

**Gum and Incense:
Recommendations for improved production
and income generation**

Consultancy Sub-report

No. 6

FARM Africa/SOS Sahel

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Tropical Forestry

March 2004

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1. Introduction

Non-wood forest products are extremely heterogenous. They play a vital role in the life and welfare of the people. A large number of items of our everyday use contain a varying proportion of non-wood forest products.

Sustainable utilisation and development of non-wood forest products are highly demanding on scientific knowledge and information relating to their resource distribution and management, chemical and biological properties, uses, supply-demand situation and so on. However, the information base of non-wood forest products is still weak in Ethiopia and sources of existing information are dispersed.

Borana Zone is richly endowed with species in the genera *Acacia*, *Boswellia*, and *Commiphora*, some of which are the main sources of commercial gum and incense. A short visit was paid to Bule Dakkara during the fieldwork where we found stands of *Acacia senegal*, *Acacia seyal* and *Boswellia neglecta*. According to the local community in Ade Gelchet Peasant Association, Natural Gum Processing and Marketing Enterprise (NGPME) is the major buyer of the gums and incense from the area. Currently, a kilogram of gum from *A. senegal*, *A. seyal* and incense from *B. neglecta* is sold at 3, 2.5 and 2 birr. The major constraints mentioned for the production of gum and incense are logistics (water and food) and transportation to and fro the far gum and incense harvesting fields. They also expressed their problem on improving yield and quality of products which has affected the prices of their products. No training has been given so far on harvesting, sorting, cleaning, grading, and storing of gum and incense products.

While discussing about gum and resins, in this report special emphasis will be given on *A. senegal*, *A. seyal* and *B. neglecta*. According to informants at Ade Gelchet PA, these are the main gum and resin producing species from which the people harvest commercial products.

2. *Acacia senegal* (L.) Willd.

Syn.: *Acacia verec* Guill. et Perr.

Mimosaceae

Gum Arabic, Senegal Gum, Sudan Gum Arabic, Kher, Kumta

Ecology

A. senegal thrives on dry rocky hills, in low-lying dry savannas, and areas where annual rainfall is 25–36 cm. This hardy species survives many adverse conditions, and seems to be favored by low rainfall and absence of frost with annual mean temperature of 16.2–27.8°C (mean of 9 cases 23.8°C), and soils with pH of 5.0–7.7 (mean of 7 cases = 6.4), but Cheema and Qadir (1973) report 7.4–8.2.

Two varieties exist in Boranaarea: *var. kerensis* and *var. senegal*. *Var kerensis* is a shrub up to 4 m tall and usually branching from near the base. The bark is yellowish brown. Thorns are known as prickles and arranged in 3's, the central on curved backwards, the laterals directed forward. This variety is the most common one in Borana Zone (Chikamai, 2003).

Var. senegal is a tree to 10m tall with distinct trunk and flat or round crown. This is observed in Ade Gelchet surrounding and is locally known as *gogole*

Uses

A. senegal yields commercial gum arabic, used extensively in pharmaceutical preparations, inks, pottery pigments, water-colors, wax polishes, and liquid gum; for dressing fabrics, giving lustre to silk and crepe; for thickening colors and mordants in calico-printing; in confections and sweetmeats. Causing partial destruction of many alkaloids including atropine, hyoscyamine, scopolamine, homatropine, morphine, apomorphine, cocaine, and physostigmine, gum arabic might be viewed as a possible antidote. Pharmaceutically used mainly in the manufacture of emulsions and in making pills and troches (as an excipient); as demulcent for inflammations of the throat or stomach and as masking agent for acrid tasting substances such as capsicum; also as a film-forming agent in peel-off masks. Its major use is in foods, for example, as suspending or emulsifying agent, stabilizer, adhesive, flavor fixative, and to prevent crystallization of sugar, etc. Used in practically all categories of processed foods (candy, snack foods, alcoholic and nonalcoholic beverages, baked goods, frozen dairy desserts, gelatins, and puddings, imitation dairy products, breakfast cereals, and fats and oils). Use levels range from less than 0.004% (40 ppm) in soups and milk products, 0.7 to 2.9% in nonalcoholic beverages, imitation dairy, and snack foods, to as high as 45% in candy products (Leung, 1980).

In modern pharmacy, it is commonly employed as a demulcent in preparations designed to treat diarrhea, dysentery, coughs, throat irritation, and fevers. It serves as an emulsifying agent and gives viscosity to powdered drug materials; is used as a binding agent in making pills and tablets and particularly cough drops and lozenges. Because of its enzyme, the gum is not suitable for use in products having readily oxidizable ingredients. For example, it reduces the vitamin A content of cod liver oil by 54% within three weeks. It is incompatible with aminopyrine, morphine, vanillin, phenol, thymol, α - and β -naphthol, guaiacol, cresols, creosol, eugenol, apomorphine, eserine, epinephrine, isobarbaloin, gallic acid, and tannin; also with strongly alcoholic liquids, solutions of ferric chloride and lead subacetate and strong solutions of sodium borate. It was formerly given intravenously to counteract low blood pressure after hemorrhages and surgery and to treat edema associated with nephrosis, but such practices caused kidney and liver damage and allergic reactions and have been abandoned (Morton, 1977).

Strong rope is made from bark fibers. White wood is used for tool handles, black heartwood for weaver's shuttles. The long flexible strands of surface roots provide one of the strongest of local fibers, used for cordage, well-ropes, fishing nets, horsegirdles, footropes, etc. Seeds are dried and preserved for human consumption (NAS, 1980). Young foliage makes good forage. It is useful for afforestation of arid tracts, soil reclamation, and windbreaks (Duke, 1981a).

Harvesting

Gum exudes from cracks in bark of wild trees, mostly in the dry season, with little or none in the rainy season when flowers are out. In some areas, a long strip of bark is torn off and the gum allowed to exude.

In Africa, it is regularly tapped from trees which are about 6 years old by making narrow transverse incisions in bark in February and March. In about a month, tears of gum form on surface and are gathered. Trees begin to bear between 4–18 years of age and are said to yield only when they are in unhealthy state due to poor soil, lack of moisture or damaged. Attempts to improve conditions tend to reduce yield. Gum from wild trees is variable and somewhat darker colored than that from cultivated plants. Collected gum is carefully freed of extraneous matter, sorted and sometimes ripened in sun before export. Gum arabic is odorless with a bland taste, yellowish and some tears are vermiform in shape. Ripened or bleached gum occurs in rounded or ovoid tears over 2.5 cm in diameter, and in broken fragments. Tears are nearly white or pale yellow and break readily with a glassy fracture. Gum is almost completely soluble in an equal volume of water and gives a translucent, viscous, slightly acid solution, but is insoluble in 90% alcohol. Kordofan (Sudan) Gum is yellow or pinkish, has fewer cracks and is more transparent (Duke, 1981a).

Annual yields from young trees may range from 188 to 2856 g (avg. 900 g), from older trees, 379 to 6754 g (avg. 2,000 g). Gum arabic is important export product for some areas in tropical Africa and Mauritania. From Africa some genuine gum is shipped to India then to Europe and America. Between 1940 and 1950, United States imports range from 3,179–8,989 MT (Duke, 1981a) Morton (1977) reports >11,000 MT more recently.

Gum Arabic status in Borana

Acacia senegal resource is distributed in a very few pockets of valley bottom soils. The valley bottom soils are need for crop cultivation by local communities, and thus are in serious completion with not only *Acacia senegal* stands but also *Acacia seyal* stands. Thus, these acacia species are locally extremely threatened by crop cultivation.

The prospect for development of *Acacia senegal* in Borana as agroforestry or plantation is good. But the upland soils that are reddish and sandy are not

naturally suitable for growing this species. However, the species can be integrated with crops on dark grey vertisols in the valley bottom areas. The species can be managed as agroforestry component with a rotation period of 15-20 years as practiced in the Sudan.

Utilization of the available *Acacia senegal* gum resource should be encouraged using local communities, especially gum and incense associations. In Ade Gelchet area the gum is collected between December and February, once in every few years Awareness and conservation education through extension should also be arranged to the users of the gum Arabic. It is high time to act for conservation of these gum resources in Borana through promotion of gum markets.

3. *Boswellia neglecta* S. Moore

The family *Burseraceae* with 17 genera is widely distributed in tropical and subtropical countries. The genus *Boswellia* has about 20 species in the dry regions of tropical Africa, Arabia and India. The resin obtained from *Boswellia* species is known in common parlance as frankincense or olibanum and is used as incense. The recent botanical report on the *Burseraceae* of Ethiopia has revealed the occurrence in Ethiopia of six *Boswellia* species namely *Boswellia papyrifera*, *B. pirottae*, *B. rivaie*, *B. ogadensis*, *B. neglecta* and *B. microphylla* (Vollesen, 1989). *B. neglecta* is known to occur in the southern provinces of Bale, Gamo Gofa, Hararghe and Sidamo (now BoranaZone). It is also known to occur in Kenya, Somalia, Tanzania and Uganda. In Boranait is called 'Dakara'. It produces a commercially important olibanum, which is coloured either black or white.

B. neglecta is a much branched tree or shrub up to 6m tall. The bark is dark grey, not peeling and often with circular ridges. Leaves compound with 21-47 leaflets. The fruit is green tinged with crimson.

B. neglecta is the major source of Boranatype incense (Tikur Itan, or black incense).

Harvesting

Resin from *B. neglecta* is collected from natural exudates; there is no report on modern harvesting techniques in the literature as far as the knowledge of the consultant is concerned. However, a significant improvement on the quality of black incense can be made through careful sorting and cleaning. Post harvest handling could also improve quality of the incense.

Market

According to Ato Saketa Bekele, Head, Marketing and Quality Control of Gum and Incense of NGPME, there is annual plan of collecting 500-1000 quintals of black incense (Boranatype), which is a big market opportunity that could be used. Black incense is sold at domestic markets, and so far NGPME has not tried to export. He also added that no attempt was made to introduce modern harvesting techniques for black incense so far.

4. Acacia seyal

Two varieties of *A. seyal* are encountered in Boranaarea: *var seyal* and *var fistula*. *Var seyal* is a tree attaining 7 meters height with flat crown. The bark is greenish yellow or orange red. The flowers are bright yellow. The pods are sickle shaped.

Var fistula is distinguished by having some of its spines fused at the base. A shrubby form spreading near the base was observed in Ade Gelchet PA and it is the major source of gum tahla (locally the plant is known as *challo*). It usually occupies black cotton soils.

Harvesting

Modern harvesting practices do not exist in the literature. What is done is just collect naturally oozing gum. However, there are methods for improving the quality of gum such as avoiding adulterating the gum with low grade gums from other species. Awareness creation and training may address such problems. In addition, research on improved harvesting should be conducted as soon as possible in cooperation with Ethiopian Agricultural Research Organization (EARO).

Market

Gum tahla is accepted in the market at the same demand for gum arabic but with a slightly lower price. NGPME and other private dealers also buy the product.

5. Recommendations on Gum and Incense

5.1 Recommendations on Organizing Gum and Incense Association

The following recommendations are given to be applied for organizing the people in and around gum producing natural stands into associations.

- ◆ Before any intervention could begin, the community should be organized in Associations.
- ◆ To start with;
 - Hold a meeting to organize an association (people of about 30-50) and decide on the by-laws of the association.
 - Make the membership on voluntary basis (and of course who could work in the gum and incense business, perhaps poorest of the poor)
 - Select the leader of the association who is highly respected by the community
- ◆ Give technical training on improved harvesting, sorting, cleaning, grading and storing gum and incense products in collaboration with NGPME
- ◆ Give training on financial administration and organization management with Government Office concerned with formation of Cooperatives.
- ◆ The association should buy a few number of donkeys for transporting food and water to the field, and gum and incense back home.
- ◆ Facilitate the contractual agreement between the established Association and NGPME. The crucial aspect of the training and discussion workshop with NGPME should be drawing up a contract between the Association and NGPME to purchase whatever quantities of gum and incense the Association has produced. The association shall sign a contract to become a licensed trader. Prices for each type and grade must be clearly agreed up on and a central collection point and pickup schedule in the PA should be agreed up on. The contract should be seen a binding for both parties.

It is believed that these activities will ensure sustainability as the associations will have an assured market for their products.

5.2 Research Recommendations

There is an immediate need for the improved harvesting of gum and resins in Boranaarea. Resin of *B. neglecta* is very thin liquid contrasting the resin from *B. papyrifera* that is thicker and forms granules easily. Therefore, introducing directly the tapping technique practiced in North Ethiopia on *B. papyrifera* may not work. Therefore, it is suggested that research on harvesting of *B. neglecta* be launched in collaboration with Dryland Forestry Research at Forestry Research Center of EARO.

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