Sudan Forest Products

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***Abstract*—** Sudan is a vast country located in North East of Africa. The land of Sudan stretches between latitude 23 ˚ 8′ and 8 ˚ 45′ North and longitudes 21 ˚ 49′ and 38 ˚ 34′ East. Such broad coverage gives the Sudan a unique range of ecological systems and zones. The forests of Sudan extend across several agro ecological zones, which implies the existence of a variety of fauna and flora species that contribute directly or indirectly to the sustainable livelihood of local communities.

The forest resources contribute wood products, in form of firewood, charcoal and timber, and non-wood forest products that provide substantial cash income and edible fruits. Those wild grown fruits have a variety of uses in pharmaceuticals, gums products, fodder for domestic animals and wildlife. The Gum Arabic belt passes through the central part of the country, where economically important types of gums are produced.

***Keywords*—** Forest products, Gum Arabic , Sudan.

I. INTRODUCTION

SUDAN located in the north-eastern part of Africa. Between latitude 23˚ 8′ and 8 ˚ 45′ North and longitudes 21 ˚ 49′ and 38 ˚ 34′ East, and extends along the maritime border on the Red Sea coast, and is bounded by two Arab countries are (Egypt and Libya) and 7 African countries (Fig 1.), and occupies an area of 1.9 square kilometers [8].

Fig. 1. Sudan location

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Sudan is located in the tropical region, which varies in climatic regions as follows (Fig.2.):

- The hot desert climate in the north of Sudan.
- Mediterranean climate on the Red Sea coast and the area of Jebel Marra in Darfur.
- Semi-desert climate in the north-central Sudan.
- Poor savannah in southern and mid-western Sudan.

Fig. 2. Sudan climatic zones

In the mid-fifties, forests in Sudan constituted about 36% of the total area. Most of this forest land has been depleted to meet the demands for fuel wood and timber. According to the [3] reports, in the 1980s the size of forests was estimated about 20% of the total area of the Sudan. Recently, it was estimated at just 11.6 %. It extends across several agro ecological zones, which implies the existence of a variety of fauna and flora species that contributes directly or indirectly to the sustainable livelihood of local communities.

Forestry in Sudan includes wood products in form of firewood, charcoal and timber and non-wood products in form of wild fruits and gum products, particularly gum Arabic. Forestry also provides protection of watershed, fodder for domestic animals and wildlife.

Samples of trees in the dry savannah and its local uses:

- Sunt (Acacia nilotica):

It is a tree up to 15 m in height with a blackish fissured bark. The wood is hard heavy and durable. This species is widely distributed in subtropical Africa, in Sudan found in most areas, especially on rivers and Nile banks [1].

- Arad (Albizia amara) Roxb

This tree resembles acacia but lacking thorns. The flowers are whitish to pink in colour; the bark is grey to dark brown in colour and longitudinally fissured. The wood is darkish in

colour, hard and it can use for furniture, agricultural implements, construction purposes, firewood and charcoal. It founds through central Sudan.

- Ban (Eucalyptus microtheca)

This tree may reach 20 m in height; the bark is brown white in colour, rough with small irregular vertical fissures. The wood from this tree is one of the strongest and hardest timbers in the world, it is used for fuel wood, charcoal and poles also used for shade, shelterbelts, and erosion control.

- Darot (Terminalia brownii)

It is a large tree reaching 25 m in height. The wood is hard, heavy and yellow brown in colour. It is used as a building material in local construction and bed frames. It provides firewood and charcoal. In Sudan it founds in Kordofan, Darfur, along the Nile and around kassala.

-Haraz (Faidherbia albida):

It was originally identified as acacia and differs from other acacia species, because its leaves are green in the dry season and shed in the rainy season. Height reaches 25m. The wood is of lower quality, but still used for making doors, windows, local furniture and boat [1].

-Heglig (Balanites aegyptiaca):

This small tree, height reaches 10 m. the bark has deep vertical fissures, the crown is dropping, the thorns occur singly. The wood is pale- yellow, fine-grained, hard, tough and insect resistant. It used for turnery, carving, firewood and charcoal. Heglig is found in Africa in most humid areas. It is widespread through the Sudan. It is fruits calls "Laloub", Sudan is the main producer of it, is spread all over the country. It considered as a laxative and purgative for stomach, which helps in removing worms from intestine. The oil released from the kernels by boiling, is used for treating headaches [4].

Fig. 3. Balanites aegyptiaca

-Sahib (Anogeissus leiocarpus):

Sahib is a medium size tree, it is wood is used mainly in transmission and building poles, fence posts, forked poles as beams in local building construction. Also, it used for firewood and charcoal. In Sudan, this species is a common constituent of the gallery forest in high rainfall savanna on well drained or alluvial soils along streams, rivers and valleys in southern Kassala, Kordofan, southern Darfur and Blue Nile.

-Sidr (Ziziphus spina-christi), known in Sudan as Nabq

It is found in western and central Sudan. Fruits are consumed either fresh or dried, in central Sudan fruits used as laxatives, leaves used in treatment of respiratory diseases and for cleaning the scalp, hair and makes it softer. Beside fruits, the tree provides forage and fodder in open grazing conditions. The wood is used as a source of fuel and produces an excellent charcoal [9].

Fig.4. Ziziphus spina-christi

- Tabaldi (Adansonia digitata), known locally as Gungulaize. It is widespread throughout the hot, drier regions of tropical Africa, in Sudan is most frequently found on sandy soils and seasonal streams (khors), in low grassland Savannas. It forms belts in central Sudan in Kordofan, Darfur, Blue Nile (El Amin, 1990). Its fruits are used for juice and for the treatment of some stomach diseases (diarrhea). Indigenous belief that early grown leaves at the beginning of rainfall season can be used for the cure of other diseases. The tree has a hollow trunk, which is used to store rain water.

Fig.5. Adansonia digitata

- Senna (Cassia angustifolia) is an herb. The leaves and the fruits of the plant are used to treat many abdominal diseases. It is also used as a purgative.

Fig.6. Cassia angustifolia

- Doum (Hyphaene thebaica)

Its fruits locally are used in the treatment of the urinary system diseases.

Fig.7. Hyphaene thebaica

- Aradeib (Tamarindus indica)

Aradeib tree is found in the tropical region in most African countries. In Sudan, it is located in the central states and extends to the South. Fruits are used to make juice, and have local benefits (treatment against malaria and constipation).

Fig. 8. Tamarindus indica

- Garad (Acacia nilotica)

Locally known as sonut; it produces tannins from the bark and seed of the plant. The leaves are used as fodder and fruits for curing the flu and fever.

Fig.9. Acacia nilotica

- Daleib (Borassus aethiopum)

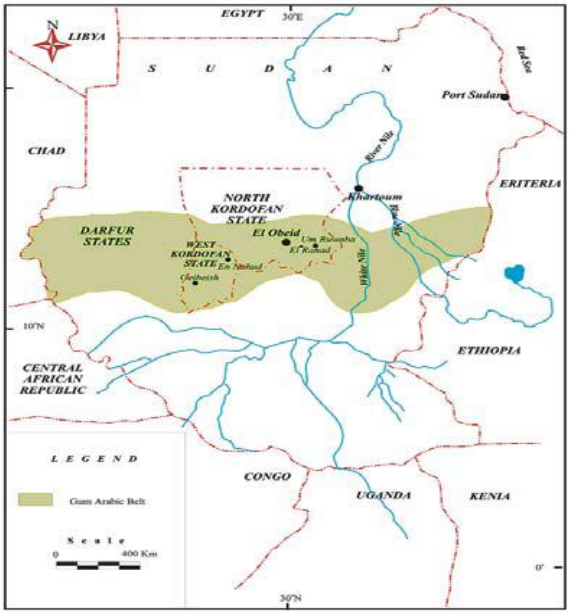
The fruits of daleib are used for food. The roots of the plant have (Halook), specific which is also eaten in areas of Sudan.

Fig.10. Borassus aethiopum

Gum Arabic Belt:

Sudan's more important forest may be the Gum Arabic Belt, which lies within the low rainfall savannah zone. The term Gum Arabic Belt is used to denote a zone of approximately 500,000 square kilometers, which extends across Central Sudan, between latitude 10° and 15° N and includes states of Kordofan and Darfur, White Nile, Blue Nile and Kassala. The Gum Arabic Belt accounts to one fifth of the country's total area. The Belt is home to roughly one fifth of the population of Sudan and two thirds of its livestock [5], map (3) demonstrate Gum Arabic belt through Sudan.

Map (3): Gum Arabic Belt in Sudan



Source: [10].

In Sudan, the commercially tapped species of gums are: Sterculia setigera (tar tar), Boswellia papyrifera (gafal or tarag tarag), Acacia seyal (Talha) and Acacia senegal (hashab). Sterculia setigera (tar tar) and Boswellia papyrifera (gafal or tarag tarag), grow in the tropical climates. In Sudan, they are fairly widespread in the high rainfall savannah area; it's grown on hilly grounds of the Blue Nile, Kassala, Darfur (Jabel Mara), Kordofan and Red Sea states [1] and [2]. Tar tar and tarag tarag have pharmaceutical applications and used as food additive [2]. Locally they are used in treatment for chest diseases.

Hashab (Acacia senegal) and Talha (Acaia seyal) The majority of gum products in Sudan are obtained mainly from Acacia senegal and Acacia seyal. They locally called "hashab" and "talha" respectively. The most important uses of these trees are sand fixation, honey production, making pesticides, producing forage and in pharmaceutical products.

Fig.11. Acacia senegal

Sudan is considered as a key supplier of raw Gum Arabic in the world providing more than 80% of high quality supply in the world market [3], [6] and [7]. These characteristics make Gum Arabic one of the country's most important cash crops and the most important non-wood forestry product.
Table (1) demonstrates Arabic name, Sudanese name and scientific name of the previous samples

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TABLE I
ARABIC NAME, SUDANESE NAME AND SCIENTIFIC NAME OF SAMPLES OF NON-WOOD FOREST PRODUCTS

Arabic name	Sudanese (local) name	Scientific name
1- Sidr	2-Nabq	1- Ziziphus spina-christi
2- Tabaldi	2- Gungulaize	2- Adansonia digitata
3- Hegleeg	3-Laloub	3- Balanites aegyptiaca
4- Senna	4-Senna makka	4- Cassia angustifolia
5- Doum	5-Doum	5- Hyphaene thebaica
6- Aradeib	6- Aradeib	6- Tamarindus indica
7-Sonut	7- Garad	7- Acacia nilotica
8- Daleib	8- Daleib	8- Borassus aethiopum
9- Hashab	9- Hashab	9- Acacia senegal
10- Talha	10- Talha	10- Acaia seyal

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