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The Characteristics and Economic Importance of *Pterocarpus angolensis* in D.C. Botswana

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Abstract: *Pterocarpus angolensis* grows throughout northern Botswana and may be found in all woodland types as well as in evergreen and deciduous forests. It is among the few indigenous trees that thrive in the deep Kalahari sands. *P. angolensis* produces a hard wood timber of attractive appearance. Due to its flexibility, resistance and lightweight, the communities in Botswana use the species for making door frames, window frames, canoes, canoe peddles, spear handles for use in game hunting, fishing and general construction. The community also use it as a carving and sculpting medium. Traditionally, all parts of the tree are used for medicinal purposes.

Key words: *Pterocarpus angolensis*, indigenous tree, Botswana

INTRODUCTION

Indigenous forests in Africa provide a wide range of goods and services that include edible fruits, saw logs, medicines, honey, poles and fuelwood. The management of indigenous forests is, however, beset with a number of problems such as deforestation, inadequate information on the resource necessary for planning and management of the forestry, inadequate trained staff and funds, a lack of environmental educational programmes for different target groups, a lack of consolidation and harmonization of legislation and effective measures for its enforcement. In most indigenous forests, uncontrolled exploitation is occurring mainly for firewood, building poles, wood for carving and medicine.

In Southern Africa deforestation caused by forest fires and wild animals (mostly elephants) is currently an immense problem and a major concern. It has led to various environmental problems such as land degradation.

P. angolensis is a dominant member of the miombo woodland association and is found scattered throughout the large area covered by this broad type of vegetation (Norwegian Forestry Society, 1992). The tree is also found in some other countries of Central and Eastern Africa (Van Wyk, 1992). *P. angolensis* is a typical savanna forest species restricted to the mainland of Africa. It is a woodland and wooded grassland species most often found in deep sand but sometimes on hill slopes (Coates

Palgrave, 1992). It occurs in the tropical deciduous woodlands, which occupy more than 50% of the land area between the rain forest block of central equatorial Africa and the sub tropical bush veld type of Southern Africa (Palmer, 1997).

The altitudinal range of the species extends from sea-level to about 1 650 m above sea-level. According to Palmer (1997) the climatic range of *P. angolensis* is that of the dry sub humid regions with a single-season rainfall regime, a mean annual rainfall of between 500 and 1 250 mm and mean minimum temperatures of 21°C for the warmest month and 4°C for the coldest month. The above climatic limitations correlate well with the northerly and southerly distribution of the species. In the north it does not enter the two season rainfall areas (in Kenya and Uganda) and in the south it does not extend into cold areas or those with high or well-distributed rainfall (Palmer, 1997).

In Botswana the tree grows throughout the northern part of the country and may be found in all woodland types as well as in evergreen and dry deciduous forests. *P. angolensis* is among the few trees that thrive in the deep Kalahari sands (Norwegian Forestry Society, 1992).

P. angolensis is one of the most popular timbers of the African continent and probably the most valuable and sought after hardwood in Africa south of the equator (Van Wyk, 1992). The species produces a timber of attractive appearance, durable and of low shrinkage. These qualities make it a suitable timber for use in the building trade (Coates Palgrave, 1992).

Despite its high commercial and medicinal value, the *P. angolensis* population in Botswana is declining due to damage by forest fires and elephants that eventually lead to dieback.

The absence of *P. angolensis* stems in the younger age classes to eventually replace mature trees is an indication that the species was under threat of extinction and calls for an urgent need to conserve it.

PLANT DESCRIPTION

Pterocarpus angolensis belongs to the super-family of Leguminosae comprising of all pod-bearing plants. It is a medium-sized tree, which seldom exceeds a height of 10-12 m. On better sites it can reach 15-20 m (Fig. 1a).

The trunk is fairly straight and cylindrical but relatively short, branching out into several long, straight, more or less steeply rising main limbs which support the spreading crown (Coates Palgrave, 1992).

The bark is dark grey to brown, rough and longitudinally fissured (Fig. 1b).

The leaves of *P. angolensis* have 5 to 9 pairs of sub-opposite to alternate leaflets. The leaflets are elliptic-lanceolate to obovate.

The tree has yellow to orange, sweets-cented, papilionaceous flowers, which are about 12-20 mm long (flowers from August to December). The fruit is a very distinctive, indehiscent and circular pod (Fig. 1c).

The seeds are smooth, shiny and dark to red-brown and very hard. They are flat and subcuneate with small protuberances above the microphytes that render them asymmetrical (Fig. 1d). Each seed is 12 mm long, 9 mm wide and 4 mm thick (Fig. 1d).

Leaves and pods (Fig. 1d): Leaves and twigs are browsed by game particularly elephants while pods are eaten by baboons and monkeys (Ben-Shahar, 1998). The butterfly *charaxes achaemenes achaemenes* breeds on the tree (Van Wyk, 1992).

P. angolensis is so liked by elephants that all the *P. angolensis* belts in the Chobe forests are being



Fig. 1a: *Pterocarpus angolensis* tree Kasane forest reserve



Fig. 1c: *Pterocarpus angolensis* leaves and flowers



Fig. 1b: *Pterocarpus angolensis* stem with deeply fissured bark



Fig. 1d: *Pterocarpus angolensis* pods/fruits

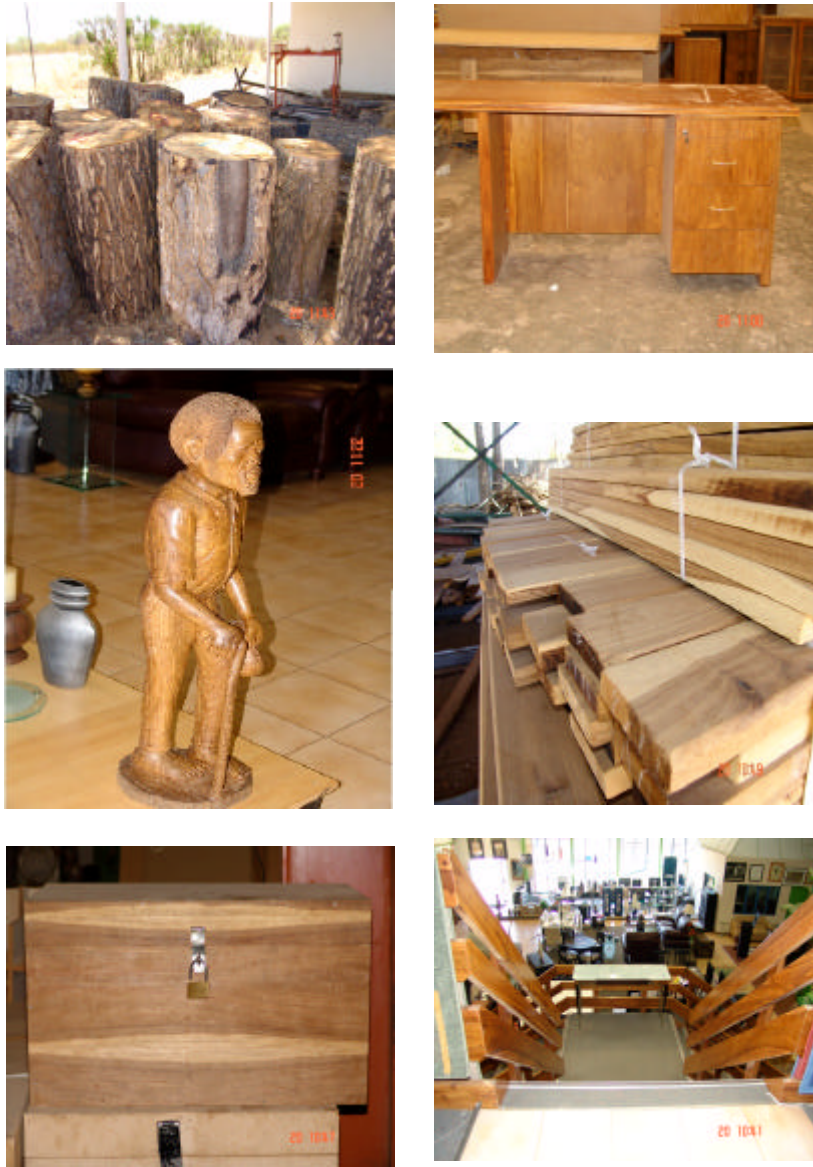


Fig. 1e: *Pterocarpus angolensis* products

devastated and to make the leaves more accessible the elephants push over the trees and also strip off the bark (Ben-Shahar, 1993, 1998).

Economic importance of *P. angolensis* in Botswana:

Pterocarpus angolensis provides many commercially and socially benefits which are of great importance to both wildlife and people of Botswana especially those living in Chobe and Ngamiland areas.

Wood: (Products from *Pterocarpus angolensis*):

P. angolensis is one of the most popular timbers of the

African continent and probably the most valuable and sought after hard wood in Africa south of the equator. Its mechanical properties and colour make it one of the most highly esteemed timbers in the world for furniture, building and high-class joinery (Palmer, 1997).

The timber has also been employed for a variety of less select purposes such as shelving, flooring, doors, window frames, decorative work, musical instruments and containers (Coates Palgrave, 1992). While *P. angolensis* might not be the most preferred firewood species, it has proved itself as a carving and sculpting medium in the curio trade (Storrs, 1995) (Fig. 1e).

The inner bark can be used for making a very strong rope and is also used in tanning leather and making dyes (Palmer, 1997).

Before the excellent quality of the wood were fully realized, it was wastefully used as railway sleepers and on mines (Coates Palgrave, 1992).

While the species is having such an important economic value it is therefore surprising to find that so little research results have been published on the species (Palmer, 1997).

Timber harvesting in Northern Botswana: Timber harvesting was a major operation in Botswana in 1990. The Government earned a total of P1 131,046.00 in royalty from the logging operations in Chobe forests and the potential harvestable volume of felled *P. angolensis* was 8,065.2 m³ (Table 1). Of this total royalty was paid on 3,302.6 m³. Another 568.7 m³ was taken free of royalty on account of the fact that it fell below the minimum 35 cm diameter stipulation for royalty wood. An estimated 4,194 m³ was left on the forest floor, which inadvertently became potential fire fuel (Norwegian Forestry Society, 1992).

About 61% of extracted *P. angolensis* was exported out of the country in round log form where it was converted into veneers. The remaining 39% was milled locally into sawn boards for the local and export markets. Local milling operations run by the logging companies were extremely inefficient.

Mill recovery averaged 37%, which translated into an overall recovery of 18%, when losses in the forest were taken into account (Norwegian Forestry Society, 1992).

Timber harvesting done on a sustainable basis can be an essential part of Botswana's economic development. It can provide the highest level of employment and if the recommended royalties are adopted, they will provide significant economic benefits for the local and national economies (Norwegian Forestry Society, 1992)

Current situation: The concessions that were operating in the Chobe Forest Reserves were stopped by the Government in 1992 due to poor supervision by the Forestry Department. Since 1992 there is no timber harvesting on a large scale. Only community forestry is carried out whereby communities are allowed to obtain

permits to cut dead or dying trees on a small scale to use for canoes, doors and door frames, windows and window frames, chairs and carving.

Future of logging in chobe forest reserve: In order to sustain the forests and to allow regeneration, it was proposed that future timber harvesting concentrate on removing damaged stems. The inventory that was carried out in 1991/92 estimated the salvageable volume at about 145,000 m³, equivalent to 10 years harvesting at current off-take rates. The value of this timber over 10 years at proposed (constant 1992 prices) was P21.75 million (Norwegian Forestry Society, 1992).

Uses of *Pterocarpus angolensis* by communities

Medicine: Traditionally, all parts of the tree are used for medicinal purposes. Cold infusion from the bark provides a remedy for nettle rash or may be taken to relieve stomach disorders, headaches and mouth ulcers while powdered bark, mixed with water is used to treat burns (Coates Palgrave, 1992). The bark or the root boiled with fresh meat can be used as a preliminary accelerator in the treatment of gonorrhoea. A decoction of the root is believed to be a cure for malaria and black fever. The species is used for treating swelling and discharging eyes (Coates Palgrave, 1992). It is believed that wounded elephants feed on the roots and inner bark of *P. angolensis* trees to enhance blood coagulation. The bark and resin are also used as a fish-poison by the communities in Chobe and Okavango (Personal Communication, Chobe and Okavango Communication, 2005).

The people in these areas use timber from *P. angolensis* for canoes, canoe paddles, game and fish spears, stools, trays, drums, mortars, beehives, doors and door frames, windows and window frames and dishes, which in Ngamiland where there are still huge healthy and dense *P. angolensis* forests big rounds logs are used for fencing kraals for cattle.

In Ngamiland where there are still huge healthy and dense *P. angolensis* forests communities use the big round logs for fencing kraals for their cattle (Interviews from the Communities, 2005).

Other uses: *P. angolensis* trees offer nesting sites to hole-nesting birds such as hornbills and small mammals. *P. angolensis* trees also host a tiny bee known as *Plebina denoita*, which produces an edible honey that is popular with herd boys which they also sell and get money.

Table 1: Volume of *P. angolensis* species exported to South Africa and Zimbabwe during the years 1986 to 1990

Type of wood	Cubic meters
Royalty wood	3,302.6
Non-Royalty wood	568.7
Harvestable branch and stem wood	4,193.93
Total	8,065.2

Source: Bailey (1992)

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