands (ASALs) occupy over 80% of the land area and are increasingly being recognized as the new frontier for afforestation programs. National Forestry Program (NFP) and Kenya's Strategy for Achievement of 30% tree cover by 2032 have recognized drylands as key targets area for afforestation using tree species such as *Acacia tortilis* and *Melia volkensii*. Acacia is widespread in ASALs of Africa and the Middle East and has been overexploited for charcoal production. Similarly, Melia, an important endemic and high valued tree species growing in the ASALs of eastern Africa has been over-harvested for timber. The two species have been are targeted for breeding. Projects on 'Development of Drought tolerant Trees for Adaption to Climate Change in Drylands of Kenya' and 'Capacity Development Project for Sustainable Forest Management in Kenya' are a pioneer multidisciplinary initiatives implemented from 2012 to 2021 whose overall goals were to promote quality plantations of indigenous species in the ASALs through: breeding drought tolerant trees for increased productivity and adaptation to climate change; development of quality seed/seedlings supply system; and creating awareness of drylands forestry using improved drought tolerant germplasm. The project's had four main synergetic discipline-oriented components: (a) Molecular component to determine inter and intra population genetic variation; (b) Tree breeding component to select Candidate Plus Trees (CPTs), establishing seed orchards; seed stands and progeny trials for continuous improvement and phenology studies (c) Drought tolerance component to develop drought tolerance indices and (d) Extension component through farmer forestry field schools to upscale adoption of improved germplasm in target Counties and establishment of improved seed/seedlings supply system. 100 CPTs each of Melia and Acacia were selected from various populations by considering qualitative and quantitative traits. To harness the outputs from the work, breeding toward second generation improvement have continued through a Project on 'Strengthening Community Resilience to Climate Change

through Landscape Restoration and Sustainable Forest Management in Kenya' since 2022. The findings that has been obtained over the years are useful for guiding tree breeding and forest restoration programs.

Keywords: *Melia volkensii*, *Acacia tortilis*, Tree breeding, Drought tolerance, Climate change

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