

Black wattle for fuel wood

Acacia mearnsii offers potential for profits while meeting the deficit for charcoal and firewood

By Joshua Cheboiwo and Fridah Mugo

A*cacia mearnsii* is a native of Australia that has been introduced to many countries in the world. It is commonly known as black wattle. It is a fast growing, nitrogen-fixing tree adapted to a wide range of sites from the temperate and tropical lowlands to tropical highlands. In tropical areas, *A. mearnsii* is best grown in the highlands at 1500-2500 metres above sea level with mean annual rainfall of 900 - 1600 mm and mean annual temperature of 12 - 18°C.

In Kenya, *A. mearnsii* thrives in a fairly humid climate with rainfall of 1000 -1500 mm. The best soils for *A. mearnsii* are moist, relatively deep, light textured and well drained. *A. mearnsii* also grows on moderately heavy soils and occasionally on shallow soils. It was one of the first species introduced for firewood and later for tannins and recently became an important charcoal producing species. The species reaches its maximum growth rate between 3 - 5 years after planting and has a life span of 15 - 20 years. It yields high quality tannin, paper pulp, charcoal and firewood.

Kenyan experience

A. mearnsii was introduced into Kenya in the 1880s by missionaries and the first trees were grown in Machakos. Later, it was introduced as a commercial species for production of bark in central Kenya and afterwards spread to the Rift Valley. By the 1940s, it was the only cash crop that Africans were allowed to grow, mostly in central Kenya.

With falling prices of tannins in the global markets, the major products from *A. mearnsii* have shifted from bark to charcoal. The East African Tanning and Extraction Company (EATEC) was one of the largest commercial growers of *A. mearnsii* in Kenya. The company produced bark for tannin extraction and poles for charcoal production in brick-made kilns until 2000 when



A black wattle showing its black bark, rich in tannins.

it sold its farms. Since then, farmers with small woodlots have become the main production centres, mostly in Keiyo, Uasin Gishu, Nandi, Lugari and Trans Nzoia areas.

Pockets of trees are found in Kiambu, Nyeri and Machakos in Central and Eastern provinces. Currently, small-scale farmers are the main suppliers of bark in the country and the stripped poles are converted into charcoal using the traditional method of earth kilns.

Planting trends and management

Since the closing of EATEC in 2000, most of the 24,000 hectares of *A. mearnsii* estates have been subdivided into smallholder farms with only a few of the new owners retaining the tree on small proportions of their land. Some farmers in Nandi, Uasin Gishu, Keiyo and Trans Nzoia have continued to grow *A. mearnsii* on a commercial scale for bark and charcoal production.

The main attraction of *A. mearnsii* growing is its minimal costs after initial planting because it regenerates profusely itself from seed banks in the soil after soil disturbances such as burning or cultivation. It produces between 70,000 to 60,000 viable seeds/kg that form a seed bank that can be relied upon for natural regeneration after the first rotation.

For first regeneration, the seed must be broken before sowing in prepared soil to ensure rapid and complete germination. The seed dormancy is broken routinely by immersing the seeds in boiling water (100°C) for 30 - 60 seconds and allowing it to cool immediately in water overnight (10 - 12 hrs). The seed is sown when wet or can be dried and stored for years if necessary and will germinate readily when sown without further treatment.

Acacia mearnsii is very sensitive to grass competition and the seed should be sown on



A lone black wattle, with typical crown form.



Acacia mearnsii or Black Wattle: a typical woodlot at dense spacing for biomass and tannin production. (Photo KEFRI)

prepared sites through ploughing and harrowing to get good regeneration and plantation density. In Kenya, the trees are cut after six years if the main product is charcoal but are retained for between 8 – 10 years if tannin is the main product as this is when the highest tannin content is achieved.

Acacia mearnsii produces a moderately dense wood that ignites easily and burns well, making excellent firewood and charcoal. Its firewood has a calorific value of 3500–4000 K cal per kg. The wood can be used for a variety of activities such as house poles, fencing posts, mine timber tool handles, cabinetwork, joinery and flooring construction timber.

A. mearnsii regenerations can number over 10,000 seedlings per hectare and have to be thinned progressively by removing weak plants every year from the first to the fourth year to create growing space for the remaining stock. In each thinning operation, the most vigorous trees should be left at the required spacing.

In large commercial plantations, it is recommended that thick stands of seedlings be removed, leaving a single continuous line along the stump line mostly in plantations established through natural regeneration. By the second year, the spacing between tree plants should be 1m x 1m with a final spacing of 3m x 2m at the end of the fourth year, leaving approximately 1,600 stems per hectare.

Yields and financial returns

The first two thinnings are intended to create growing space and promote stand hygiene. The third and fourth thinnings have market value as droppers and railings are sometimes converted

into low-quality charcoal. A well-managed *A. mearnsii* stand growing in a good site has a potential of producing 80 tonnes of firewood per hectare at the age of 9 - 10 years. However, trees growing on poor sites can yield as low as 50 tonnes. When firewood is air dried to a moisture content of about 15 per cent, it is considered ready and can be used for firing boilers in industries that use firewood as a source of energy. It is preferred for domestic use as it ignites easily, burns with little smoke and has persistent embers.

At the current factory gate price of Ksh 1,800 per tonne, a hectare of *A. mearnsii* that produces 60 – 80 tonnes of industrial firewood can generate between Ksh 108,000 to 144,000. On conversion to charcoal, it can produce 16.8 to 24 tonnes. At the current price of Ksh 420 per 40kg bag, this translates to between Ksh 176,400 and 252,000.

Market opportunities

The market for firewood is enormous, accounting for 70 per cent of the energy consumption in the country. Currently, the estimated deficit stands at over 7 million tonnes, mainly for domestic use but a substantial quantity is used in food and textile processing enterprises and institutions. The deficit value at the current price of Ksh 1,600 per metric tonne is estimated at Ksh 11 billion.

Charcoal is a big business in both rural and urban areas with an estimated consumption of 67 million bags annually, equivalent to 2.4 million tonnes. The estimated annual trade arising from charcoal at the current price of Ksh 420 per bag

is Ksh 28 billion. Falling supplies mean large section of the market demand is unmet. The farm level prices for charcoal rose from Ksh 130 in 1998 to Ksh 420 by 2010, an increase of 223 per cent.

Production technologies

There are various improved charcoal kilns available in the country such as the dome-shaped kiln and the half orange-shaped kiln. The recovery of charcoal burnt by these methods can be above 25 per cent. Production by kilns is recommended to reduce wastage.

Recommendations

There is a huge market for both firewood and charcoal in Kenya, thus investors in the sector are assured of markets and good prices. Competition from settlements, subsistence and commercial agricultural enterprises in the Rift Valley, the main growing region, is likely to reduce the size of the few *A. mearnsii* woodlots continuously. Therefore, there is need for promotion of sustainable biomass energy sources through concessions of public land for growing tree crops like *A. mearnsii* to address the growing fuel wood deficit for the rural and urban poor.

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