Food and Agriculture Organization of the United Nations

MULTILOCATIONAL DRYLAND SPECIES TRIAL IN UGANDA

SUMMARY

NARO

NaFORRI

Funded by:
European Union

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Uganda has experienced increasing levels of deforestation over the last decades. Drylands, characterized mainly by savanna woodland vegetation, are some of the most severely affected landscapes. The key drivers of deforestation and forest degradation in drylands include illegal charcoal burning, cutting of firewood and conversion to other land uses such as agriculture, cattle ranching and settlement. This has subsequently left inadequate biomass to sustain livelihoods, hence increasing vulnerability and reducing the resilience of households to the effects of climate change.

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Although several initiatives have supported the rapid expansion of commercial timber and wood energy plantations in Uganda, little has been done in dryland areas such as Karamoja. This has partly been attributed to insufficient information about suitable tree species for dryland afforestation and reforestation, their potential growth rates and silvicultural practices. Due to the challenges associated with growing trees in dryland areas, identifying suitable tree species for these areas is of considerable importance. However, there has been little research to date to support dryland afforestation.

In collaboration with the National Forestry Resources Research Institute (NaFORRI), FAO funded a research trial study of tree species, with the objective of testing potential tree species suitable for dryland afforesttation. The study involved establishment of multilocational trials in drylands across the country. Six tree species considered potentially well-adapted to dryland conditions, including: *Gmelina arborea, Melia volkensii* (Kenya provenance), *Melia volkensii*

(Uganda provenance), *Grevillea robusta,* Eucalyptus hybrid clone GC 550, and Eucalyptus hybrid clone 796 were planted in Karamoja (Nabuin Zonal Agricultural Research and Development Institute/ ZARDI)), Nakasongola (Kasagala Central Forest Researve), Kazo/Kiruhura (Kiringa) and Mbarara (Kyahi CFR). The trial sites were located in the cattle corridor characterized by high temperatures, low soil moisture, low rainfall, and prolonged droughts. The trial sites were selected to cover a range of soil types and climatic conditions in order to assess the effect of site-specific factors on tree growth and survival. A range of site edaphic and climate characteristics were recorded during trial establishment. At each site, the trial was established in a randomized complete block design with four replicated blocks.

Table 1: Climate conditions and soil types of trial sites

Site	Average annual temperature (°C)	Average annual rainfall (mm)	Soil type
Karamoja (Nabuin ZARDI) in Nabilatuk	25	624	Sandy soil
Nakasongola (Kasagala CFR)	22	786	Sandy soil
Mbarara (Kyahi CFR)	21	941	Loam soil
Kazo (Kiringa)	20	1200	Loam soil

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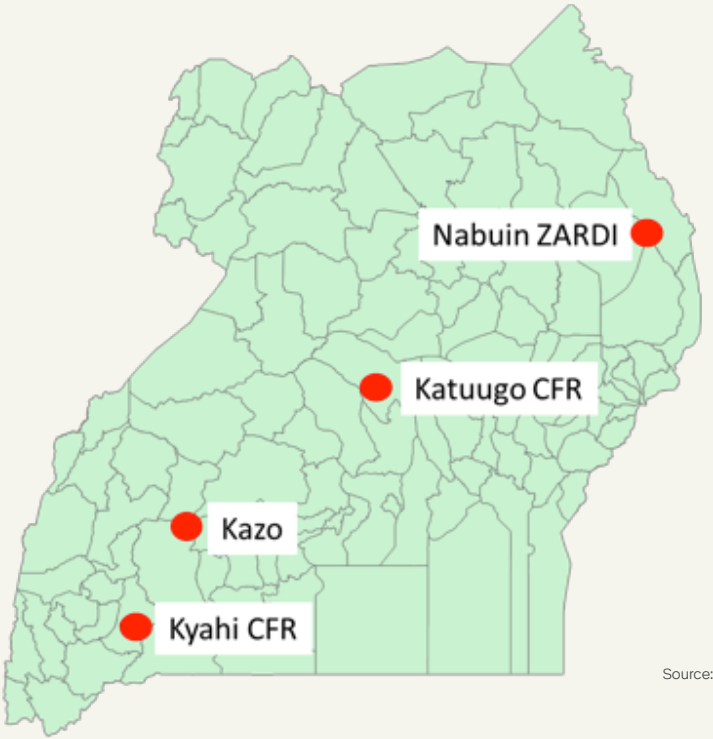
Figure 1: Location of dryland species trial sites in Uganda



Source: NaFORRI

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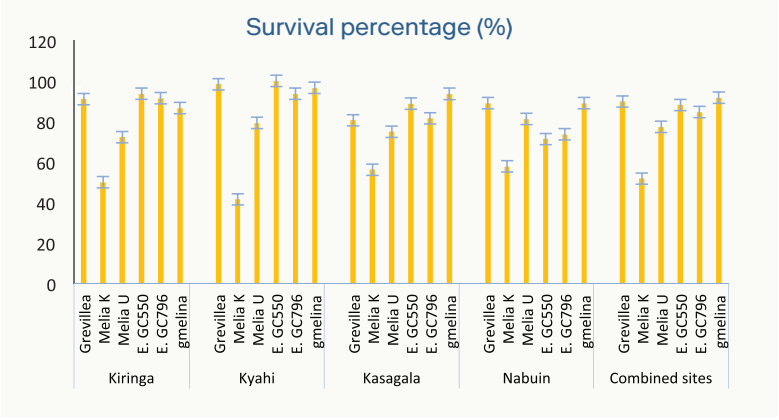
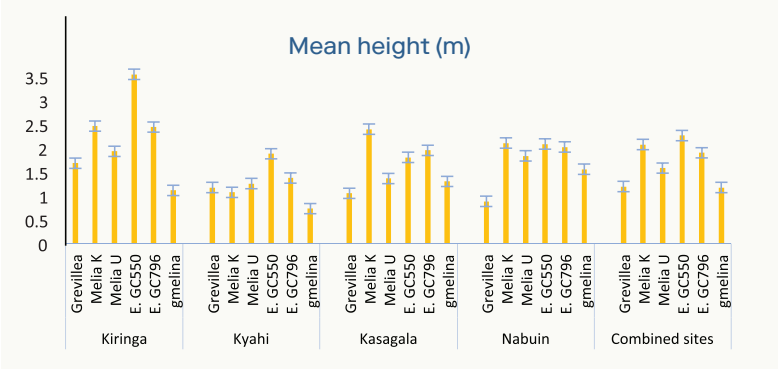
Preliminary results from the assessment of trials

Detailed data on survival rate and tree height were collected from the four trial sites to assess growth performance at 11 months. Results indicated a significant difference in tree height growth between species and this differed by site. At Kiringa (Kazo/Kiruhura) and Kyahi (Mbarara) sites, Eucalyptus GC550 had significantly higher height growths of 3.35m and 1.18m respectively (Figure 2). Similarly, *Melia volkensii,* (Kenya provenance) showed significantly higher height growth (2.40m) compared to the other species at the Kasagala (Nakasongola) site. Overall, good height growth was recorded for Eucalyptus GC550, *Melia volkensii,* (Kenya provenance), *Melia volkensii,* (Uganda provenenace) and Eucalyptus GC796 at Kiringa, Kasagala and Nabuin sites.

Figure 2: Survival percentage and mean height (m) of tree species at 11 months





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Results further indicated that *Gmelina arborea* and *Gmelina robusta* had significantly lower tree height growth than most species in all the sites. Although they had low tree height growth, the two species had the highest average survival of 91.81 percent and 89.96 percent respectively. Kiringa site registered the best height growth for most species. This can be attributed to less harsh climatic conditions (Table 1) and better soils. Conversely, the lower height growth at the Kyahi site could be attributed to late blanking.

When data were combined for the four sites, it was apparent that Eucalyptus GC550, *Melia volkensii*, (Kenya provenance) and Eucalyptus GC 796 had good height growth, having attained greater than 1.9 m by 11 months. Although *Melia volkensii,* (Kenya provenance) showed impressive height growth, it had the lowest survival of 51 percent. This could be attributed to the reduced vigor of the *Melia volkensii,* (Kenya provenance) seedlings at the time of planting. It should be noted that these are prelimary results and thus non conclusive. Further monitoring of species is therefore required to provide more conclusive results.

Given the size of the plots, they could potentially be split in the future for comparison of silvicultural treatments. It is also recommended that the trial be expanded to include a greater diversity of dryland tree species. Collection of growth data will continue annually over the next seven years and full analysis will be presented at year seven.

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11-month-old *Melia volkensii* at Nabuin ZARDI in Karamoja

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CB5724EN/1/10.21