Commercial potential of oil seed and gum trees

If nurtured, wild trees can change the economic status of communities

BY FRANCIS GACHATHI

Seed oils, gums and gum resins represent a group of non-wood tree products (NWTPs) with potential for alleviating rural poverty while increasing the sustainability of our forests. These are tree-derived products but for which it is not necessary to fell the tree. By complementing wood-based management, NWTPs offer a basis for managing forests in a more sustainable way and therefore support biodiversity conservation.

This article highlights seed oils from *Croton megalocarpus* and *Calodendrum capense*, plant gums from *Acacia senegal* and gum resins from *Commiphora holtziana*.

Croton megalocarpus, popularly known as croton, is a deciduous spreading tree, growing to 35m in height, with layered branches. It has grey, rough and cracking bark. Leaves are dull green on the upper surface and silvery green on the underside.

Flowers are pale yellow, in hanging spikes, opening after heavy rains but very short-lived. Fruits are 3-valved grey woody capsules containing three flattened brownish seeds. Croton is related to the castor oil plant *(Ricinus communis),* the candlenut *(Aleurites moluccana)* and physic nut *(Jatropha curcas).*

The seeds of croton contain oil that can be processed to produce high-quality biodiesel, usable in a standard diesel engine. The hard, yellow wood produces very good charcoal. When in flower, croton attracts a lot of bees foraging for nectar, resulting in excellent white honey. Croton oil is a strong laxative and the tree has other medicinal uses.

Croton occurs in dry forests and scattered tree grassland between 900 – 2,100m. It is common around Nairobi and on hilltop forests in the drylands. It is propagated by seeds through direct sowing. Fresh seeds germinate within 7 - 40 days. There are about 1,600 – 1,800 seeds per kg.

Seeds are available between October and February in most areas. The oily seeds cannot be stored for long; they are better sown fresh. They are relished by various rodents particularly rats and squirrels.

Croton megalocarpus **in flower (the light-green hanging spikes), near in Juja town, Kiambu County, in Kenya. (Inset) Croton biodiesel** *(Photos: Francis Gachathi)*

Local names for *Croton megalocarpus* include nyapo (Boran); nyaeppo (Duruma); nyaap'po (Gabra); muyama (Giriama); muthulu (Kamba); mukinduri (Kikuyu and Meru); masineitet (Kipsigis); musine (Luhya); ol-mergueit (Maasai); masineitet (Nandi); lameruguet (Samburu); mukigara (Taita) and ortuet (Tugen).

Calodendrum capense

Calodendrum capense, commonly known as Cape chestnut, is a deciduous tree that grows to about 15m, with a spreading crown, almost bare for several months. It has grey smooth bark. The leaves are opposite, with prominent parallel veins below.

Flowers are very showy, pinkish white with pale pink dots, in erect terminal heads, covering the tree canopy. Fruit is a round, 5-lobed capsule, covered in warty prickles, cracking open into a

Showy flowers of Cape chestnut. (Photo: Francis Gachathi)

Mature fruits of Cape chestnut, with the black seeds inside. (Photo: Francis Gachathi)

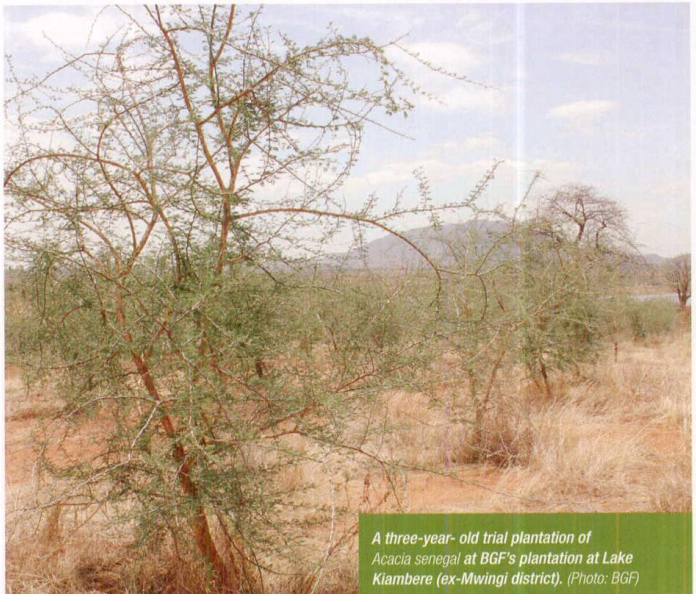
star-like structure when mature and dry. The seeds are shiny black and angled.

Cape chestnut seeds contain valuable oil used for beauty care and soaps. The oil has a reputation for ultra-violet protection. It is largely traded under the name yangu or Cape chestnut oil. The timber is durable and suitable for furniture/ joinery, general construction and surgical splints. Flowers attract many honey bees.

Cape chestnut is very wide-spread. It is common in all highland evergreen dry forests such as Karura and Ngong. It is adapted to a wide range of soil types, including black cotton.

The tree is widely planted as ornamental because of its beautiful showy flowers. It is propagated through seed where one kilogram may contain between 600 and 1,000 seeds.

Local names for the Cape chestnut include: yangu (Kamba); muraracii (Kikuyu); kipkaria or sasuriet (Kipsigis); ol-larashi or enkarash (Maasai); mujai or mujura (Meru); kipkarkuriat (Nandi); ocharasliit (Pokot); larachi (Samburu); mogorusi (Taita) and murei (Taveta).



A three-year- old trial plantation of Acacia senegal at BGF's plantation at Lake Kiambere (ex-Mwingi district). (Photo: BGF)

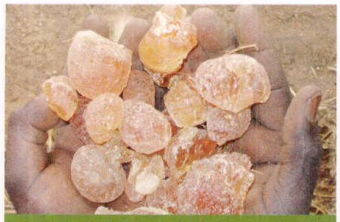
Gums and gum resins

Plant gums and gum resins are important forest products from the drylands. The products have the potential for driving economic development of drylands communities. One advantage of these resources is their ability to produce marketable products in the dry season when forage is scarce, thereby allowing the communities to be occupied in a meaningful economic activity.

Acacia senegal

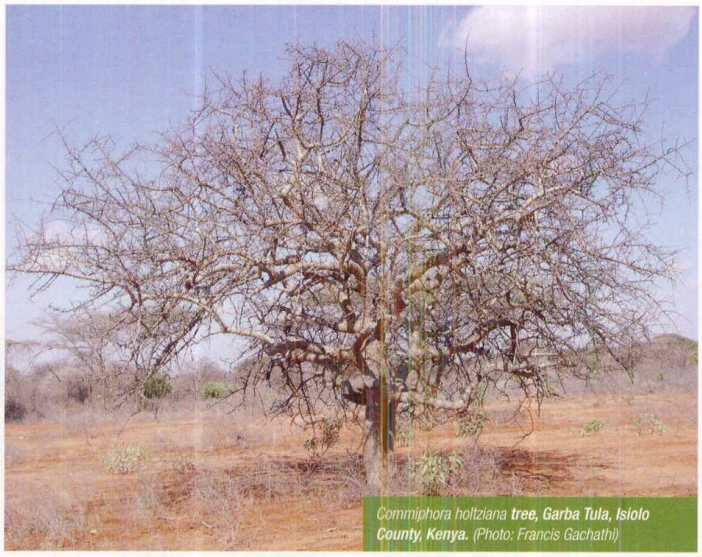
Acacia senegal, currently known as *Senegalia senegal,* after changing the genus name, is commonly known as the gum arabic tree. It is a very variable tree or shrub generally recognised by its three curved thorns at the nodes, the lateral ones more or less directed forward in the direction of growth and the median one hooked backwards. The tree has grey yellow bark, rough or smooth, papery and peeling. It has white flowers in a spike. Pods are flat, papery, yellowish brown when dry, splitting to release 2 - 5 sub-circular greenish brown seeds.

In Kenya, *Acacia senegal* exhibits three growth habits called varieties - *senegal, leiorhachis* and *kerensis.* The *kerensis* variety, which is shrubby with yellowish-brown peeling bark and rarely exceeding 4m in height, is the



***Gum arabic from** Acacia senegal (Photo: Francis Gachathi)*

***Gum resin, hagar, from** Commiphora holtziana. (Photo: Francis Gachathi)*



Commiphora holtziana ***tree, Garba Tula, Isiolo County, Kenya.*** *(Photo: Francis Gachathi)*

main gum arabic producing variety in Kenya, while in other countries like Sudan, Chad and Nigeria, it is the *senegal* variety.

Acacia senegal is the source of gum arabic of international commerce. The gum exudes from the stem and main branches but the flow is generally stimulated by tearing off a thin strip of the bark (tapping). After about two weeks, it hardens on exposure to air, usually forming round or oval "tears" which are pale yellow to orange in colour.

Commercial gum arabic production is confined to northern Kenya drylands and particularly in Turkana, Samburu, Isiolo, Marsabit and Mandera counties. Hundreds of tonnes are collected from these areas every year for export and for local industries. Collection of gum arabic is highly dependent on weather. A good rain season followed by dry hot weather ensures a good harvest. The main production season is usually from July to October.

Gum arabic is used in three main sub-sectors – the food industry, the pharmaceutical industry and technical areas such as printing, ceramics and textiles. It is a natural emulsifier, binding substances that would not normally mix well. Pharmaceutical companies use it to keep medicines from separating into their different ingredients and it makes printing ink more cohesive and permanent.

The gum is eaten as food, while leaves and pods are good fodder, particularly for camels and goats. The tree is a good source of bee forage as it flowers profusely.

Acacia senegal is a common acacia in drylands. It is found on rocky limestone hills and ridges and on sandy plains, most common between 400 – 1,100 metres above sea level with 300 - 550mm mean annual rainfall. It is propagated through direct sowing of fresh seed.

For better germination results, soak seeds in hot water and leave to cool overnight or nick the seed coat. The seeds germinate within 10 - 20 days. There are about 8,000 - 12,000 seeds per kg.

Local names for the gum arabic tree include: idado or baabido (Boran); idaado (Gabra); king'ole, king'olola (Kamba); enderkesi (Maasai); mung'ora (Mbeere); chemanga (Pokot); hadhaadh or mirgi (Rendille); lderkesi for the tree and manok for the gum (Samburu); edad (Somali); kikwata (Swahili); mung'oora (Tharaka);and ekunoit (Turkana).

Commiphora holtziana *(C. erythraea)*

Commiphora holtziana, commonly known as haggersu is a tree that grows to 3 -7m high. It has smooth, whitish to yellowish or bluish grey bark, often with pink spots, peeling in large irregular papery flakes. Leaves are 3-foliolate or a few 5-foliolate on long shoots. The fruit is oval, about 10 x 8mm.

When injured, the bark of haggersu exudes a pale yellow liquid that hardens to a yellowish brown semi-transparent aromatic oily mass known as sweet myrrh, opoponax or hagar in Boran.

This oleo-gum resin is of considerable economic importance to the people in drylands of north-eastern Kenya. It has an established market since ancient times and has been a key component of perfumes, incense and ritual purification since biblical times.

Essential oil from the sweet myrrh is used in various therapeutic preparations and in cosmetics. Tonnes of sweet myrrh are collected yearly for export and for local industries.

Locally, sweet myrrh is mixed with cow's milk and used to kill ticks, mites and fleas. It is also used to treat mange, scabies, foot rot, wounds, snake and scorpion bites. The wood is used to make household containers, headrests and writing boards. Trunks of old trees are used to make beehives.

Commiphora holtziana is found in Acacia-Commiphora woodland on well-drained red sandy soil overlying limestone, between altitudes 100 – 1,100m with annual rainfall of 250 - 600mm. It is particularly common in Garbatula, Wajir, Moyale and Mandera. It is easily propagated by large cuttings, often planted as a live fence.

Local names of *Commiphora holtziana* include haggersu ferda for the tree, and hagar for the resin (Boran); sweet myrrh (English); agarsu (Gabra); hagar-ad or hagar jerer (Somali) and mwagari (Taita).

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