

The right tree in the right place

It's not enough to pick the correct species; you need the correct provenance as well

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If you want to plant a tree for timber in the semi arid areas of Kenya, mukau (*Melia volkensii*) is the correct choice. In the highlands where rainfall is high, Meru oak (*Vitex fischeri*) is the tree for you.

However, besides choosing the right species, it is also important to choose the correct area from which to collect the seed to be used to raise the seedlings. This is done by matching the ecological conditions of the areas in which the seed trees are growing with the ecological conditions of the planting site. Why is this important?

A population of trees in a given species within a given locality interact with the environment and over time accumulate a genetic composition that enables that particular population to survive and thrive in that particular location. The genetic information accumulated is passed to successive generations through seeds. Over a long period, a certain genetic uniformity emerges that is associated or is unique to a particular location.

Indigenous tree species with wide distribution over Kenya will inherently have such segregation in their populations scattered in different parts of the country. This differentiation has its basis in the fact that Kenya varies a lot ecologically from one place to another principally due to differing altitudes and corresponding rainfall.

A population of trees with genetic uniformity closely tied to a given locality is referred to as a **provenance**. In tree planting, foresters will, besides considering the right species to plant, also give attention to the right provenance, a process called **provenance matching**.

Provenance matching is used in tree seed distribution to ensure that tree seedlings of a given species are planted in areas where the genetic information the seedlings contain will be of highest value in enhancing survival and ensuring optimum growth of the planted trees. How is this done effectively?

An area of relative ecological uniformity is demarcated. Such an area is used as a seed zone as tree seeds collected from such an area have a reasonably uniform genetic composition. When seeds are collected and used in the same seed zone, there is no risk of poor performance of planted trees arising from provenance mismatch.

The Kenya Forestry Research Institute (KEFRI) has demarcated Kenya into 23 forest seed zones. Besides describing the ecological conditions of each



A stand of mukau (*Melia volkensii*) that is non-uniform, seemingly indicating a lack of provenance-site matching. (Photo: KEFRI)



A uniform *Melia volkensii* stand in BGF's Kiambere plantations. The seeds were collected from selected trees in its neighbourhood. (Photo: BGF)

forest seed zone, KEFRI has also mapped the zones to ease the use of the seed zones in provenance matching. Seed zones that are numerically close have their ecological conditions varying less than those numerically further apart.

In an ideal situation, seeds collected in one zone (source seed zone) should be used in the same zone (destination seed zone). However, in reality, cases arise where seed is moved from one zone to another due to unavailability of seeds from the destination seed zone. The greater the distance between the source seed zone and the destination seed zone, the higher the risk that trees established could fail due to lack of proper adaptation. A seed supplier should therefore make professional judgement on limiting the movement of seeds from one zone to another.

In the formal tree seed supply system operated by KEFRI through the Kenya Forestry Seed Centre, tree seed customers are requested to disclose the intended planting site/location conditions in terms of mean annual rainfall, mean annual temperature ranges, and altitude. This assists in providing not only the correct species, but also the correct provenance.

Provenance matching should be practised by all who supply indigenous tree seed or/and seedlings. It is also an important issue to consider for those planting such trees. Mukau and Meru oak, mentioned earlier, are sources of good timber. In Kenya, mukau occurs



A KEFRI seed stand of *Vitex keniensis*. Despite having lost their leaves, this being in the dry season, these trees are healthy. (Photo: KEFRI)

in seed zones 17 to 22 while Meru oak's occurrence is restricted to seed zones 4 and 5.

In planting mukau, disregarding the seed zones exposes tree growers to the risk of mismatching the source seed zone with the destination seed zone due

to the many seed zones from which one can collect seeds. For Meru oak, there is a risk of moving the seed far beyond its right ecological conditions due to its limited seed zones.

The writers are KEFRI researchers.

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