REPORT OF THE MEETING OF THE NETWORK OF NATURAL GUMS AND RESINS IN AFRICA (NGARA)

Kenya College of Communications Technology, Nairobi, Kenya. 29th-31st May 2000

AIDGUM
REPORT OF THE MEETING OF THE NETWORK FOR NATURAL GUMS AND RESINS IN AFRICA (NGARA)

Edited by
B.N. Chikamai¹, S. S. Mbiru¹ and E. Casadei²
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B.N. Chikamai\textsuperscript{1}, S. S. Mbiru\textsuperscript{1} and E. Casadei\textsuperscript{2}

Cover Photos: Top - \textit{Acacia senegal} (at flowering stage)
Bottom - \textit{Commiphora} species (in the dry season)
(\textit{Photos by Francis Gachathi, KEFRI.})

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Participants at the meeting of the Network for Natural Gums and Resins in Africa at Kenya College of Communication Technology (KCCT), 29th - 31st May 2000.
FOREWORD

The regional workshop of the Network of Natural Gums and Resins in Africa (NGARA) was organised by Kenya Forestry Research Institute (KEFRI) in Nairobi in May 2000, with the cooperation of Food and Agriculture Organisation (FAO) and International Association for the Development of Natural Gums (AIDGUM).

The establishment of NGARA is a significant step in the development of the gum arabic and resins sector in the dryland Sahel for ensuring food security, rural development and hence poverty alleviation. I believe that the network will lead to a co-ordinated strategy among African producing countries and partners to sustainably utilise these resources so as to improve livelihoods of the rural poor. I wish to acknowledge with thanks the contribution of all those who attended the workshop and their active participation in the discussions, which made the meeting a remarkable success. I am grateful to members of the organising committee for their devoted service, the editorial team for compiling the report and J. S. Nandi for proof reading the draft document.

FAO is committed to pursue the outcome of the workshop and to support the implementation of its recommendations, in collaboration with partner agencies and countries.

Kraisid Tontisirin
Director
Food and Nutrition Division
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<thead>
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<th>Acronym</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>AFORNET</td>
<td>African Forestry Research Network</td>
</tr>
<tr>
<td>AFREA</td>
<td>African Forestry Research Institutions in Eastern Africa</td>
</tr>
<tr>
<td>AIDGUM</td>
<td>International Association for the Development of Natural Gums</td>
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<td>GARA</td>
<td>Gums and Resins Association</td>
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<td>Kenya College of Communication Technology</td>
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<td>KEFRI</td>
<td>Kenya Forestry Research Institute</td>
</tr>
<tr>
<td>NAGAPPEN</td>
<td>National Association of Gum Arabic Producers, Processors and Exporters of Nigeria</td>
</tr>
<tr>
<td>NGPME</td>
<td>National Gums Processing and Marketing Enterprise</td>
</tr>
<tr>
<td>SADC-FSTCU</td>
<td>Southern Africa Development Corporation – Forestry Sector Technical Coordinating Unit</td>
</tr>
<tr>
<td>SALTLICK</td>
<td>Semi-Arid lands Training and Livestock Improvement Centre of Kenya</td>
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</table>
PART I: INTRODUCTION AND WORKSHOP RECOMMENDATIONS
1.0 INTRODUCTION

1.1 Preamble

This workshop was a follow-up to a regional conference on the "Conservation, management and utilization of plant gums, resins and essential oils", held in Nairobi in October 1997. The workshop was attended by representatives from nine African countries which produce natural gums and resins (Chad, Ethiopia, Kenya, Niger, Nigeria, Mali, Sudan, Tanzania and Uganda) and representatives of other African and international organisations (AIDGUM, FAO and NAGAPPEN). The program of the workshop consisted of: (i) presentations on the initiatives to establish an African network on plant gums and resins, (ii) country presentations on the status of gums and resins, (iii) presentations from invited organisations, (iv) group discussions on the establishment of the network and preparation of project concepts. The workshop was officially opened by the Permanent Secretary in the Ministry of Environment and Natural Resources, Dr. Mohammed Ishakia and closed by the Chief Conservator of Forests, Mr. Gideon Gathaara.

1.2 Opening Remarks

The Director KEFRI

The Director-KEFRI warmly welcomed the participants and wished them a pleasant stay in Kenya. The Director noted that 30-90% of the countries in sub-Saharan Africa are drylands. In Kenya about 80% of the land area is classified as dryland and desertification is a major challenge. Some of the solutions to this problem are the use of the existing natural vegetation in the drylands like gums and resins to improve the livelihood of the rural people. The Director informed participants that KEFRI is coordinating various networks such as African Forestry Research Network (AFORNET) and Association of Forestry Research Institutions in Eastern Africa (AFREA) and was looking forward to using this experience in supporting the proposed network. The Director then outlined the following as objectives of the meeting:

1. To review recommendations of the Nairobi Conference (1997) on plant gums and resins and related developments,
2. To discuss and establish the African network for gums and resins and
3. To develop a project concept paper on the development of the network as well as relevant project concepts for the network.

The FAO Representative, Rome

The FAO representative, Dr. Enrico Casadei noted that African gum and resin producing countries needed a co-ordinated strategy for the sustainable development and conservation of their natural gum and resin resources. He informed the participants that FAO’s priority intervention areas are in food security and rural development for poverty reduction. He noted that the workshop would focus on some of these areas and hoped that tools and strategies would be established to sustainably utilise these resources so as to improve the livelihoods of the rural poor. He also assured the participants that FAO will provide the necessary inputs to assist African producing countries facilitate the sustainable development of these natural resources and increase the export of value-added products to the international market.
Permanent Secretary, Ministry of Environment and Natural Resources

The Permanent Secretary gave a concise address emphasizing the importance of non-wood forest products dryland resources as alternative sources of livelihood. He noted that the non-wood forest products contributed to poverty alleviation through generation of additional income, contributing to food and improved nutrition, medicine and foreign exchange earnings. He observed that this was a unique meeting in the sense that it had brought together the scientific community, policy makers, traders and industrialists to deliberate on how to address pertinent issues affecting some of the most important dryland resources like gums and resins. He reiterated the importance of networks especially in our region, which had limited resources such as funds, facilities and qualified staff. He said that he was pleased that Kenya was chosen as a venue and hoped that at the end of the workshop a refined course of action will be developed at both national and regional levels to develop and promote these important dryland resources for poverty alleviation.

1.3 Establishment of the Network on Natural Gums and Resins

Dr. Ben Chikamai (KEFRI) presented a background paper on the establishment of the Network for Natural Gums and Resins in Africa (NGARA). The paper highlighted the important role that gum arabic, myrrh and frankincense played in contributing to the livelihoods of local communities in terms of food security, income generation and foreign exchange earnings. These resources were also shown to contribute to the amelioration of the environment. The increasing health consciousness among consumers internationally also favours their increased use.

The development of these resources is key to sustainable management and development of the drylands which, due to harsh environmental conditions, had fewer options. However irregularity of supply of these commodities accompanied by widely fluctuating prices and variable product quality had resulted in unfavorable long-term effects on the demand of these commodities. Thus a coordinated strategy was needed among producing countries and partners to address these constraints.

He said that it was in recognition of these opportunities and constraints that an inaugural workshop was held in 1997 in Nairobi, Kenya during which issues on the conservation, management and utilisation of plant gums, resins and essential oils were discussed and concrete recommendations made. A key recommendation of that workshop was the creation of a regional network to enable countries develop their own system of sustainable production, marketing and improvement of their products to international standards. The network is to promote the relationship between primary producer, processor and consumer. The network should also harness the opportunities inherent in these resources and commodities as well as additional opportunities available elsewhere to develop and promote an effective strategy for the rural communities and producing countries.

Dr Enrico Casadei (FAO) added that the proposed network should have clear Terms of Reference, a program of activities and prepare a project concept for possible support by FAO for its initial development. This could be further elaborated into a project to last about 2 years.

2.0 WORKSHOP RECOMMENDATIONS

2.1 Establishment of the Network

During the workshop, the Network for Natural Gums and Resins in Africa (NGARA) was established, initially with the membership of all countries attending the workshop. The network was officially launched by the Chief Conservator of Forests.
Mission of the Network
The network is to assist in formulating a coordinated strategy for African producing countries and partners in the sustainable development of their natural gum and resin resources for improving rural livelihoods and environmental conservation.

Goal of the Network
To position African producer countries and partners as major global players in the production, processing and marketing of gums and resins.

Objectives of the Network
1. To promote exchange of information on production, marketing, processing and quality control among producer countries as well as with partners.
2. To facilitate access to technological development and training.
3. To undertake resource survey and data collection.

Organisation and Management of the Network
1. Establish a national contact point in each member country.
2. Establish a regional focal point in the three subregions (i.e. West and Central, Eastern and Southern Africa).
3. Establish a secretariat to coordinate activities of focal and contact points.
4. Constitute a steering committee.
5. Establish a technical or advisory body.

Mechanism of Operation of the Network
1. Define at the national, regional and international levels and elaborate strategic plans for networking.
2. Promote information flow among stakeholders and member countries.
3. Organise national and periodic meetings of the general assembly of the network.
4. Establish a constitution.

Sustainability of the Network
1. Source funds from governments and private sector locally and internationally.
2. Generate income through offering services and selling technology, where applicable.
3. Establish strong and committed membership.

2.2 Identification of Regional Focal Points
Regional focal points were based on geographical location and the following representative countries in those regions were identified as the focal points:

- West and Central Africa – Chad
- Eastern Africa – Sudan
- Southern Africa – SADC-FSTCU

2.3 Identification of Contact Points
Contact points were identified in each of the member countries as follows:

1. Chad – Ministry of Environment
2. Ethiopia – Natural Gum Processing and Marketing Enterprise (NGPME)
4. Niger – Ministry of Environment
5. Nigeria – Ministry of Commerce
7. Sudan – Forests National Corporation (FNC)
8. Tanzania – Ministry of Agriculture, Forestry and Beekeeping Department
9. Uganda – Ministry of Natural Resources, Forest Department

* Burkina Faso, Eritrea and Senegal were invited to the workshop but did not attend. It was agreed that they should be included in the network and the Secretariat should inform them and establish their commitment.

2.4 Establishment of the Secretariat

Members unanimously agreed that Kenya (KEFRI) should continue to host the Secretariat.

2.5 Establishment of a Steering Committee

A steering committee was constituted to oversee the activities of the Network. When a constitution is put in place a technical or advisory committee can be established.

The composition of the Steering Committee will be as follows:-

1. Representatives from the 3 regional focal points
   - West and Central Africa - Chad
   - Eastern Africa - Sudan
   - Southern Africa - SADC-FSTCU
2. Experts on
   - Quality Control – Prof. Ermias Dagne, Ethiopia
   - Marketing – Eng. Chidume Okoro, Nigeria
3. International Observers
   - FAO
   - AIDGUM
4. Secretariat

2.6 Development of a Project Proposal to Strengthen the Network

A draft project proposal for a request of funding under the FAO Technical Cooperation Program for the initial development of the Network was prepared entitled, “Strengthening the Network on Gums and Resins in Africa”. This draft will be sent to member countries to make contributions to fine-tune the proposal. The final proposal will then be submitted to FAO-Rome through the FAO Country office in the 4 countries represented in the Steering Committee (Chad, Sudan, Nigeria, and Ethiopia) and the Secretariat (Kenya).

The expected commencement date of the project is January 2001 and the completion date is October 2002. The contact points of the network in the member countries will be responsible for project execution, once it is funded.

**Overall Objective**
To support proper structuring and functioning of the network on Natural Gums and Resins and assurance of its effective operation.

**Expected outputs**

a) An operational network established for effective exchange of information among member countries through strengthening of the Steering Committee, Secretariat and National Contact Points.
b) Greater awareness among policy makers and needs assessment in less developed countries undertaken on the development of natural gums and resins resources.

c) A pool of trained personnel in gum arabic and resins production and primary quality control undertaken in member countries.

d) Gum arabic and resins resource assessment carried out and databases on national and regional resources developed.

e) The relationship between primary producer, processor and end user strengthened through improved exchange of information.

2.7 Development of other relevant Project Concepts

The network will generate funds to sustain itself through elaboration of project concepts from member countries into fundable projects. As a start priorities identified in the 1997 workshop were reviewed and the following identified for development into project concepts:

- Training and Capacity Building
- Information and Databases
- Research and Technology Development

The project concept ideas will be developed by the network into fully-fledged projects for funding.

2.7.1 Training and capacity building

Background
Countries are at different levels in terms of know-how, production, marketing and research.

Objective
Train and develop capacity of all stakeholders in member countries to sustainably produce and effectively process and market gums and resins.

Activities
1. Carry out a training needs assessment (TNA) in member countries.
2. Identify technological and human expertise in member countries.
3. Develop training manuals. Manuals on different aspects should also be developed eg production, quality, post harvesting techniques, marketing, product development and protection of the environment.
4. Organise workshops, seminars and study tours.

Outputs
1. Human capacity in member countries strengthened.
2. Production, processing, marketing and research in gums and resins improved.

2.7.2 Information and Database

Background
There is lack of data on gums and resins in the African producing countries on resource base, production, marketing and export trade. There is also lack of an efficient information network. Information should thus be generated that will be disseminated to farmers by extension workers (efforts have already been carried out in Sudan and Chad to create awareness through extension).
There is also a need to document indigenous knowledge on the use of gum arabic products and to create awareness on product development in gum arabic industries.

**Objectives**
1. To have a pool of data on production, collection, processing and marketing of gums and resins for better and efficient utilisation.
2. To identify future market opportunities.
3. To build up information on local demand and consumption of gum arabic and resins.
4. To build up exchange of information on processing of gum arabic and resins among producing countries (value added product).
5. To build up information on national and international resource personnel on gums and resins.

**Activities**
1. Basic manual on primary functions of farmers, extension workers in gums and resins production.
2. Establish a regular newsletter.
3. Create relevant databases.
4. Regular updates of information in all aspects of gum arabic production and exporting countries.
5. Trade and market surveys.

**Outputs**
1. Accurate and efficient data on all aspects of gums and resins generated.
2. Competitive and efficient production and marketing of gums and resins put in place.

### 2.7.3 Research and Technology Development

**Background**
Various forms of information will require carrying out research and development initiatives. In particular there is inadequate information in member countries regarding resources, available quantities, quality and market opportunities. Specific studies will require to be commissioned to generate required data.

**Objectives**
1. To carry out resource surveys and mapping.
2. To undertake socio-economic, policy and market research that will foster and support activities in the production to consumption value chain.
3. To undertake quality control and monitoring studies.

**Outputs**
1. Data on gum arabic and resin resources availed.
2. The management of resources improved.
3. Socio-economic, policy and market information generated.
4. The quality of gums and resins improved.
PART II: COUNTRY AND OTHER REPORTS ON THE STATUS OF GUM ARABIC AND RESIN RESOURCES.
THE STATUS OF GUM ARABIC IN CHAD

BOURNEBE YADDOU
Forests and Environmental Conservation Unit, N'djamena

1.0 Introduction

In the 15th century, European explorers discovered Gum arabic in Senegal and present day Mauritania. In the 18th century, a bloody "gum war" left France with the monopoly of the trade on the West African coast.

At the beginning of the 20th century Britain opened up the second largest cradle of the Gum arabic by constructing a railway line between El Obeid in the heart of the Kordofan region and the port of Sudan. Britain and France processed the Gum in Europe having procured it from the counters of their merchant fleets; the Gum became one of the items initiated and commercialised by the two colonial powers.

2.0 Gum in Chad

This is a vast area, bordering the Sahara desert in Africa. The Gum tree is found in the meridional region, which is very wet and borders another zone, which is just as vast, the Combretaceae. Chad is covered from East to West by a "gum belt" (Michon, 1968) which corresponds to the zone where annual rainfall of between 250 and 450 mm is favourable to Gum tree vegetation. According to Michon, the first production of Gum in Chad started in 1956-57, with less than 60 tons produced. Ten years later commercialisation reached 850 tons. Gum had already been known to Chadians who traded small quantities for their own use. Traders from Darfour (Sudan) also bought Gum from peasants on the Chadian border.

Today, Gum covers the inter-tropical zone between latitudes 11°-17° where annual rainfall is from 150 to 900 mm.

The Gum arabic is spread as follows: Ouaddai, Biltine, Batha, Guera, Kanam the Lake, Salamat and Chari – Baguirmi. The main varieties found are: Acacia senegal, Acacia laeta and Acacia seyal. These varieties grow in sandy, pebbly and rocky or stony ground.

3.0 Ecological Spread of Gum Varieties.

3.1 Acacia senegal

The vernacular name for Acacia senegal in Chad is "Kitir ablâd". It is found in plenty in Ouaddai, Biltine, Chariguirmi and is characteristic of the wooded steppes of the Sahel region in Chad. It is therefore well known for drought resistance. However, it does well in areas with annual rainfall of 300 to 400 mm falling between June and September. Acacia senegal regeneration depends on the distribution of rain during the season. This variety also prefers sandy and slightly lime soils. Its density of between 100-600 stems/ha differs according to bioclimate and soils. The fixed dunes at "Goz" in Kanem and Lake Chad have a very good and dense population of 250-300 stems/ha.
**Acacia senegal** blends well with other forest varieties such as *Acacia radiana*, *Acacia laeta*, *Balanites aegyptiaca* and *Hyphaene the baica* with stratum herbaceous composed of *Cenchrus biflorus*, *Panicum leatum* and various *Aristida*. This variety supplies 90% of the Gum arabic market, and is known for its superior quality comparable to the hard Gum of the Sudanese Kordofan which is the reference for quality in the world. *Acacia senegal* "Kitir" is spread on an area of over 38,000 km².

### 3.2 *Acacia seyal* (Del).

This variety is locally known by the vernacular name "Taïha". It produces second grade Gum and is mainly found in Salamat, Guera and in parts of Chari-Baguirmi.

It requires an annual precipitation of 250-1000 mm. Found in pebbly and stony soils, it can withstand floods and drought. Its impressive density of population is between 400-6000 trees per hectare. Often, *Acacia seyal* population is to be found pure. In the most northern area, *Acacia seyal* is found in cultured fields when in fallow and benefits greatly from the repression of *Combretum*. In the most southern area, the same phenomena are observable. The dominance of fallowed land in the green lands creates a woody steppe where *Acacia seyal* and *Balanites aegystiaca* abound.

Other than its value as good vegetation, *Acacia seyal* provides a low grade Gum arabic compared to *Acacia senegal* and supplies 10% of the export. *Acacia seyal* wood burns well and is valuable for charcoal.

### 3.3 *Acacia laeta*

This variety is locally known as “Quitter Azadak”. *Acacia laeta* is richly found in Batha (Oum-Hadjer) and in Ouaddai. Common in rocky and stony fields and being drought resistant it grows in areas with 240-750 mm of annual rainfall.

Compared to Acacia Senegal its gum is inferior in quality and quantity. It provides vegetation and firewood and is also a good source of wood charcoal. All Gum zones in Chad have a potential estimated at 19,040,034 hectares.

Numerous sources (MAE, 1994; CIRAD, 1989) indicate that 5-10% of this potential is currently exploited in the major production zones whose area and volume of production per administrative region are given as follows:

<table>
<thead>
<tr>
<th>District</th>
<th>Gum Ton/Km²</th>
<th>Habitat Density Km²</th>
<th>Total Area (km²)</th>
<th>Potential (km²)</th>
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<td>Kanem</td>
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<td>500</td>
<td>12431000</td>
<td>287261</td>
</tr>
<tr>
<td>Chari-Baguirmi</td>
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<td>-</td>
<td>7693210</td>
<td>4111059</td>
</tr>
<tr>
<td>Salamat</td>
<td>1,9</td>
<td>-</td>
<td>6868800</td>
<td>5682738</td>
</tr>
</tbody>
</table>

Source: (Raymaker, 1994)
NB. Since 1999, the Gum project financed by French agency for Development (AFD – Agency Francaise de Developpement) started a cartographic inventory on the population of Acacia senegal, Acacia seyal and Acacia laeta in Chari-Baguirmi District. The results of this inventory are not yet available.

4.0 Plantation or Artificial Regeneration Attempts

Given the importance of Acacia senegal, plantation potential and protection of the tree have been attempted. In 1987, AFICARE established a plantation of 50 hectares in Ouaddai district; in 1990, GCP/CHD/NET Rural Forestry project planted 7 hectares in Batha while AICF planted 2 hectares in Guera. In 1998 the NGO ACORD also planted 3 hectares in Bokoro.

FED, started a big project for protection of Acacia senegal population in Tourba. These activities were interrupted by the disturbances that the country suffered.

Since 1994, the French Agency for Development (AFD) has been financing a Gum project. The objective of this project is to contribute in consolidating the place of Chadian Gum Arabic in the market and to strengthen management and exploitation by its producers. In an effort to raise its production the Gum project is helping in diversification, reafforestation, and plantation, directly or indirectly, in the Batha, Guera Kanem and parts of Chari Bagirmi districts.

All these attempts signify the importance of Gum development in the rural economy and also in fighting against desertification.

5.0 Production Methods.

Several techniques have been used (financed by French Agency for Development) starting from the choice of placement, right through to production. Originally, Gum was produced by natural exudation from the tree. Consequently, several techniques are used to guarantee viability and improvement of the quality of the commercial product.

The natural methods for tapping used in Chad include:

- The Sudanese method of Tapping:-
  The tree barks are peeled by an instrument with a small metal head with which one makes two longitudinal incisions which are parallel and shallow, 40 to 60 cm in length, then the bark is pulled by hand.

- The other method used consists of making squares with the instrument "Farrar" 3-5 squares on a branch or on the tree. This gives the possibility of obtaining a high intensity of gum without damaging the tree. One must strictly respect the gum period (December to June).

Volume

The estimate of production in Chad given by exporters is 9,000 tons from rural areas in 1997-1998. Customs statistics give 12,000 tons. Although this statistics are not exhaustive, they are without the inclusion of uncontrolled border exchanges.
6.0 Opportunities and Constraints.

6.1 Opportunities

Among various possibilities for Gum production in Chad we will only consider that:-

- Chad has a great potential for varieties which have been studied (2/3 of the country has these varieties). It is also important to note that the documented potential up to today by the project covers only around a third of Gum produced in the country.

- Suppression of certain varieties by gum trees to the detriment of Combretacees results in more or less hostile climatic conditions, more favourable to the Gum tree.

- With Gum arabic being the second largest earner of foreign exchange after cotton, the government supports the expansion of gum production activities. Proof of this is the financing of Gum projects since 1995 by the French Agency for Development as a partner of the state.

- Gum species are leguminous and therefore form part of agroforestry practice, which is the government's priority in the fight against desertification.

6.2 Constraints.

It is true that Gum production in Chad does not reflect its great potential. So, what constraints inhibit Gum production in Chad? Why is Chad unable to go beyond 15,000 tons per year despite its potential?

We attempt to answer these questions taking into account the constraints related only to the production sector.

6.2.1 Production Constraints

- Lack of recognition of producers which translates into ignorance of production techniques. In fact, lack of skill in tapping results in degeneration of the gum tree.

- Competition for wood in towns which means the Acacias are not spared.

- Lack of adequate infrastructure for example roads, water points and health facilities.

- Insecurity in the country interrupts the production.

- Long drought periods which causes the gum trees to dry up and die.

- Giving authority to traditional chiefs which more often than not results in giving out land parcels in anarchy from which violence and conflicts arise.

- Lack of technical know how.
7.0 **Suggested Priorities**

- Fight against poverty in gum producing zone
- Recognise value of foreign exchange earned by Gum
- Fight against environmental degradation

7.1 **Fight against Poverty in Gum Producing Zone**

Gum production is on the Sahelian fringe whose conditions are hard. Also in this region agricultural activities are hampered by lack of rain. The nomadic and transhuman community depends on the harvesting of gum to meet its primary needs. To improve it, Chad government has as its priority the organisation of the peasant in production and commercialisation.

Concerning production, rural development projects going on in the gum production zone have as priority, the training of peasants in techniques for growth and tapping. The first group of peasants is selected by village and are trained in various techniques which will enable them to be "channels of transmission".

7.2 **Value of Foreign Exchange Earned by Gum Export**

Since independence, the economy of the country depended on agriculture and livestock. In the last two decades, in Chad as in other Sahelian economies, the economy has been affected by climatic changes leading to:

- Low return in agriculture
- High mortality
- Low cotton price in the international market etc.

The low price of cotton in the international market lowers foreign exchange earnings in the country and indeed leads to low revenue for the cotton-producing peasant.

With an aim to diversify foreign exchange earnings, the Chadian government has prioritised the gum industry which is second to cotton in Gross Domestic Product.

7.3 **Fight against Environmental Degradation**

The gum tree 'belt' is in the transitional zone between the Sudanese zone and the Saharan zone. It therefore is a 'tampon' zone for the fight against desertification. Besides, gum varieties seem more adapted to climatic conditions which makes it possible for them to replace the species that are more sensitive to poor climatic conditions.

Currently all projects of afforestation in this zone use gum varieties as preference in the fight against desertification.
THE STATUS OF GUM ARABIC AND RESINS IN ETHIOPIA

GIMRAY FITWI
Natural Gum Processing and Marketing Enterprise, Ethiopia.

1.0 Introduction

Together with neighbouring countries, Ethiopia, due to its diverse agro-climatic conditions, has remained the natural home of various species of natural gum since time immemorial. At the height of the Axumite Empire, when trade flourished with the Far East countries along the Red Sea coast, natural gum products alongside ivory, hides and skins were among Ethiopia’s exports.

Historical records show that organized tapping and collection of Natural Gums on a commercial scale was started by the Italian colonialists first in Somalia and then in Eritrea during the 1940’s from where the neighbouring Tigray Region of Ethiopia learnt and developed the technique.

Currently the state owned Natural Gum Processing and Marketing Enterprise, and some private organisations are involved in tapping, collection and marketing. However the harvesting and marketing is not compatible with the resource base, which is undeveloped.

On the other hand the resource is deteriorating rapidly due to extensive farming, over grazing, cutting and unwise use of trees, as well as accidental and deliberate fire hazards.

2.0 Status of the resource/commodities

2.1 General Background

Different kinds of indigenous trees are found in Ethiopia. Among these trees, natural gum and resins are products secreted from tree species belonging to families of Burseraceae, Mimosaceae and Sterculiaceae, which grow wildly almost in all parts of the country. The family Burseraceae is represented by 2 genera and 58 species. More than 40 species of the genus Acacia are also known to be indigenous to Ethiopia. The following are reported to yield gum and resin products of commercial value:

- **Boswellia Species**

Gum olibanum is obtained from trees of the genus Boswellia. Three species of Boswellia are indigenous to Ethiopia including *Boswellia papyrifera*, *Boswellia ogadensis* and *Boswellia rivea*. *Boswellia pirotae* is also reported to be endemic to Ethiopia. However *B. Papyrifera* is the most common and dominant species.

The Boswellia species yields:

- Gum Olibanum Tigray type from *Boswellia papyrifera*.
- Gum Olibanum Ogaden type from *B. ogadensis*
- Gum Olibanum Borena type from *B. rivea*
- Gum Olibanum Tigray type is produced by tapping of the tree while Ogaden and Borena types are collected from natural exudation due to different factors.

- **Commiphora Species**

Several species of Commiphora produce resins, which are used locally. The chief commiphora gum of economic importance is myrrh, produced by *C. myrrha*. This is an important article of commerce in Southern and South Eastern Ethiopia. Other species producing myrrh but of less value include: *C. habessinica*, *C. schimperi*, *C. africana* and *C. erythraea*. *C. guidotti* also produces Gum Oppoponax which is of commercial value. All gums are collected from natural exudation when the bark is broken by pests, animals and other factors like the Borena and Ogaden type of Olibanum.

- **Gum Acacia**

There are a lot of Acacia species grown in Ethiopia. The species of the genus Acacia is locally known as “Gra” (Amharic). *Acacia senegal*, *Acacia seyal*, *Acacia polyacantha* (Gumero) and *Acacia drepanolobium* are the four species reported to yield economically important Gums. Production is obtained from two known varieties of *Acacia senegal* namely:
  - *A. senegal* var. Senegal
  - *A. senegal* var. Kerensis.
Similarly, *A. Seyal* gum is also obtained from two known varieties:
  - *A. seyal* var. Seyal
  - *A. seyal* var. Fistula.
The techniques of tapping *Acacia senegal* are now being introduced slowly. Gum from the other three Acacia species is collected from natural exudation.

- **Sterculia (Gum Karaya)**

There are many species of this genus grown in North and Northwest Ethiopia. The genus is wildly represented by the species of *Sterculia setigera* locally known as “Darile.” Gum Karaya is obtained from this species. Attempts have been made by the N.G.P.M.E to introduce these products to the market with the view to increasing the exploitation of the existing potential. However, experience about the method of tapping and collecting of the product is not adequate.

### 2.2 Sources of Gum bearing trees in Ethiopia

Almost 100 percent of the existing gum and resin bearing trees under consideration are naturally or wildly grown under arid, warm or hot, very sloppy and rugged topographic conditions in the Acacia-Commiphora bush land vegetation.

### 2.3 Region of production and estimated areas

The potential of natural gum bearing trees in Ethiopia is generally believed to be very high. Since no forest inventory has been taken so far regarding natural gum and resin bearing trees, the information available on the
density of the tree is neither adequate nor accurate. However, some organizations have attempted to provide some crude estimates about the available potential and the area is given in Table 1.

Table 1: Regions of Production and estimated area

<table>
<thead>
<tr>
<th>REGION OF PRODUCTION</th>
<th>SPECIES</th>
<th>ESTIMATED AREA/HECTARE</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIGRAY</td>
<td>Boswellia sterculia</td>
<td>940,000</td>
</tr>
<tr>
<td></td>
<td>Commiphora</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acacia</td>
<td></td>
</tr>
<tr>
<td>AMHARA</td>
<td>Boswellia</td>
<td>680,000</td>
</tr>
<tr>
<td></td>
<td>Commiphora</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acacia</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sterculia</td>
<td></td>
</tr>
<tr>
<td>OROMIA</td>
<td>Boswellia</td>
<td>430,000</td>
</tr>
<tr>
<td></td>
<td>Acacia</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Commiphora</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sterculia</td>
<td></td>
</tr>
<tr>
<td>BENSUGHULE</td>
<td>Boswellia</td>
<td>100,000</td>
</tr>
<tr>
<td></td>
<td>Acacia</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sterculia</td>
<td></td>
</tr>
<tr>
<td>SOMALIA</td>
<td>Boswellia</td>
<td>150,000</td>
</tr>
<tr>
<td></td>
<td>Acacia</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Commiphora</td>
<td></td>
</tr>
<tr>
<td>SOUTHERN</td>
<td>Boswellia</td>
<td>70,000</td>
</tr>
<tr>
<td></td>
<td>Acacia</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Commiphora</td>
<td></td>
</tr>
<tr>
<td>GAMBELLA</td>
<td>Sterculia African</td>
<td>420,000</td>
</tr>
<tr>
<td></td>
<td>Acacia</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Commiphora</td>
<td></td>
</tr>
<tr>
<td>AFAR</td>
<td>Commiphora</td>
<td>65,000</td>
</tr>
<tr>
<td></td>
<td>Acacia</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>2,855,000</td>
</tr>
</tbody>
</table>

Sources - Regional Bureaus of Agriculture
- Natural Gum Processing and Marketing Enterprise

3.0 Production of Natural Gums in Ethiopia

3.1 Actual Production

Tapping and collection of Natural Gums, especially Gum Arabic and Gum Olibanum are believed to have a long history. In Ethiopia, they have been collected from trees damaged naturally by nomads, farmers or individuals
on a casual basis. Organized collection on a commercial basis is reported to have begun around 1948. Around 1960/61, Tigray Agricultural and Industrial Development limited (T.A.I.D.L) was established and began a systematic and controlled tapping and collection procedure, operating till its nationalization in 1976.

General and statistical information on the production of Natural Gums in the pre-1970's are scarce. But based on the crude data, the estimated production figures of Gum Arabic for the years 1960, 1961, 1962 were 100, 300 and 1,100 tones respectively. Even so, such crude forms of information for the other products were scarce and difficult to obtain.

From 1978 onwards, production figures are available as reported in Table 2.

Table 2: Production of Natural Gums: 1977-85 (Quintal)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>2450</td>
<td>9217</td>
<td>10705</td>
<td>17902</td>
<td>25231</td>
<td>35429</td>
<td>42544</td>
<td>14636</td>
</tr>
<tr>
<td>Index</td>
<td>100</td>
<td>276</td>
<td>437</td>
<td>731</td>
<td>1030</td>
<td>1446</td>
<td>1736</td>
<td>597</td>
</tr>
</tbody>
</table>

Source: Natural Gum Processing and Marketing Enterprise

During the eight years ending in 1984/85 collection has increased by more than 400 percent compared with the 1977/78 level. In the year 1983/84, production reached the highest ever recorded peak of about 43,000 quintals, increasing at a rate of 61 percent per annum. The main reason for such large increase could be attributed to the centralization of the whole marketing process and proper organization.

More specifically, the increase can be attributed to:

- The establishment of N.G.P.M.E. with a full responsibility as a sole supplier and exporter of all Natural Gums on the part of the government.
- Exploitation of new regions endowed with natural gums.
- Transfer of people with the know-how and training of local people in these newly explored regions.
- Opening of new branches to buy collected gums and/or exchange with some consumer goods. These and other efforts have substantially increased production on the one hand and supply to the market on the other.

Until the declaration of the free market economic policy, the production and marketing of natural gum was carried out under the full monopoly of the government. Thus the NGPME was the only government enterprise engaged in the production and marketing of natural gums. At present some private organizations are active in production and marketing of natural gums.

Statistical data on the production of natural gum from different private organizations are scarce. Actual production data were obtained from NGPME on the free market economy policy, 1992-1999.
Table 3: Production of Natural Gums by Type 1992/1998 (Quintals)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>O. Tigray Type</td>
<td>18,004</td>
<td>25,266</td>
<td>30,637</td>
<td>N.P</td>
<td>N.P</td>
<td>11,923</td>
<td>7,178</td>
<td>14,223</td>
</tr>
<tr>
<td>O. Ogaden Type</td>
<td>317</td>
<td>596</td>
<td>343</td>
<td>478</td>
<td>2,627</td>
<td>58</td>
<td>N.P</td>
<td>N.P</td>
</tr>
<tr>
<td>O. Borera Type</td>
<td>54</td>
<td>251</td>
<td>1,168</td>
<td>2,005</td>
<td>1,777</td>
<td>106</td>
<td>N.P</td>
<td>N.P</td>
</tr>
<tr>
<td>Myrrh</td>
<td>373</td>
<td>291</td>
<td>968</td>
<td>486</td>
<td>743</td>
<td>1,051</td>
<td>853</td>
<td></td>
</tr>
<tr>
<td>Oppomonex</td>
<td>135</td>
<td>33</td>
<td>N.P</td>
<td>9</td>
<td>53</td>
<td>147</td>
<td>80</td>
<td>122</td>
</tr>
<tr>
<td>G. Arabic</td>
<td>92</td>
<td>269</td>
<td>1,098</td>
<td>1,485</td>
<td>1,130</td>
<td>56</td>
<td>582</td>
<td>36</td>
</tr>
<tr>
<td>TOTAL</td>
<td>18,975</td>
<td>26,706</td>
<td>34,214</td>
<td>4,463</td>
<td>6,330</td>
<td>13,341</td>
<td>8,693</td>
<td>15,378</td>
</tr>
</tbody>
</table>

Source: Natural Gum Processing & Marketing Enterprise

* N.P = No Production

In general total production has shown an increasing trend from 1992-1994, and decreasing at an increasing rate from 1995 onwards. Various causes were held responsible for such ups and downs. The major ones include policy changes and the drought in the country. Of significance is the policy change on the part of the Enterprise with the main objective of ensuring quality production, that is, offering high price to gums for which world demand is high and low price to the remaining gums in order to reduce supply.

Other causes for reduced production are:
- Early onset of rain and prolonged cold weather that affected production and collection.
- Security problems in some gum producing regions.
- Aid and assistance donated to the drought affected nomads reduced collection and supply to the Enterprise for commodity exchange.
- The laying of over-used trees in areas of intensive collection, etc.

3.2 Potential Production of Natural Gums

Many years ago, Ethiopia possessed considerable natural forests and woodlands, with about 25 percent of the total land area being covered by forest.

The method of agricultural practices combined with population growth, irrational uses, uncontrolled management of forestry, slow regeneration of devastated forests and others have aggravated deforestation resulting in several adverse consequences. At present total forest coverage in the country is believed not to exceed 5 percent, the larger part being located in inaccessible regions.

Since no forest inventory has been taken so far regarding natural gum bearing trees, the resource potential is as such not precisely known. Nevertheless, there is a general assessment which indicates that Ethiopia possesses a large potential of resources. According to current estimates the total amount of gum that could be produced annually has a minimum potential of 450,000 quintals or 45,000 metric tones. Out of the total production capacity, it is estimated that 65 percent is olibanum, 15 percent is commiphora, i.e. myrrh and Oppomonax, while Gum Arabic constitutes 20 percent.

Tigray, Amhara and Somalia are observed to possess the larger share of the potential (61.9%) while Oromya and Benishangule Gumuze possess a considerably important share (32.7%). With regard to product types, the
Tigray region is first in Gum Arabic and Gum Olibanum Tigray type, while Somalia region possesses a large potential of Gum Commiphora and Gum Olibanum Ogaden type. Although the potential is high in all regions, actual production versus potential production shows minimal exploitation due to various constraints.

Table 4: Estimate of Annual Potential Production (In Quintals)

<table>
<thead>
<tr>
<th>REGION</th>
<th>GUM ARABIC</th>
<th>%</th>
<th>GUM OLIBANUM</th>
<th>%</th>
<th>GUM COMMIPHORA</th>
<th>%</th>
<th>TOTAL</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>TIGRAY</td>
<td>21,000</td>
<td>23.3</td>
<td>80,000</td>
<td>27.4</td>
<td>1,500</td>
<td>2.2</td>
<td>102,500</td>
<td>22.8</td>
</tr>
<tr>
<td>AMARA</td>
<td>18,000</td>
<td>20</td>
<td>70,000</td>
<td>23.9</td>
<td>1,000</td>
<td>1.5</td>
<td>89,000</td>
<td>19.8</td>
</tr>
<tr>
<td>SOMALIA</td>
<td>17,000</td>
<td>18.9</td>
<td>25,000</td>
<td>8.5</td>
<td>45,000</td>
<td>66.7</td>
<td>87,000</td>
<td>19.3</td>
</tr>
<tr>
<td>AFAAR</td>
<td>6,000</td>
<td>6.7</td>
<td>2,500</td>
<td>0.9</td>
<td>5,000</td>
<td>7.4</td>
<td>13,500</td>
<td>3</td>
</tr>
<tr>
<td>GABELA</td>
<td>11,000</td>
<td>12.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>11,000</td>
<td>2.4</td>
</tr>
<tr>
<td>TOTAL</td>
<td>90,000</td>
<td></td>
<td>292,500</td>
<td></td>
<td>67,500</td>
<td></td>
<td>450,000</td>
<td></td>
</tr>
</tbody>
</table>

Source - Regional bureaus of Agriculture  
- G/Markos and W/Selasea (Study project on resin bearing species of Gambela & Tigray Region)  
- Natural Gum Processing & Marketing Enterprise

3.3 Production and collection procedures

The system of natural gum collection or the way the production system is organized is similar to Gum Arabic and Gum Olibanum Tigray type. The tapping or collection of natural gum is also uniformly organized throughout the country where the NGPME is active. Thus, description of the production procedure followed by the NGPME will suffice description of the system as a whole.

The NGPME has been producing natural gum following three systems. The first one is by directly employing and organizing coordinators and tappers and providing them with basic necessities. The enterprise employs experienced people as coordinators and each coordinator employs tappers on contract basis. It also provides both the coordinator and the tappers with petty cash, cooking materials, cloths, medicines and food items on loan basis except medicine, which is provided freely.

The collection of gum commences in September and terminates at the end of June or before the onset of the rainy season. During this period, one tapper on the average collects 10-12 Quintals of gum olibanum. About 8-10 tappers are organized under a work team commonly known as “squadra” and a number of squadra are organized under a coordinator. Thus each squadra submits the olibanum or gum collected to the coordinator. The coordinator delivers the gum to the NGPME and payment is based on piece rate. The second system is related to concession. Individuals who have knowledge and experience in collecting, quality of gums and have sufficient capital to cover the food and transportation costs of tappers are selected to sign an agreement with the enterprise. Depending on the size of site, the concession employs a number of tappers and provides them with basic necessities. The concessionaire covers all these expenses and the payment to tappers is determined by a contract agreement of wage per season. Unlike the NGPME the concessionaires do not provide medicine and cloths to the tappers. The third system is by directly buying different types of olibanum,
acacia gums, myrrh and Oppoponax from individuals who directly collect the naturally exuded gums from the plant.

3.4 Technique of tapping and collection

As learnt from experience tapping and collection of gum olibanum from *Boswellia papyrifera* is carried out following a specific pattern around mid-September up until the offset of the dry season, usually June.

The technique used is usually carried out by shaving a very thin external circular layer of the bark 2 mm deep and 4-8 mm wide, starting at 0.5 meters from the base of the stem using a hand tool called "Mingaf." When Mingaf is used for tapping care should be exercised that the sapwood is not wounded. Wounding of the tree to ooze it should only be confined to the bark.

Once the first tapping is done, the second tapping will take place 30-40 days later and involves a moderate widening of the wound which was started during the first tapping. The tapping process will continue for three or four months until the wound has reached 4 cm in width. After each wounding or incision the exudate starts to ooze and will be dry in two to three weeks when it will be ready for collection. The wound has to be renewed immediately, while collecting the gum, to prevent the hole through which the latex comes out from drying.

The whole process will continuously be carried out until two to three weeks each time of tapping before the onset of the rainy season. The collection of gum olibanum should be stopped during the first week of June, since the tree starts producing leaves which will enable it to start the process of photosynthesis. The wound created during tapping is required to be healed and closed during the first week of June. This process is locally known as "Jalebe" or Closing of wound."

Yield per tree varies due to locality or sites, the variety of the tree, the season and various other factors. Olibanum gum can be collected seven to nine times a year from a single olibanum resin-producing tree with a production yield ranging from 100-1000 gms and averaging at 500 grams. It is also estimated that one person can collect 10-12 quintals a year. Wounding of the tree is made from East to West on both sides of the stem to enable it to get sufficient sunlight to enhance drying of the gum. Usually 3 tapping spots are made on each side of the tree but in some cases they could also be four. All in all 6 to 8 tapping spots are made on each tree according to its size. Too many wounds on the same tree will affect its quality of produce, since the tree "oozes" sap to close the wound. If the number of wounded spots tends to be higher, the sap to "ooze" will be small drops reducing the size of the gum granules.

The life span of an olibanum gum tree is not precisely known, but judging from experience it ranges from 25-50 years. A resting period of about 2-3 years is highly required especially when the wounding spots are about to meet or join one another for the space on the stem to be completed.

Wild myrrh and Oppoponax is harvested using an axe and plastic or tin container while wild olibanum is collected by hand from the trunk and branches of the trees.

3.5 Grading and Cleaning Processes

Processing or sorting out of the collected Gums is usually done manually by women in the main stores by hand picking. Accordingly, olibanum Tigray type is selected into classes of five grades on the basis of size, color and brightness.
Gum myrrh is also graded in the same way, and in addition to its grain size, it is further differentiated by its color. Red in color and big in size amounts to a first “A” while the same size but brown in color gives a first “B” grade.

Gum Arabic is also cleaned while other gums like Ogaden, Borena and Oppoponex have no grading and cleaning.

3.6 Constraints and problems against increasing production

Among many indigenous trees of commercial value in Ethiopia, Acacia, Boswellia and Commiphora trees produce gum arabic, Gum Olibanum and Myrrh respectively. Collection and harvesting of natural gums has spread into almost all regions with gum olibanum being the largest of all natural gums collected in the country. Due to deforestation, the natural forest lacks concentrated tree stands giving way to scattered regions of growth mostly characterized by arid environment.

Furthermore, lack of access roads, inadequacy of transport facilities to the potential forest areas, as well as lack of trained and skilled manpower in tapping gum trees, and human and livestock interference have depressed volume and quality of production.

The gum and resin bearing trees mostly grow on rugged and undulating topography in the remotest part of the region. Inaccessibility and lack of infrastructural facilities such as roads and residential quarters have made the whole process very difficult. Mobilization of the labor force, equipment, supply, etc. and the collection and taking out of harvested gums to the nearest transport system is always difficult.

The presence of diseases such as Malaria, relapsing fever and dysentery, which frequently inflicts the tappers is highly common in the resource area. These diseases make tappers to terminate the work on various occasions. Lack of access to proper medical treatment of the diseases is one of the main drawbacks in harvesting gums. This is due to the remoteness and inaccessibility of the resource area.

The area where the resource base is located is hot, warm, moist or dry and potential evapotranspiration rate tends to be very high in many instances. As a result, the water requirement for the labor force is very high. On the other hand the shortage of drinking water in the area is high and this makes the harvesting of this resource even more problematic.

The occurrence of fire in the forest, encroachment by the local people through deforestation for agricultural purposes, and the cutting and collection of fuel and construction wood for domestic consumption, are some of the major problems and constraints facing the increasing of Natural Gum and resin production.

4.0 Conclusions

The stock of resin bearing trees has been deteriorating over the years due to various reasons. Most areas in the country which were once covered with thick forests of gum bearing trees are now either totally deforested or have only a few remnants. A large number of gum bearing trees has been decimated by human and animal interference, with very little or no effort made to replace them.

As a consequence, the size of the gum tree growing areas has been shrinking continuously. This is closely related to the fast rate of deforestation that has been taking place in the country during the past decades on the
one hand, and the minimal efforts made to the contrary on the other. It also indicates the very little attention paid to the commercial trees which has never been equal to their importance.

Therefore a budget should be allocated by the government to carry out research and trials on its propagation methods and to revitalize its management and protection.

5.0 References


European Commision. 1974. Study of Natural gum bearing trees (Ahmaric)

Flora of Ethiopia Volume 3.


TOWARDS A BETTER ASSESSMENT OF FOREST RESOURCES PROVIDING NON WOOD FOREST PRODUCTS

LAURA RUSSO
Forestry Department, FAO, Rome.

1.0 Abstract

Rural and urban people in Africa are heavily dependent on non-wood forest products (NWFP's) for a wide range of needs including food, medicines and construction materials. Many of these NWFP are important sources of income and employment at the local level, with some being traded at the international level.

In order to determine the sustainable level of any commercial utilization of a given NWFP, accurate information is needed on the status and regenerative capacity of the resource providing the product, in addition to information on the socio-economic and cultural aspects affecting the use of the NWFP.

Practical methodologies for assessing socio-economic and biological factors of NWFP utilization are not widely available. Such methodologies are needed to collect information both at the forest management unit level as well as at the national level.

This paper discusses current gaps in knowledge and presents some of the main activities of the FAO Forestry Department aimed partly to fill these gaps at the local and national scale.

2.0 Introduction

A variety of definitions exist for non-wood forest products (NWFPs) and the related term non-timber forest products (NTFPs), corresponding to different perceptions and different needs. For the purposes of this paper, the following definition of NWFP is used: "Non-wood forest products are goods of biological origin other than wood derived from forests, other wooded lands and trees outside forests" (FAO 1999).

This definition makes a distinction between the forest resources and the products, which are obtained from these resources through direct human intervention. An assessment of the resources providing NWFPs, therefore, will not aim to quantify all biological resources (other than wood) found in a forest, but only those which are actively used by people for particular purposes or which have a potential for exploitation. In this sense, assessment of NWFP resources is aimed at assessing the status of exploited resources and evaluating the potential or otherwise of NWFP utilization for economic development at local and/or national level within the framework of sustainable forest management. NWFPs can be collected from the wild or produced in plantations, in agroforestry systems or in intermediate systems. The knowledge of the prevailing production system is an important factor in planning a sustainable promotion of NWFPs.

The last decade has witnessed a steep increase in interest and activities concerning NWFPs. There are numerous ongoing projects in African countries and globally to promote NWFP use and commercialization as a means to improving the well being of rural populations while at the same time conserving existing forests (FAO 1995, Wollenberg and Ingles 1998, Ros-Tonen 1999).
Report of the meeting of the Network for Natural Gums and Resins in Africa (NGARA)


In order to determine the sustainable level of any commercial utilization of a given NWFP, accurate information is needed on the growth and regenerative capacity of the resource providing the product, in addition to information on the socio-economic and cultural aspects affecting the NWFP use. Although there is often considerable indigenous knowledge for specific NWFPs, there is often a lack of documented or scientific information suitable for the determination of sustainable yields readily available to forest users.

At the national level, the full recognition of the socio-economic value of NWFPs to people and national economies is still hampered by the lack of good national data on NWFPs production, consumption and trade. At the same time, increasing demands are being put on countries to report on the status of forest resources and their biological diversity (which includes NWFPs and their use) at the national level as part of reporting requirements under international initiatives, such as the Convention on Biological Diversity, initiatives on Criteria and Indicators for Sustainable Forest Management, and for reporting to international agencies like the Food and Agriculture Organization of the United Nations (FAO), World Trade Organization and International Tropical Timber Organization.

Although significant advances in research on both the socio-economics and the biology of NWFPs have occurred in the last few years, methodologies for NWFPs assessment at the national as well as the forest management unit level are still not widely available in practice. The multitude and variety of NWFPs, the multiplicity of interests and disciplines involved in NWFP assessment, organizational and financial constraints, the lack of globally, or even nationally, recognised common terminology and units of measurement (FAO 1998a), all contribute to making the assessment of NWFPs and of the resources providing them a difficult task.

According to its mandate, FAO shall collect, analyse, interpret and disseminate information related to nutrition, food and agriculture (including forestry). FAO is mainly concerned with the national, regional and global levels. Within this mandate, the FAO Forestry Department is carrying out a number of activities aimed at addressing gaps in the knowledge and field application of NWFP assessment at various levels, so as to contribute towards the achievement of sustainable forest management in its member countries.

• **Assessment of NWFPs and non-wood forest resources at the national level**

Within the framework of the EU-FAO Partnership Programme on “Data collection and analysis for sustainable forest management in African, Caribbean and Pacific (ACP) countries: linking national and international efforts”, quantitative and qualitative information was gathered during 1998/99 on the exploitation practices and production levels of major NWFPs in collaboration with 42 African countries. The preliminary findings were discussed in four regional workshops: East Africa (Kenya, 1998), Southern Africa (Zimbabwe, 1998), Central Africa (Gabon, 1999) and West Africa (Côte d’Ivoire, 1999). Gums and resins are among the most important NWFPs in Africa which were identified during this process, and on which further development efforts should be concentrated.

The above-mentioned activities have provided some useful information on the trade and consumption of the main NWFPs for 42 countries in sub-Saharan Africa. However, the study also highlighted the fact that there is a serious lack of data at the national level on the resources providing these products.

Reviews of case studies and other reports on the assessment of non-wood forest resources at the forest management unit level (particularly a DFID study) concluded that the range of assessment methods used so far
in tropical moist forests has been limited and many assessment methods in use are not biometrically valid (Wong 2000 in prep.).

**Discussion**

The discussion below focuses on the biological and technical aspects of non-wood forest resources assessment. The political and legal context of NWFP use (ownership, tenure and access to the resources, legal restrictions), the social profile and welfare of the collectors/users, current and future demand for a given product, market assessments etc., also affect the sustainability of forest resource use. However, such analyses lie outside the scope of this paper.

- **Information needs at the national level**

The recognition of the socio-economic value of NWFPs to people and national economies requires information on the collection, validation and analysis of national level data on NWFPs production, consumption and trade. Increasing demands are also put on countries to report internally on the status of their forest resources and biological diversity (and therefore, incidentally, reporting on the status of resources).

This calls for a two-pronged approach to obtain information on both products and resources at the national level.

**Products**

Product information needed at the national level are production and trade data (quantities and values) of major NWFP for their inclusion into national and regional level country statistics, including the FAO Forest Products Statistics Yearbook. These data are essential to assess the full contribution of the forest sector to the economy of the country, and may be complemented with other descriptive information on the importance of NWFP for sustaining subsistence livelihoods, particularly their contribution to food security and/or their income generating role.

**Resources**

At the national level, improved assessment of forest resources providing NWFPs require information on:

(i) the identification, prioritization and knowledge of the plant and animal species from which major products are obtained;

(ii) the extent, frequency and status of the species, based on national inventories; and

(iii) habitats in which the species are found.

The above information should be available, as far as possible, in a standard format to allow comparisons both among countries and products.

- **Management information needs at the forest management unit level**

Abundance, distribution, population structure and growth rate data are among the most fundamental pieces of information required for sustainable management of a given forest resource. Data can only be obtained through
quantitative forest inventories combined with growth and yield studies. Such inventories also provide the baseline data necessary to monitor the impact of harvesting and management practices.

3.0 **Main factors to be considered in the assessment of forest resources providing NWFPs**

Assessments should concentrate on priority NWFPs. Initial screening of NWFPs for further study at the local level can be done through a participatory appraisal and may include information from harvesting records, household consumption analysis and market studies. At the national level, information on traded products, e.g. taxation records and/or preliminary information on the status of the resource, can be used for initial screening.

Due to the great variation of NWFPs and the settings in which they occur, it is not possible to prepare specific prescriptions, which are valid for the assessment of all the forest resources providing NWFPs. However, some general considerations to ensure that such assessments are biometrically sound are presented below.

The discussion is limited to the biological and technical aspects of non-wood forest resources assessment. Other aspects, such as the economic feasibility and socio-cultural suitability of each approach, should be carefully considered in the context of local conditions before choosing a specific approach. Techniques must be refined and adapted to suit location-specific ecological and socio-economic circumstances, needs and priorities.

3.1 **General approach for forest resources assessments**

Few assessments will have to start from scratch. At the national level, results from previous inventories, recent aerial photos or satellite imagery at a large scale and existing maps may be available.

At the local level, collectors and users often have long-established and detailed knowledge of the resources of which they make use. This may include knowledge of their life history, distribution and abundance, and variation of productivity in time and space and with respect to harvesting practices. Although this knowledge is rarely quantifiable, it can be very valuable if used together with sketch maps drawn by experienced collectors during a preliminary participatory appraisal.

Where possible, the delineation of different forest types should be undertaken based on available information prior to conducting the inventory.

Local users undertake many NWFP inventories at the forest management unit level. In a participatory inventory, techniques must be tailored to the abilities and resources available to the communities.

The methodologies for resource assessment vary according to the type of forest resources in question. Plants and animal resources, more often than not, are thus treated separately. It should be kept in mind, however, that an assessment of plants that are important food sources or habitats for animals might be needed for the sustainable management of the forest animal resources. Likewise, an assessment of the status of animals that are important pollinators and seed dispersers might be needed for successful management of forest plant resources. Although valuable information on plants may be obtained from an inventory of forest animals and vice versa - and should be used as far as possible – few examples exist of successful efforts at combining the assessment of plant and animal resources in, for example, a multi-purpose resource inventory (Lund 1998).
Bushmeat is an important NWFP in sub-Saharan Africa. Yet, the assessment of forest animal resources poses several specific problems due to their mobility, habitat (e.g. tree canopies), life cycle, seasonality (caterpillars/butterflies, migratory birds) and diurnal pattern (many species are nocturnal) and fall outside the scope of this paper.

3.2 Resource assessment designs

Assessments can either be undertaken as total counts or by sampling. Total counts are expensive and time-consuming and can only be justified if the resource is very valuable and the area relatively small. Most assessments are carried out through some form of sampling.

Several different sampling designs exist. The choice between sampling designs depends mainly on the type of forest and resources to be assessed, the existing information and knowledge of the area and the skills of the assessors.

The sampling units may be transects with or without fixed boundaries, plots – usually square or circular, sample points, or measured in time. The choice between these depends on the type of resource(s) involved.

The size of the individual sampling units depends on the size and density of the resources being assessed.

The sampling intensity employed for sampled counts varies according to the purpose of sampling and the degree of accuracy needed and on the funds and time available. It also depends on the size and abundance of the resource and according to whether information on the local distribution of animal/plant populations is available or not.

Timing of the assessment depends on the type of resource and its life cycle and seasonality. The issue is most critical with regard to ephemeral resources such as flowers, fruit or mushrooms.

The parameters to be measured depend on the purpose of the assessment, the type of resource(s) and the product(s) to be obtained.

The inventory of forest plant resources at the forest management unit level should provide the following information (Peters 1999):

- a reasonably precise estimate of the density of harvestable plants;
- data on the current population structure or size-class distribution of adult plants; and
- a preliminary assessment of the regeneration status of the species.

4.0 What is FAO doing?

(i) Assessment of NWFPs and non-wood forest resources at the national level

A prerequisite for compiling national level statistics on NWFPs of countries for inclusion into the Forest Products Yearbook is the availability of a global, applicable and agreed upon classification system for NWFPs. This was initiated by FAO (Chandrasekharan 1995), which continues to work with its member countries to develop further
practical mechanisms for countries to report on NWFP production and trade data, including supporting efforts towards harmonization of related definitions, concepts and classification systems (FAO 1999).

Few NWFPs are significant at global level, which is one of the reasons why they are not reported in the global forest products statistics published by FAO. The publication of regional forest statistics, where important NWFPs at the regional level could be featured, and the identification of low-cost, easy and applicable methodologies to improve the collection of national data on NWFPs, are initiatives supported by FAO (FAO 1998b).

The FAO-EC partnership programme mentioned above supports capacity building in participating countries to provide improved statistical data on forestry and specifically NWFPs. The information obtained is being used to prepare a regional synthesis on NWFPs, while also contributing to ‘NWFP country reports’ as a Special Study under the FAO “Forest Resource Assessment 2000” programme. In addition, information on the current use of main NWFPs and on likely trends will be the basis for the formulation of the NWFPs section of the recently initiated Forestry Outlook Study for Africa, which is coordinated by FAO and funded by the African Development Bank.

Within the FAO-EC partnership programme, ‘pilot studies’ have been initiated in four countries (Uganda, Cameroon, Madagascar and Zimbabwe) to develop and test methodologies for the collection and analysis of data on NWFPs. These methodologies should provide reasonable estimates of the production, consumption and trade in NWFPs, and should be cost-effective and widely applicable and relevant to other countries in the region. During the pilot studies, all available information related to NWFP in the respective country is analysed and NWFPs of major national importance are identified. The coverage of NWFPs by national statistics is evaluated and all institutions involved in the collection of statistical data, as well as the methods used for data collection, are identified. Finally, necessary steps to improve statistical data availability on NWFPs are suggested:

(ii) Assessment of non-wood forest resources at the forest management unit level

Guidelines for the management of tropical moist forests for the provision of non-wood goods and services are under preparation (FAO in press). This document provides general guidelines for the assessment and management of forest resources providing NWFPs, complemented with several examples and case studies on this subject.

A “Forest Inventory Manual” (working title) is currently under preparation in FAO. This manual aims to provide an overview to natural resources users and managers on inventoring and monitoring techniques, which will enable readers to access other references for details and in-depth studies. The final result will be a “forest inventory package” where single chapters will be set up as inter-linked, self-contained units, which can be updated, reviewed and compiled over time by various individual or corporate authors. This modular format will allow more dynamic access to users, timely modification and revision of the content and closer collaboration of inventory specialists in sharing knowledge and experiences. The NWFP section is structured so as to guide the user to a set of recommendations, which can be used as the basis for a locally specific and relevant protocol.

Within the framework of another and recently initiated partnership programme between FAO and the European Commission, NWFP resource assessment methodologies at the forest management unit level will be tested for important, selected NWFPs in each of the major sub-regions in sub-Saharan Africa. The project will develop guidelines that will enable national forestry administrations to implement improved and regular monitoring of the NWFP resource base and develop sustainable management plans in partnership with local and indigenous
communities. This endeavour will draw on existing knowledge through the review of ongoing and completed work on NWFP resource assessment.

5.0 Conclusions

Rural and urban people in Africa are heavily dependent on NWFPs for a wide range of needs, including food, medicines and construction materials. Many of these NWFPs are important sources of income and employment at the local level, with some being traded at the international level. However, the full recognition of the socio-economic value of NWFPs to people and national economies in sub-Saharan Africa is still hampered by the lack of national level data on NWFPs production, consumption and trade.

The assessment of NWFPs, and the forest resources providing them, is an essential tool for the sustainable management of these resources.

In spite of recent interest in and research work on the ecology and socio-economics of NWFPs, practical methodologies for the assessment of NWFPs at the local and national levels are still largely unavailable to the main resource users (local communities) and to the institutions that are responsible for centralized planning, monitoring and national reporting.

Various approaches exist to carry out NWFP assessment: those drawing on indigenous knowledge and ethnobotany, and those drawing on quantitative inventory. However, the range of assessment methods used so far in tropical moist forests is limited and more attention should be given to ensuring that quantitative inventory assessments are biometrically valid.

The mandate for work on NWFPs often falls across several disciplines, institutions and land-use categories. While this may represent a constraint in the implementation of inventories, it also presents an opportunity for devising much needed innovative approaches to NWFP assessment, drawing on the experiences of different disciplines and sectors (forestry, agriculture, ecology, social sciences, etc.).

Due to the great variation of NWFPs and the settings in which they occur, it is not possible to prepare specific prescriptions that are valid for the assessment of all the forest resources providing NWFPs. However, in the forthcoming FAO Forest Inventory Manual, practical information on the main factors that should be taken into account to ensure biometrically sound NWFP resource assessments is included.

The economic feasibility and socio-cultural suitability of resource assessment approaches should be carefully considered within the context of local conditions, and methodologies and techniques should be refined and adapted to suit location-specific ecological and socio-economic circumstances, needs and priorities.

FAO, in close collaboration with other international and regional organizations and institutions in member countries, supports the development, testing, adaptation and dissemination of improved methodologies and practices for the assessment of forest resources providing NWFPs through a number of specific activities in sub-Saharan Africa, as well as in other countries.
6.0 Literature cited


1.0 Introduction

Kenya's economy is dependent on agriculture and related industry. Agriculture contributes 26% to the national GNP. However, only about 20% of the land is within the high potential area with 80% constituting drylands. The communities in this area are mainly nomadic pastoralists whose economic mainstay is livestock. This area provides about 85% of the livestock. It is also home to the varied rangeland resources key among which are the gums and resins.

2.0 Status of the Resources/Commodities

2.1 Types, geographical distribution and uses

Commercial plant gums in Kenya are gum arabic and gum paoli. Gum arabic is a product of Acacia senegal. All the three varieties of A. senegal are found in Kenya with var. kerensis being the main source of commercial gum arabic. The variety is also found in Ethiopia, Somalia, Uganda and Tanzania. The variety has wide distribution in the drylands of northern, eastern and southern parts of the country though commercial production is confined in the northern region. The exact area under A. senegal var. kerensis is not known. Gum paoli is produced from Acacia paoli, a shrub up to 2.5 m high with flattened crown. The species is found in specialized habitats in Isiolo and Wajir Districts. Its gum is used for other industrial applications - adhesive and print industries.

The major commercial resins from the drylands of Kenya are myrrh, hagar and olibanum. Myrrh is produced from Commiphora myrrha found in northern Wajir and Mandera Districts. The species is also found in Somalia, Eastern Ethiopia and South Western Arabia. It has wide applications both traditionally and commercially with major uses being as incense, perfumery and flavouring agent.

Hagar is produced from Commiphora holtiziana which grows through most of the eastern half of Kenya. Commercial production comes from North Eastern province, Isiolo and Samburu Districts. The species also grows in Ethiopia, Somalia, Uganda and Tanzania. It is usually used for medicinal purposes with well known traditional application being in the control of ticks in livestock. Some is exported to China and USA.

Olibanum, commonly known as frankincense, is produced from three species of Boswellia in Kenya. The main source is B. neglecta which is widespread throughout most of Kenya's drylands. The species also occurs in Eastern Ethiopia, Somalia, Uganda and Tanzania. It is burnt locally as incense and also exported for extraction of essential oil. Some local industries are also extracting essential oil for the local and export markets. B. microphylla and B. rivae have limited distribution in Wajir and Mandera Districts respectively. They are mostly Ethiopian and Somalia species and produce incense which is more preferred by the local people than that of B. neglecta.
Apart from identifying geographical regions of production, the areas under resins have not been adequately mapped.

2.2 Production, Quality and Markets

- Gum arabic

Virtually all the gum arabic is collected from natural stands. So far there are no plantations of *Acacia senegal* in the country. All the gum arabic collected is from either natural exudation or damage caused by animals (domestic/wild) or stumps left behind during fencing for enclosures (livestock bomas, homes). Tapping has not been promoted as yet for various reasons. One is because of the problems of tree tenure leading to problems of deciding who has the right to the trees and guarantees that the tapper will be the person who will collect the gum. The other problems relate to the suitability of tapping var. *kerensis*, which appears to produce gum abundantly without tapping during the dry season. However, reliance on this mode of production has led to inability to determine the optimum potential yields for the variety.

Total production in the country is not yet established. However, considering the combined production of major companies in the country, production reached 300-400 tonnes in the mid 1990s. This figure declined in the late 1990s following increased supply on the international market from traditional suppliers and increased production from some West African countries. The production capacity of the country is however currently estimated at 2,000 - 3,000 tonnes annually.

Regarding quality, Kenyan gum arabic falls within the requirements given under the international specifications. The major requirement is to continuously improve the collection and post harvest handling practices. There is need, for example, to impress collectors to collect only mature nodules, avoid nodules from insect borer as well as proper cleaning and sorting.

Most of the Kenyan gum arabic is exported to the European Union, the US, India and the Far East. There is also an expanding local market, thanks to aggressive marketing by the local companies. Local industries are now increasingly replacing expensive imported synthetic substitutes with the locally available gum arabic. With a fairly well established industrial base, local Kenyan producers stand to gain even more in the future.

- Resins

Like gum arabic, all the resins are collected from natural stands. However, most of the myrrh produced in Kenya is through tapping. Tapping is done during the dry season when leaves have turned yellow. An axe is used to remove the bark (3 cm wide and 7-10 cm long) in a number of places on the trunk beginning from the base. The first commercial crop is collected 21 days after the initial cut. Besides tapping, wild harvest myrrh is also collected and is often of superior quality. Most of the hagar is collected from exudation due to burrowing insect larvae and damage caused by animals or tree stumps cut for wood for domestic use. *Olibanum* on the other hand is collected from natural exudation though some is from damage on the trees due to various agents.

Annual production is not known but combined production from major suppliers provides an estimate of about 5,000 tonnes. Compared to gum arabic, a lot more resins are harvested and exported. However, this is one area where a lot of effort is required to adequately document the trade statistics.
Three factors affect the quality of Kenyan gum resins; the source of resin (species/variety), mixing of resins and stage of collecting the resins. The source of myrrh and hagar from Ethiopia, Kenya and Somalia is the same. The main difference comes in with regard to collection and post harvest technologies. Ethiopia is quite advanced in the manner of collection and handling where emphasis is on wild harvest and vigorous sorting, attributes Kenya needs to emulate. In this direction contact has already been established with the African Laboratory of Natural Products (ALNAP) as well as the Natural Gum Processing and Marketing Enterprise. In line with the goal of this workshop bilateral cooperation has already been established where in mid last year, a group of Kenyan stakeholders visited Ethiopia on a one week study. The experience gathered has been found to be most helpful. Continued collaboration is planned in the future.

As for Olibanum, established international market is for resins from B. frereana (Somalia) and B. papyrifera (Ethiopia). The quantities of B. neglecta from Kenya are still comparatively small.

3.0 Opportunities and constraints for increased production

3.1 Opportunities

i) Abundant resources of gum and resin producing species.

The potential for gum arabic production from natural resources is estimated at about 2,000-3,000 tonnes/year with that for myrrh and frankincense being about 5,000 tonnes per year. With further development this figures are bound to increase in future.

ii) Establishment of a National Association on Gums and Resins.

In 1997 Gum Arabic and Resin Association was founded and registered as a coordinating body to develop and promote the gum arabic and resins industry within and outside the country. The association brings together various stakeholders from field collectors to exporters, relevant government agencies on research and policy and industrialists. It was founded by KEFRI (Kenya Forestry Research Institute), SALTCLICK, AFRIGUMS, NALEPO FARMERS and Mennonite Central Committee and has to date increased membership to 10 organizations. The association has, among others, carried out a national survey on the demand and supply of gum arabic and is preparing a book titled “Commercial Plant gums and resins in Kenya.”

iii) The government has also put in place two policy documents that are expected to greatly enhance the development of gums and resins. These are the Social Dimensions of Development (SDD ) and the National Poverty Eradication Programme ( NPEP ). As mentioned earlier gums and resins are mainly found in the arid areas of the country where the economic mainstay is livestock. With further development of these resources there is a chance to further diversify the communities’ income base and hence improve livelihoods.

iv) At the national level it has also been realized that there is need to expand Kenya’s "export basket" and reduce reliance on the traditional export products- coffee and tea. The Export Promotion Council has been instrumental in seeking markets for the gums and resins among many other resources with export potential.
v) Kenya has a fairly well developed industrial base that serves the East and Central African markets. With greater awareness these industries have been increasingly substituting synthetics for the locally available gums and resins. A couple of industrialists have also embarked on processing of the resins and exporting the essential oils. Further growth in this area is envisaged in future.

### 3.2 Constraints

i) Lack of a clear government policy in support of the production and marketing of the commodities in the country. Despite the formulation of the two policies mentioned above there is still need to clarify the details on the access and use of range resources.

ii) Since almost all gum and resin collection is from the wild there is need to address the issue of land/tree tenure. This has been found to be a major handicap in the development of the resources.

iii) Despite Kenya’s potential in the production of gums and resins it is still not well known in the international markets. As a result, some of the gum arabic and resins exported are considered as having originated from neighbouring countries.

### 4.0 Priority Needs and Activities

- **Policy development**

  There is urgent need to take the efforts already made by the government a step further by lobbying for specific policies on management and use of rangeland resources.

- **GARA**

  Having established GARA there is now need to further strengthen its capacity to adequately carry out its mandate and also link it to other regional networks.

- **Resource Mapping**

  To get accurate statistics on the production potential and trade figures there is need to carry out a detailed resource survey covering all the gums and resins with commercial potential.
THE STATUS OF GUM ARABIC IN MALI

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Director Nationale de la Conservation de la Nature, Mali.

1.0 Availability and Status

In Mali, *Acacia senegal* is found in the entire Sahelian zone. Kayes, Koulikoro, Segou, Mopti and Timbouctou regions bear productive quantities in terms of density and area.

Due to good rainfall in the last few years, regeneration of the natural gum trees as well as good yields have been realized.

Gum is produced through two methods:-

- Natural exudation
- Tapping (in experimental stage)

After the decrease in Gum trade in the 60s, Mali put in place a national policy which encouraged the production of Gum to be left in the hands of the private sector.

This policy made it possible to maintain good production during the dry season resulting in an average of 800 tons at the beginning, and a subsequent 2000 tons per year since 1979. This is due to the drynanusm of Malian traders who often, despite competition from foreign enterprises and a seriously reduced source of production, have succeeded in reviving and continually increasing gains for the harvesters, while at the same time trying to improve their exploitation. Some of the Gum from Mali is of high quality and is able to compete favorably with that from Kordofan region in Sudan, which is of world-wide fame in terms of quality.

Mali is one of the many Sahelian countries which has benefited from Technical cooperation with the aim of promoting Gum trees, and also improving the production and quality of Gum arabic. Currently there is enough information on production methods of the Gum, regeneration of natural plantations and the commercialization of Gum arabic.

However, we have to take into account the re of natural Gum trees due to continued droughts and other pressures related to human activities.

One should also consider the insufficiency of available data on the production potential of the natural varieties, lack of information and training for the producers which limits production and lack of consultation between producers and technical services.

2.0 Recommendations

- Establishment of an inventory of natural Gum trees in Mali and the collection of main socio-economic and production data is necessary.
• Implementation of training programmes in the three areas of research, production and commercialization in a manner that the acquired knowledge during these programmes will be transferred to the rural population.

• Establishment of adequate policy on protection, management of existing trees and reafforestation of an industrial kind in the villages which allows for the participation of the locals.

• Reorganization of the commercialization with the participation of the economic operators.

• Promotion of the product through quality control and appropriate plans of action of Malian Gum.

• Sensitization of producers on the best methods of production and commercialization.

3.0 Planned Technical Activities

• A follow up of research and development actions currently going on whose results are not complete. To this end, site for agroforestry and management of natural formation through initiated experimental parcels.

• Implementation of techniques and methods of agroforestry of Acacia senegal based on the results of the experiments at the parcels, as well as improved techniques of tapping.

• Production and distribution of improved material (selected seed, plants).

Gum Promotion: The participation of producers in all activities is a prime condition for success. To this end, gum promotion needs development and management through silvo-pastoral practices.

4.0 Priorities

• Improvement of production techniques through massive diffusion of the tools and modern methods of tapping.

• Funding means to effectively encourage production. Many areas are unexploited.

• Localization of production zones in order to satisfy the requirement of quality in the international market.

• Organization of harvesters be put in place as well for collectors and traders.

• Homogenous lands will be determined based on empirical knowledge of the harvesters as well as through physical-chemical analysis to be carried out in laboratories.

5.0 Commercial Promotion and Valuation Of Gum

Two actions needed in these area are:-

• To increase exports to industrialized countries and

• To promote local producers' knowledge of the product through trade fairs, exhibitions and print media while emphasizing the importance of improvement in quality standardization.

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All existing possibilities should be explored in order to make gum more valuable. To this end, particular attention on technological research should be made.

Training in matters related to protection and the value of natural resources will be offered to peasants.
THE STATUS OF GUM ARABIC IN NIGERIA

ENGR. CHIDUME OKORO
National Association of Gum Arabic Producers, Processors and Exporters of Nigeria, Nigeria.

1.0 Status of gum arabic in Nigeria.

It is not clear when Gum Arabic was discovered in Nigeria, but commercial activities in Gum Arabic started between 1950 and 1960, in the Northern part of Nigeria. As in most other countries in the world producing Gum Arabic, the product is grown in Nigeria within the Sahel region of the country.

1.1 Main Types Of Gum Arabic In Nigeria.

Although several species and varieties of gum Arabic occur in Nigeria, four major types are produced in commercial quantities and traded internationally.

Table 1: Gum arabic produced in commercial quantities in Nigeria.

<table>
<thead>
<tr>
<th>SERIAL NUMBER</th>
<th>SPECIES</th>
<th>LOCAL TRADING NAME</th>
<th>COMMERCIAL NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Acacia senegal</td>
<td>No. 1</td>
<td>Grade One</td>
</tr>
<tr>
<td>2.</td>
<td>Acacia sieberiana</td>
<td>Gwogwobrawa</td>
<td>Special Grade Two</td>
</tr>
<tr>
<td>3.</td>
<td>Acacia seyal</td>
<td>No. 2</td>
<td>Grade Two</td>
</tr>
<tr>
<td>4.</td>
<td>Acacia seceos</td>
<td>Bauchi/Sokoto Gum</td>
<td>Grade Three</td>
</tr>
</tbody>
</table>

Apart from grades one and two gums, where sufficient technical data are available, technical information on grade three and special grade two gums especially with respect to the toxicological status is insufficient.

Other types of acacia gums exist in Nigeria but little information is available on them because these species of gums do not occur in commercial quantities.

1.2 Sources.

Over 95% of Nigeria's Gum Arabic production is from wild natural forests.

These include forest reserves, community forests and other forests which are not classified under any of the above categories. These forests are either ill-maintained or not maintained at all giving rise to poor harvest.

A few commercial farms owned by governments, organisations or individuals exist in Nigeria but production from these farms is very small compared to the national output of Gum Arabic. Furthermore the absence of serious research and technical support to back up these farms render them as good as any other wild farm.
1.3 Area Coverage

As stated in the opening paragraph, Gum Arabic is produced within the Sahel region of Nigeria. States which fall within this region and the types of gum Arabic they produce are tabulated in Table 2 below.

Table 2: Gum arabic production by type and state in the Sahelian region.

<table>
<thead>
<tr>
<th>SERIAL NO.</th>
<th>PRODUCING STATE</th>
<th>GRADE ONE</th>
<th>GRADE TWO</th>
<th>GRADE TWO SPECIAL</th>
<th>GRADE THREE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>YOBE</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>2.</td>
<td>BORNO</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
</tr>
<tr>
<td>3.</td>
<td>GOMBE</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>4.</td>
<td>BAUCHI</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>5.</td>
<td>ADAMAWA</td>
<td>-</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>6.</td>
<td>PLATAEU</td>
<td>-</td>
<td>✓</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7.</td>
<td>SOKOTO</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>8.</td>
<td>KEBBI</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>9.</td>
<td>JIGAWA</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10.</td>
<td>ZAMFARA</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>11.</td>
<td>KANO</td>
<td>✓</td>
<td>✓</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>12.</td>
<td>TARABA</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>✓</td>
</tr>
<tr>
<td>13.</td>
<td>NASARAWA</td>
<td>-</td>
<td>-</td>
<td>✓</td>
<td>-</td>
</tr>
</tbody>
</table>

It is to be noted that the most active states for the production of *Acacia senegal* and *Acacia seyal* in Nigeria are Yobe and Borno states.

Because of the vast nature of the forest, statistics are scanty on the acreage covered by the gum Arabic trees. However, unproven estimates based on discussions with the officials of Borno and Yobe state governments indicated that Nigeria has over 15 million wild, largely unproductive, old and ill maintained gum Arabic trees and about 3 million trees in public, private and corporate farms scattered all over the various gum Arabic producing states of Nigeria. Out of the 3 million trees in organised farms, 1.6 million were distributed to states by the Federal Ministry of Agriculture, under the Accelerated Industrial Crop Production Programs of the Federal Government of Nigeria.

1.4 Production.

Between 1959 and 1970 when significant commercial activities in Gum Arabic started, agriculture was the main stay of the Nigerian economy. Within this period, attention was given to all agricultural products by the government of Nigeria. Gum Arabic was then an emerging agricultural export product. But before government could put a strong national development strategy in place for Gum Arabic, there was discovery of massive petroleum products in Nigeria. The subsequent financial boom that followed the exploitation of petroleum
products and the long intervention of the military in the governance of the country led to the total neglect of agriculture for nearly thirty years. The production and development of Gum Arabic suffered within this period, resulting in the absence of a national policy, strong research program or production policy on Gum Arabic. Production has been epileptic, haphazard and uncoordinated. The summary of the production of Gum Arabic in Nigeria in the 1998/1999 season is as follows:

Table 3: Nigeria’s gum arabic production in 1999

<table>
<thead>
<tr>
<th>Acacia senegal (GRADE ONE) MTS.</th>
<th>Acacia seyal (GRADE TWO) MTS.</th>
<th>Combretum (GRADE THREE) MTS.</th>
<th>Gwogwobrawa (GRADE TWO SPECIAL) MTS.</th>
<th>TOTAL MTS.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1200</td>
<td>3500</td>
<td>4300</td>
<td>300</td>
<td>9300</td>
</tr>
</tbody>
</table>

This is outside an estimated 4540 MTS, which was purchased from neighbouring countries of Chad, Niger, Sudan, Mali and Mauritania by Nigerian businessmen either for internal consumption or for export.

The production of Gum Arabic in Nigeria’s forests is still based on the old, crude technology devoid of modern techniques. Soon after the rains in October/November of each year, farmers go to the forests to hit the gum Arabic trees with sharp objects from where the gum exudes. But because the forests are wild and without specific owners, the exudates are not allowed to mature before harvesting, giving rise to small pieces instead of big lumps of properly formed gums.

There are no research findings to back up the breeds, farm management or harvesting techniques. Hence production can not be optimum. Because of the pains inflicted on Nigeria’s agricultural development by the nation’s oil boom and the prolonged and devastating military intervention in governance, Nigeria, which ought to be the world’s largest producer of Gum Arabic, given her land mass, human capital and financial resources is now struggling to maintain a third position among the producing nations of Gum Arabic.

1.4 Quality.

Upto 1996, the quality of Nigeria’s gums was a grave source of concern to both exporters and importers. This concern arose due to wide scale adulteration of the various grades of gum Arabic. However since the formation of the National Association of Gum Arabic Producers, Processors, and Exporters of Nigeria (NAGAPPEN), sanity in the quality of Nigeria’s gums has been restored. The improved quality of gums since 1997 has been confirmed by overseas importers. NAGAPPEN will continue to work with all relevant authorities and communities from the farming level to export level in order to ensure total quality control for Nigerian gums. The Federal Government of Nigeria through an inter-ministerial technical committee under the chairmanship of the Federal Ministry of Commerce is working with NAGAPPEN to ensure that the quality of every kilogram of Gum Arabic shipped from Nigeria meets the minimum internationally acceptable standard of quality.
1.5 Processing

It is important at this stage to note that the only spray dried Gum Arabic production facility in Africa started production in Kano, Nigeria, in 1999. The plant has a capacity to produce about 2000 MTPA of spray dried gum, which is currently being distributed all over the world. The products of this plant are reputed to exceed the international minimum standards of quality for spray dried Gums and is competing favourably with spray dried Gums of European and American origins.

Nigeria will continue to take the lead in adding value to Africa's export products.

2.0 Opportunities and constraints for increased production

About 50% of Nigeria's land mass of nearly 1 million square kilometres fall within the Sahel region and is largely uninhabited with a fast approaching desert. Current estimates by various international and local authorities put Nigeria's population at about 190 million people. Nigeria is also reputed to have tremendous petroleum, gas and solid mineral resources unequalled in Africa. With its land, human, capital and financial resource base, Nigeria has great potential to lead the world in the production of Gum Arabic. The Nigerian Government has also recovered from the disaster of "Oil Doom" and devastating military governance, and is now set to redirect her effort towards agricultural development under democratic governance. Gum Arabic is one of the eight core commodities selected for accelerated development by the government of Nigeria in the medium and long term.

The present President of the Federal Republic of Nigeria is a farmer, who is doing everything possible to return Nigeria to its former agricultural glory.

The greatest constraints to the development and increased production of Gum Arabic in Nigeria include;

(i) Absence of a policy, policy trust or sustainable plan of action by the government on the development of Gum Arabic at all levels.

(ii) Lack of research, training and support facilities for the production of high yield, disease resistant varieties of Gum Arabic and the corresponding extension services to bring research findings to the grassroot farmers.

(iii) Weak institutional support and framework within the entire length and breadth of the Gum Arabic industry in Nigeria.

(iv) Complete absence of a private sector-driven regulatory mechanism for the conduct of gum Arabic business in Nigeria.

3.0 Priority needs and activities in the Nigerian gum arabic industry.

The priority needs of Nigeria in the Gum Arabic Industry include:

(i) International support for the massive production of high yield, disease resistant varieties of *Acacia senegal* and *Acacia seyal* seedlings for distribution to farmers and communities within the Sahel region of Nigeria as an interim measure to boost the production of gum Arabic in Nigeria. The variety of the *Acacia seyal* and *Acacia senegal* seedlings to be so produced must be in consonance with current industry and market requirements and preferences.
(ii) Support in strengthening Nigeria’s research institute responsible for Gum Arabic (RRIN) through capacity building, infrastructure and financial support for research programs.

(iii) Assistance in the rehabilitation of Nigerian Gum Arabic forests, which are now old, ill-maintained, unproductive, and lacking in scientific management.

(iv) Capacity building and organisational support for the various institutions working in the Gum Arabic industry, especially the National Union of Gum Arabic Producers, Processors and Exporters of Nigeria (NAGAPPEN), the Standards Organisation of Nigeria (SON), the Raw Material Research and Development Council (RMRDC), the Commodities Department of the Federal Ministry of Commerce, the Industrial Crop Production Unit of the Federal Ministry of Agriculture and the Forestry Research Institute of Nigeria.

(v) In-depth chemical, biological, and toxicological studies on Nigerian Grade three Gum Arabic (Combretum) and Gwogwobrawa (Grade II special) to enable their classification by codex for use in the food industry.

(vi) Co-operation by all African producers of Gum Arabic in the efforts of the Sudanese and Nigerian Authorities towards the formation of a strong African Union of the producers of Gum Arabic to ensure an orderly production, marketing and development of the Gum Arabic business in the world.

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GUMS AND RESINS PRODUCTION IN SUDAN

ABDELAZIM M. IBRAHIM and MOHAMMED E. OSMAN

1. Forests National Corporation (FNC), Sudan.
2. The Gum Arabic Company, Sudan.

1.0 Abstract

Sudan produces around 80% of the world’s annual production of gum arabic derived from Acacia senegal var. senegal and up to 20% of gum Talha derived mainly from Acacia seyal var. seyal. It also produces minor quantities (about 2000 metric tons) of gum olibanum, a resin obtained from Boswellia papyrifera. Over 60% of the gum derived from Acacia senegal and virtually all of the gum talha is obtained from natural stands. Olibanum resin, which is of high commercial potential, is not properly exploited. Secured stability in supply, stability in prices and consistency in quality are of paramount importance to maintain the position of gum arabic in the international markets. With various constraints realized in this respect, however, support of international agencies is desperately needed.

2.0 Background

Gum production in the Sudan has developed through the centuries into a traditional art handed down from generation to generation. Gum Arabic’s unique properties makes it a valuable commodity in the world markets. Almost all gum arabic that enters world trade is of African origin. Of the African producers, Sudan has historically been by far the most important, and has produced the best quality gum. In the early part of the century the collection and trade of Sudan gum arabic, which had been in use as an article of commerce for some 4000 years, developed and flourished on a more organized basis. The gum became a truly international article of commerce and Sudan established itself as the center for its production. As new uses of gum arabic were developed and the market for foods and beverage containing it expanded, demand grew and it became an important item in the national economy, generating much-needed foreign exchange.

There are also socio-economic benefits from gum collection, which stretch beyond the simple cash value of the gum. Millions of people are involved in harvesting and cleaning the gum, and because it is an activity that is carried out during the dry season it does not put demands on the farmer when he needs to tend other crops. It, therefore, helps to make him and his family attached to the land and discourages him from migrating to urban areas in search of work. Environmentally, there are benefits which accrue from gum arabic production. In particular, Acacia senegal, the main gum arabic producing species in the Sudan and the other gum-producing species that produce non-commercial quantities (Acacia seyal, A. polycantha, A. mellifera and A. laeta) provide a means of combating desertification and desert encroachment.

3.0 Production

Acacia senegal has a wide distribution in Sudan. It occurs in a belt that lies between latitudes 10° – 16° North in an area of about 52,000 km² (approximately one fifth of the total area of Sudan). Within this belt, gum is being mainly produced in two distinct areas namely western Sudan and eastern Sudan. The west comprises Kordofan and Darfur regions, while the east includes Blue Nilee and Gedarif states. In addition, gum is also produced in
Upper Nile states and Central Sudan (White Nile and Sennar states). The two areas, however, exhibit marked differences in soils, climatic conditions and mode of production, which are significantly important in the security of supply. It is clear that those differences have given Sudan the latitude to produce gum arabic, even at the most difficult and adverse conditions. This flexibility is a key factor in the security of supplies because a drop in production in one area is normally counterbalanced by increased production in the other. Commercial production of good quality gum arabic within this belt is, however, restricted to areas where there is high degree of uniformity of the species. In the Sudan, particularly in Kordofan and Darfur regions the species is uniform and is found in pure stands giving the Sudan the advantage of being the biggest producer and exporter of the best qualities. This merit renders Gum arabic from Sudan to be the yardstick for measuring quality of gums produced in other countries. Another important comparative advantage is that in Sudan A. senegal occurs both wild and cultivated in a wide area giving the advantages of economies of scale. In the sandy areas of Kordofan and Darfur, the pattern of land-use which involves A. senegal is frequently referred to as "gum cultivation cycle". The system basically consists of about 4-5 years of cropping followed by a period of 15–20 years of fallow under regenerated A. senegal.

Table 1. Gum Arabic Production in Sudan by Region (m/tons)

<table>
<thead>
<tr>
<th>Region</th>
<th>Total</th>
<th>%</th>
<th>Average</th>
<th>Annual rate of increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kordofan</td>
<td>412.28</td>
<td>.54</td>
<td>13 743</td>
<td>-0.012</td>
</tr>
<tr>
<td>Darfur</td>
<td>146.277</td>
<td>20</td>
<td>4876</td>
<td>-0.033</td>
</tr>
<tr>
<td>Eastern</td>
<td>103.584</td>
<td>13</td>
<td>3453</td>
<td>-0.039</td>
</tr>
<tr>
<td>Central</td>
<td>93.106</td>
<td>12</td>
<td>3104</td>
<td>-0.004</td>
</tr>
<tr>
<td>Upper Nile</td>
<td>8.114</td>
<td>1</td>
<td>1159</td>
<td>+0.038</td>
</tr>
</tbody>
</table>

Judging from experience, growth and production of gum seems to slow down considerably after A. senegal tree passes the age of 25. Trees are tapped when they reach a height of 4 to 5 feet with the main stem being about 2 inches or more in diameter. Such growth is attained in a period of 3-7 years depending on the method of establishment. Tapping is carried out when trees start to shed their leaves naturally, i.e. at the onset of the dormancy period. Any induced shedding of leaves (by fire, locust, etc) will cause severe losses in production; because trees react by flushing, which will prolong the growing season and delay tapping. The dormancy period starts just after the end of the rains in October or early November depending on whether the rains end early or late.

There are two tapping periods in one season, commonly known as the first and the second tapping. Each tree is, however, only tapped once in a season and the terms simply mean that if trees cannot be tapped during the first tapping before the cold spell, they could be done later during the second tapping. It is therefore preferable to use the terms early and late tapping as corresponding to first and second tapping respectively.

The early tapping starts from the beginning of the dormancy period until about a month before the expected cold weather. Consequently the early tapping period is very short and if it happened that the rainy season is longer than average there will be inadequate time for early tapping and it has to be postponed till late, after the cold spell in March. The early tapping is important because it is thought to give the best yield and also because the farmer will be in need of cash after the cold spell. An important conclusion that follows is that in many areas, if the farmer was unable to carry out the early tapping, then gum production is forgone for cotton collection where income could be earned under better conditions.

Exudation does not occur in a general trickle as it does with latex or resins, but usually occurs at one or more points at the side of the stripped branch or stem, starting as a droplet and gradually growing in size. The process is characterized by intermittent exudation forming a hard but slightly elastic skin from the outside. As
more gum exudes the outer skin expands or cracks and the nodule grows in size to about 1-1½ inch in diameter. When the outer casing becomes so hard that the liquid cannot force it to expand any further, the nodule ceases to grow in size and is ready for picking. The time taken to reach the picking stage is also variable depending on the tree reserves, but usually the farmer through his own experience allows a period of 3-6 weeks between tapping and first picking. As soon as the nodules are picked, new ones start to form and within 10-15 days a second picking is possible. An average of four pickings is common but up to more than seven have been recorded, roughly at ten-day intervals.

4.0 Supply

Sudan’s production generally shows erratic fluctuations over the years and production was decreased at an alarming rate; from an average of 46 000 m/tons in the sixties to 23 000 m/tons in the nineties. A minimum of about 7 000 m/tons was recorded in 1991/92 because of locust attack and a maximum of over 48 000 m/tons in 1994/95, with an actual average annual production of 30 000 m/tons over the past 20 years as compared to an average estimated potential of 65 000 m/tons per annum.

All the above analyses refer to *A. senegal* being the main specialty species of Sudan. *Acacia seyal* (Talha gum), however, is a minor exportable product with an average annual production and export of about 5 000 m/tons. It is of lower quality and mainly used in the non-food items. In Sudan *A. seyal* tree grows in the Central clay plains that stretch over vast areas. Sudan’s potential for production of Talha is very huge. The estimated tree resource is twice as much as *A. senegal*. If the international market develops positively for the use of Talha then the Sudan could flood the market with very large quantities. In its natural habitat, which is 70% of the gum belt, *A. seyal* regenerates prolifically at no cost. It is also cheaper to produce because it does not require tapping and the gum exudes naturally. The production of gum Talha, however, is handicapped by two factors. Firstly, the use of *A. seyal* trees as a main source of energy endangers the species and, therefore, gum Talha production by the continuous felling of the tree resource. Secondly, the domain of the *A. seyal* within the gum belt is a proper area to accommodate future agricultural expansions, i.e. the eradication of *A. seyal* trees to introduce new agricultural extensions is inevitable. These two factors limit Sudan’s opportunities in gum Talha shares in the gum market.

The actual purchases of the Gum Arabic Company (GAC) for the last thirty seasons (69/70-98/99) amounts to about 841 000 m/tons. Of these, 740 000 m/tons was Hashab (gum derived from *A. senegal* var. *senegal*, 85%) and 101 000 m/ton was Talha (gum derived from *A. seyal* var. *seyal*, 15%). The highest percentage for an annual production compared to the total was 6% for season 74/75 and the lowest was 0.9% for 91/92 as shown in Table 2.

Table 2. Gum Arabic production in Sudan for the period 1969–1998 for Hashab and Talha gums

<table>
<thead>
<tr>
<th>Period</th>
<th>Production</th>
<th>Hashab</th>
<th>Talha</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>69/70-79/80</td>
<td>Total</td>
<td>355378</td>
<td>28894</td>
<td>384272</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>32307</td>
<td>2627</td>
<td>34934</td>
</tr>
<tr>
<td>80/81-89/90</td>
<td>Total</td>
<td>234198</td>
<td>43669</td>
<td>277867</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>23422</td>
<td>4367</td>
<td>2278</td>
</tr>
<tr>
<td>90/91-97/98</td>
<td>Total</td>
<td>150778</td>
<td>28812</td>
<td>179595</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>18842</td>
<td>3601</td>
<td>22449</td>
</tr>
</tbody>
</table>

N.B. The total average of gum arabic production for the last three decades is 29028 m/tons (Hashab is 25530 m/tons and gum Talha is 3498 m/tons) with very sharp fluctuations in Hashab production.
5.0 Factors affecting production and supply

Factors affecting gum production can be grouped into four main categories. Physical factors (soils, topography and climate) may have direct and indirect bearings on production; directly through their effect on growth and exudation of gum and indirectly through their effect on agricultural production and consequently on the social and economic conditions of farmers. Among the many operative physical factors, climate may be singled out as the most important. This is based on the assumption that soils are mostly sandy and poor and that gum trees grow throughout the belt only if climatic conditions are favorable. Water, of course, is essential to growth but the average annual rainfall within an area seems to have little effect on total production. Its effects may be a long-term one but what is more important is the local distribution of the rains. The length of the rainy seasons prolongs the growing season for both agricultural crops and gum trees. On the one hand this is beneficial because it produces healthier trees and better agricultural harvests, but on the other hand it is limiting to gum production by either keeping the farmers busy on agricultural harvesting or by prolonging tree growth up to the cold spell. In the first case early tapping is being foregone for agricultural production and in the latter case tapping is useless before the trees shed their leaves. Biotic factors, on the other hand, are potentially dangerous. The whole gum belt could be defoliated overnight by locusts (Acridium melanorhodn), thus checking the growth on one hand and inducing re-growth on the other. Repeated fires could have the same effect. Fortunately this state of affairs does not happen frequently nor does it occur uniformly throughout the belt. The locust attack is intermittent and sporadic. What is more frequent, however, is the damage done by man and his animals. With increasing population, greater pressures are being exerted on the land and harmful practices, such as overgrazing, felling of immature trees for agricultural expansion, and repeated grass fire, are all very common. Of the four factors that affect production and supply of gum the socio-economic and institutional factors seem to be the most important operative factors.

Resin production

Sudan produces minor quantities (about 2000 metric tons) of gum *olibanum*, a resin obtained from *Boswellia papyrifera*. *Olibanum* resin, which is not properly exploited at the present time is obtained from high rainfall savanna regions of southeastern and southwestern Sudan that can provide about 10 000 m/tons annually.

6.0 Constraints

The constraints of the gum Arabic industry in Sudan can be viewed under internal and external constraints.

6.1 Internal constraints

Internal constraints can be summarized in the following points:

- Production regions often lack local market branches that expand opportunities for dealings between junior producers and merchants. Trading activities in Gum arabic are still restricted to auction markets in main cities within the gum belt.

- The percentage of gum arabic that is handled by auction markets doesn’t exceed 30% of the total (i.e. 70% of trade dealings are executed outside official markets).

- Junior producers in remote regions of the gum belt are exposed to exploitation by local traders (prices offered are always less than the official floor price).
- The fact that major production regions are remote and lack of transport facilities (for junior producers) makes it almost inevitable that they have to sell their harvest at very low prices as their weak financial position deprives them from any price-negotiating power.

- Lack of vital amenities and supply pushes small producers to take part in losing contracts, handing over their harvest in exchange of vital supplies of food, sugar, coffee etc (this is known locally as Shail trade).

- Lack of knowledge of floor prices for a particular season (due to lack of sound information systems) make junior producers in remote areas sometimes to be involved in barta trade activities where prices are often fixed as for the previous season.

- Lack of adequate provision of finance to face the production costs that include food, water, etc for the 8-month production period forces junior producers to participate in production via a producer-dealer sharing process in which the producer is always under pressure.

- Production communities suffer the lack of regulatory infrastructure i.e. production principle depends on individual producer-trader activities. Lack of the co-operative sense of organization and trading information is due to the inferior economic, social and demographic characteristics of these communities.

- There are too many middlemen in the long gum arabic trading chain. Thus actual returns to junior producers do not exceed 40% of the floor price for a particular season. A recent study shows that over 70% of marketing process is executed over the very lengthy chain of middlemen.

- Lack of local consumption of gum arabic makes it impossible to compensate for losses in international market.

- Increased taxes imposed cause higher export prices and diminish the possibility of competitive capabilities.

6.2 External constraints

External constraints fall under three main headings:

(i) **Competition from substitutes:** instability in gum supply caused by natural climatic conditions and pests resulted in sharp reduction in production and hence increased prices. This diverted the attention of end-users to cheaper substitutes such as modified starches, modified celluloses, gelatins, etc.

(ii) **Introduction of a new specification:** change in gum arabic specifications with the introduction of gum Talha from *Acacia seyal* is highlighted by increased volume of Talha export. The gum from Talha now consumes 50% of the international gum Arabic market previously dominated by gum arabic from *A. senegal*.

(iii) **The political pressures on Sudan's trade:** the American embargo on gum arabic from Sudan substantially reduces Sudan's share of the international gum arabic market. American gum traders are forced to seek gum arabic supply to the American market via other sources.

The direct effect of the above constraints is the reduction of export volumes and financial returns. This has further adverse effect on the resource and the five million people inhabiting the gum belt as it deprives them from a vital cash crop. It also adversely affects the substantial livestock and grazing animals inhabiting the belt from fodder. Marked ecological defects are anticipated as a result of felling the trees leading to desertification and enhanced desert creep into the gum belt area. This will also deprive the belt inhabitants from other agricultural activities due to loss of fertile agricultural lands.
7.0 Opportunities

- In view of the importance of gum-producing tree species in respect of multiple economic values reflected in the production of gum arabic, environmental protection, security of agricultural production, improvement of national rangelands, provision of fuel wood and building materials and other amenities that are necessary for the continued stability of living conditions in the rural areas, gum-producing trees should be accorded the care and protection they deserve.

- Establishment of technical and scientific relations with other gum-producing countries, through the Union of African Gum Arabic Producers and Exporters, to serve mutual interests in respect of gum arabic.

- Support to be provided to institutions concerned with gums and resins production in order to be able to discharge their obligations in the following manner:
  
  - Extension services to enlighten producers on tree planting, tapping, gum collection and storage prior to marking.
  - Strengthening research services to promote production and novel areas of uses.
  - Strengthening database management on all aspects of gums and resins, such as production, yield, areas of plantations and natural stands, exports, prices, etc.
  - Provision of technical support to re-stocking of the gum- and resin-producing tree species.
  - Arrangement for separate specifications for all commercial gums.
  - Secure stability in supply of gum arabic, stability in prices and consistency in quality. This requires the support of international agencies as the keeping of stocks require financial obligation and training.

8.0 References


Report of the meeting of the Network for Natural Gums and Resins in Africa (NGARA)


ALEX CHIHONGO
Tanzania Forestry Research Institute, Tanzania.

1.0 Abstract

Although gum arabic is exported from the country, exploitation of the resource from the natural stands is still begging. The sector is facing a number of constraints including weak extension services to enlighten producers on tree planting, tapping, gum collection and storage prior to marketing, little research strength buildup to promote production and novel areas of use. There is also scarce or unreliable data on all aspects of gums and resins, such as production, yield, areas of natural stands, exports, prices etc. Similarly there is an instability in gum/resin supply, price fluctuations and inconsistency in gum quality. However, these drawbacks could be overcome through policy reviews and networking among producers and exporting countries.

2.0 Introduction

Indigenous forests cover some 42.41 million hectares of which 75% belong to different shades of miombo and acacia woodlands. This forest resource contains big value in the form of timber and catchment uses besides offering unique environmental and biodiversity values. Miombo woodlands also make available a long range of products, for subsistence use.

Though it is generally accepted that the importance of non-wood products is comparable to that of wood products for the well-being of the people in the country, statistical information to underpin such a statement could be lacking in a number of cases. However, production of gum arabic is estimated at 1000 tons annually half of which amount exported to overseas markets. Gum arabic is of more importance than resins in the Tanzanian economy with the latter coming from pines that are currently not tapped. Major importers of gum arabic are Germany, India, Austria and Japan. The exports of gum arabic are gradually increasing since 1996 owing to the high demand on the world market. Traditionally gum arabic together with tannin extract, honey, beeswax and cinchona barks have been major non-wood forest products exported from Tanzania.

3.0 Status of the Resource Base

The principal sources of gum arabic are the Acacia woodlands in semi-arid areas of Tanzania. These include Urambo district in Tabora region; Singida and Iramba districts in Singida region; Kieto, Mbulu and Hanang districts in Arusha region; Same, Hai and Mwanga districts in Kilimanjaro region; Handeni district in Tanga region and to a lesser extent Kilosa and Morogoro rural districts in Morogoro region. These natural stands of Acacia woodlands are not managed at present. They occupy an estimated area of about 100,000 hectares of the forested semi-arid areas in mainland Tanzania.

4.0 The Main Gum Arabic Producing Species

Gum arabic is mainly produced from Acacia senegal (up to 70%) and Acacia seyal (up to 15-25%) however most of it is collected from Acacia senegal var kerensis and var leilorachus.
5.0 Production and Use

The major activities involved in the chain of gum arabic production from the wild sources include collecting, sorting, processing, quality control and end-use marketing. In the country, the gum arabic is not processed, hence most of the produce is exported to overseas markets. There have been multipractices brought about by overgrazing and cutting of acacia trees for agricultural activities in Singida and Dodoma regions that have accelerated desertification.

6.0 Export Quantities of Gum Arabic in Tanzania

Tanzania has one of the largest export potentials for gum arabic among the East African countries, though the industry is yet to be developed. As stated elsewhere the annual production capacity of gum arabic is about 1000 tonnes and approximately half of this amount is exported. Since the production depends mainly on collection from the natural forest stands that are not managed, there is a need to ensure that this resource base is managed, or else planted to ensure a sustainable supply in future programs. There is no cultivation undertaken at the moment. Neither has there been resource surveys conducted in the country. Gum arabic is exclusively collected and exported by the private sector. Usually small scale farmers and livestock keepers collect the exudate from Acacia trees and sell the product to middlemen who finally sell the gum to businessmen based in the coastal towns like Dar-es-Salaam, Bambagomo and Tanga. However, the present production levels of gum arabic are too low to adequately satisfy the growing demand of both domestic and export markets. Another aspect is that tapping of acacia trees is not practised as this may lead to the drying up of the trees that are tapped.

Table 1. Gum arabic: Imputed exports (tonnes) 1990-1998

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7.0 Constraints

Gum arabic, like other major non-wood forest products (NWFP), is threatened by over-exploitation of natural resources, for instance acacia forests, due to indiscriminate harvesting of trees to produce charcoal and fuelwood. Most of the reserved natural forests, particularly Acacia woodlands, are without appropriate management plans and harvesting on public lands is without any control. As it were, gum arabic quality control from the collection stage, transportation and marketing of the product is not systematically performed. This scenario sets up trading in improperly graded products from the farmers who obtain less money for their value. The same is true traders who export semi or unprocessed gum that fetches less competitive prices.
8.0 Opportunity for Increased Production

Despite the constraints that the gum arabic trade is facing, there are still opportunities for increased production as envisaged from the production and export statistics of 1994/98, which show an upward production/export trend of the gum arabic resources. Such an increase in the export trade is a reflection of increased awareness of the socio-economic contribution of the product by producers, processors and consumers at the domestic market level. There are no gum arabic/resin Associations that are in existence, though these could help in improving of the performance of the sector.

9.0 Priority Needs and Activities – Way Ahead

- Increased marketing skills for the gum arabic processors and exporters. The private sector’s contribution in the gum arabic trade can not be over-emphasized (through proper cleaning and grading of the gum).
- The NGOs and private sector requirements of capital from the Government as incentives.
- The Government policy on gums and resins is unclear. They are still regarded as minor forest products. Need for the Government to come up with clear policy on gum arabic research and development to enhance its production.
- Action Plans at national level for the NWFP with emphasis on the gums and resins.
- Training on the production skills for the gum arabic trees (partial wounding of trees, season at which wounding could be done, collection etc, or tapping if compatible at all, grading of gum according to colour and grain size).
- Proper marketing procedures for the gum arabic and resins.
- Nursery research practices to increase the planting stock of Acacia resources. The National Tree Seed Programme NTSP at Morogoro has carried out small scale plantation establishment for Acacia species. The extension services shall be charged with the responsibility to impart such knowledge to farmers engaged in the gum arabic activities.
- Finally, the establishment of the Network on gum arabic and resin.

10.0 Reference

UGANDA COUNTRY REPORT ON NATURAL GUMS AND RESINS

PAUL ELAOKA OKICH
Forest Department, Uganda.

1.0 Background

Uganda has a total area of 241,540Km² with a population of about 20 million people. It is an agricultural country and hence depends on agriculture and livestock production for its economic well being.

The location of Uganda bridges two ecological zones of the dry East African Savanna grassland and the West African rain forests. These major geographically distinct vegetation formations and ecologically important Tropical rain forests provide Uganda with modified tropical climate. This makes Uganda conducive to prolific growth of diverse ecosystems including forests.

The amount of vegetation cover in Uganda is dwindling. The depletion of forest cover essentially leads to depletion of forest resources. This threatens forests due to the result of population expansion, which is estimated to be increasing at the rate of 2.5%. Increase in population means higher demand for products like timber and non-wood forest products. There is also the problem of unemployment; hence the rural people turn to forests to make things like handicrafts for their economic well being. Agriculture being the main economic activity means that people clear forest land for agricultural expansion. There is also the misconception where forests are looked at as fertile land and therefore should be put to more productive use such as agriculture. This is a failure to realise that the apparent fertile look of the forests is a result of nutrient recycling processes of the forest ecosystems.

2.0 Gum-Arabic

The tree species that produce gum-arabic are found in the semi-arid and deciduous scrubs in the North Eastern part of Uganda (Karamoja region). There are two acacia species (Acacia senegal and Acacia seyal) that grow in natural stands in this region. But the Acacia belt includes the districts of Soroti, Kumi, Lira and Kitgum. Acacia senegal produces gum-arabic which is locally eaten by the pastoral Karamojong and is the most important and abundant species in Karamoja region. Acacia seyal is known also to produce gum.

Similar vegetation found in the Karamoja region and neighboring districts also exists in Nakasongola district in the Central region as well as the Ankole-Masaka corridor. Species like Acacia senegal, Acacia seyal, Acacia polycantha, Commiphora abyssinica, etc. are found in these areas, but little is known of the types, qualities and quantities of the exudates they produce.

In Karamoja region reasonable stock of Acacia senegal which produce gum-arabic exists. In the dry season these trees naturally exude gum-arabic which are collected by pastoral Karamojong for local consumption. There is no organised gum-arabic tapping or marketing in Uganda despite the potential that exists for its resources in Karamoja region. This has mainly been attributed to lack of funds, and to a lesser extent to the sometimes volatile situation of the area due to cattle rustling. A study was carried out in this region to find out the extent, type and quality of gum resource and the possibility of introducing these trees on small holder farms.
The resource survey indicated that sufficient cover of acacia species particularly *Acacia senegal* exists in Karamoja region (Kityo 1991).

The *Acacia senegal* trees which produce gum-arabic on a commercial scale were found to regenerate freely in the region and growing in association with other species like *Balanites aegyptica*, *Euphobia Candhibrum*, *Ziziphus abysinica*, *Commiphora africana*, *Combretum* and *Terminalias* species. These trees are also capable of producing gums or resins, but no study has been done to find out the type and quality. The local people in the area, use gums from balanities for gumming their spears.

Forest Department in the 1970's made some trials in the handling and marketing of gum-arabic. About 3-5 tons of the gum-arabic which were mainly from natural exudates were collected from small areas each dry season. This shows a high potential for gum-arabic production if organised tapping can be done.

Acacia trees have multiple uses amongst the local communities in the region. The trees give provision for shade, windbreak, fodder, fencing, energy, construction and reducing soil erosion. The local communities in Karamoja region particularly value trees for providing shade for both humans and animals during prolonged dry seasons when there is severe heat. This has rendered the trees not to be cut indiscriminately.

The woody biomass assessment of the region in 1992 by the National Biomass Study project of the Forest Department, carried out using aerial photographs and ground turthing and which adequately covered Karamoja region, estimated *Acacia seyal* at a stocking of about 390 trees per hectare with the area of Karamoja region being about 2,182,500 ha. This seems to support the above scenario that the local communities value acacia species.

### 3.0 Resins

Resin tapping in Uganda has not been taken seriously despite the availability of various species of trees, both exotic and indigenous, that can produce resins. In plantations where tapping of pine resin should be taking place, concessionaires are more interested in timber harvesting. With already an impending threat of wood deficit from plantations by the next five years or so, there is no hope that tapping in the pine plantations will ever be an important activity.

A little tapping of pine resin, however, began about 1997 in Katugo plantation. Between 1997 and 1999 a total of 52,140 kgs of pine resin were recorded tapped. The operation is not organised as in certain periods no tapping takes place.

### 4.0 Conclusion

The fact that over 3 tons of gum-arabic can exude naturally from one area in the Karamoja region in one season means that there is great potential for gum-arabic production in Karamoja region. Commercial production of gum-arabic would boost the living standard of the pastoral communities of the region. What is important now is to organise the local communities, by training them in the gum tapping and handling.
PART III: ANNEXES
ANNEX 1: WORKSHOP PROGRAM
THE NETWORK FOR NATURAL GUMS AND RESINS IN AFRICA (NGARA)
WORKSHOP PROGRAM (29TH-31ST MAY).

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ANNEX 2: STATISTICS


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