

## Growing African Mahogany in Northern Australia

*(Khaya senegalensis)*

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### INTRODUCTION

African mahogany is given various names according to the country of origin and port of shipment in West Africa. There are several species of *Khaya* but the timber from these is often mixed in parcels and exported as one species. *Khaya senegalensis* (dry zone mahogany) occurs in riverine forests and is scattered within the higher rainfall savannah woodlands. In more moist areas, it is found on uplands, but is restricted to riparian habitats that extend into the savannah in the dryer portions of the range. Its distribution extends from Senegal to the Congo in West Africa, and across the continent to Sudan and Uganda.

During the first year of growth, the seedling develops a strong, deep taproot, (see Figure 2) which makes it the most drought hardy of all the *Khaya* species. Its deep taproot provides the tree with the ability to access moisture deep in the soil profile and stability in high winds. When planted in shallow rocky soil types, taproot development maybe severely restricted, reducing resistance to wind damage and tree vigour. African mahogany was planted for the first time around Darwin in the Northern Territory (NT) in the late 1950s and showed potential as a plantation species in the Top End. In a series of Commonwealth-funded trials in the Top End of the NT, *K. senegalensis* was the outstanding species for growth compared with other high-value tropical hardwoods (see Figure 1).



**Figure 1.** Young African mahogany, age 22 months, grown at Katherine

## GERMINATION

Natural regeneration from seed is poor, but fresh seed germinates readily when sown in a sand and peat mix in flat trays. Germination commences after about 10 to 14 days and high germination rates, usually around 90%, can be expected when fresh seed is used. Seedlings can be pricked out into deep containers and grown in the nursery until they reach 25 to 40 cm in height. They should be planted into the field early in the wet season after sufficient rain has fallen.

Another method of planting stock is to use striplings or wildlings. These are small seedlings about 40 to 50 cm in height and about the thickness of a pencil, growing at the base of large mature trees (see Figure 2). During the wet season, individual seedlings can be pulled out of the ground and, after stripping the leaves and pruning the root section, they can be planted directly into the field after sufficient rain, or potted in containers.

Seed for growing trees in plantations should be selected from good individuals with long straight trunks (Figure 3). However, superior seed is not readily available and, for this reason, clonal seed orchards (based on superior trees) have been established in Darwin and in north Queensland (see Figure 4). These orchards have already started producing good genetically-improved second generation seed for further deployment and evaluation.



**Figure 2.** Seedling with a strong and deep taproot

## SOIL REQUIREMENTS

*K. senegalensis* will grow in a wide range of soil types. The pH tolerance can range between neutral to very strongly acidic; however, a neutral pH is more desirable. It prefers well-drained soils. Sandy loams are ideal, whereas poorly-drained clays or duplex soils should be avoided. It should not be planted in shallow soils as this will prevent the large taproot from developing and anchoring the tree. It is not recommended to plant *K. senegalensis* near houses or other buildings as damage can occur to foundations from the potentially large tree (ICRAF online).

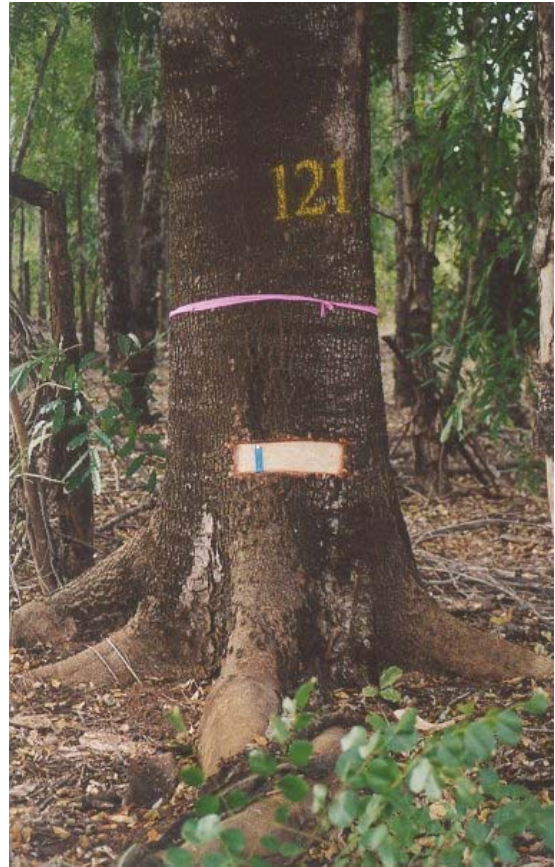
## SITE PREPARATION AND PLANTING

The planting lines should be deep ripped to at least 50 cm to prepare a favourable bed for the planting material and for ease of root penetration. This area should be sprayed with a 'knock-down' herbicide prior to planting and kept weed-free for at least the first two years of plant growth. Planting should occur as soon as the soil is moist enough to allow survival until the regular rains commence.

Proper spacing of trees is very important as it affects the patterns of growth, weed suppression, water requirements and the economics of planting and tending of the plantation. Seed from superior trees with a good straight trunk can be spaced farther apart than say seed collected from inferior, poorly-formed trees. A common spacing for superior seedlings on cleared and prepared sites is 5 m between rows and 5 m along the row (400 stems/ha). The planting density can be increased to 5 m x 3 m (666 stems/ha), or even 4 m x 3 m (833 stems/ha) for inferior seedlings and poorer soils. This allows for a greater thinning potential of poorly-formed or slower-growing trees early in the rotation and still maintain an economically viable final population for harvest. However, seed from poorly-formed trees is not recommended and should be avoided if the aim is to grow trees for timber production.



**Figure 3.** A good tree suitable for seed collection, with a straight trunk of 11 m to the first branch



**Figure 4.** One of the 96 trees (Clone 121) planted in the clonal seed orchard

## FERTILISER

A complete fertiliser with trace elements should be applied at the time of planting at a rate of 100 to 200 g/tree. This can be done in two applications if necessary, one application after planting and the other halfway before the end of the wet. Earlier fertiliser trials on *K. senegalensis* in the Top End showed that nitrogen, phosphorus and trace elements were very important for the successful establishment of this species. The fertiliser should be placed in pockets on either side of the tree and not spread on the surface of the ground, as this encourages weed growth.

## THINNING

The growth of the trees should be monitored regularly and thinning should start before the stand is suppressed by competition for light, moisture and nutrients. In a thinned plantation, the crop should look distinctly open and individual crowns should have clear space all round. Normally, trees with the best crowns and stem-form should be retained and left evenly spaced within the stand, even if that means sacrificing some of the well-formed trees. Because *K. senegalensis* has a tendency to form branches low on the stem, form-pruning may be necessary on some trees. However, all trees with poorly-developed crowns and stems should be removed, provided this does not result in large canopy gaps.

## THE TIMBER

The heartwood is pale pink-brown when freshly-cut, darkening with exposure to a deep red-brown with a high feature. The sapwood is not very distinct from the heartwood, being only slightly more pale and brown. The stripe or roe, characteristic of timber with interlocking grain, is often very marked. In texture and general appearance, it more closely resembles Cuban mahogany than any other African species. It is moderately hard and heavy;

density is between 680 to 750 kg/m<sup>3</sup>. It is the hardest and heaviest of all the mahoganies found in Africa (Alwyn Jay 1972).

## FUNCTIONAL USES

The most important uses of mahogany are for furniture and interior decoration, both as solid wood and as veneer. It is also used for good quality joinery and ship cabins, plywood, turnery, carving inlay work, picture frames, linings and mouldings (ICRAF online). In the past, mahogany timber has been used for making furniture and bench tops in the Top End. Previously, no proper drying schedule had been followed or determined, resulting in excessive shrinkage of the product. Schedules have now been developed and appropriate seasoning is followed in kiln drying for best results.

The seeds have an oil content of 67%, most of which is oleic acid (66%). The oil is used in West Africa for cooking. *K. senegalensis* is an important medicinal plant in Africa and the very bitter bark has a considerable reputation as a fever remedy. The young leaves contain fairly large amounts of digestible protein and are used in Africa as fodder for cattle and camels, although they are not very palatable (ICRAF online).

## SEASONING

The timber can be satisfactorily dried using conventional air and kiln seasoning methods, although care must be taken to prevent warping and splitting (Alwyn Jay 1972).

## DURABILITY

The heartwood is categorised as durable (Class 2), highly resistant to decay when fully exposed to the weather, clear off the ground and well drained with free air circulation. The sapwood is susceptible to attack by the Lyctus borer (Alwyn Jay 1972). The timber is resistant to termites, although young trees may be attacked before any heartwood has formed in the trunk.

## WORKING QUALITIES

The timber gives satisfactory results when using all tools; however, because it is much harder, it is not as easy to work on as some of the other African mahoganies. Some surface woolliness can occur when turning the timber. Sharp blades and cutters should be used on machinery. No difficulty has been experienced with gluing, fixing and finishing (Alwyn Jay 1972).

## PESTS AND DISEASES

In its natural range, *K. senegalensis* like many species within the family Meliaceae, can be severely attacked by shoot borers (*Hypsipyla robusta*). Such attacks may result in misshapen trees with no timber value; however, the shoot borer is thought to be benign in the Top End of the NT. The sapwood of the African mahogany is also susceptible to attack by longicorn beetles and powder post beetles (*Lyctus* spp.) (ICRAF online).

## REFERENCES

Alwyn Jay (1972). Timbers of West Africa. Timber Research and Development Association, Hughenden Valley, High Wycombe, Bucks.

ICRAF International Centre for Research in Agroforestry (Online)

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