Deutscher Tropentag 2002
Witzenhausen, October 9-11, 2002
Conference on International Agricultural Research for Development

The Potential of Under-utilized Fruit Trees in Central Sudan

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Abstract

A number of under-utilized species with edible fruits have been identified during field studies in Central Sudan. Fruits of these indigenous species play a important role in the diet of people in the savanna belt of Sudan, especially during famines and food shortages. They have a considerable wide range of uses. Beside the fruits, the multipurpose trees provide a diversity of other important forest products. The species have great potential for future development. However, detailed scientific studies and trials are needed and a list of research priorities is given.

Introduction

Africa has faced with the serious problem of not being able to feed its population or supply it with fuel wood (FAO 2001). Frequent crop failure in arid and semi-arid areas often results in the poor nutrition of local people (MAXWELL 1991, WATERLOW et al. 1998). For this reasons it is important to find other resources for getting enough food for the growing population.
Sudan is the largest country in Africa with an area of more than 2.5 km^2. The country includes different ecological zones from the desert in the north to the tropical rainforest in the south. The savanna areas are vast, and occupy at least 37% of the entire land in Sudan (CRAIG 1991). They are habitats for numerous plant species (EL AMIN 1990).
Trees and shrubs play a significant role in maintaining the natural ecosystem and in preventing and combating desertification in the Sahel. They provide a multitude of useful products for the people (VON MAYDELL 1990). With a new understanding of the value of indigenous fruit trees in providing food security and meeting nutritional needs, these trees will receive increasing attention, especially in semi-arid areas.
Only a few indigenous species have been promoted or researched and are under production in the field. Little attention has been paid to minor or under-utilized crop species like wild fruit trees in Sudan.

This paper outlines the results of a preliminary survey conducted to collect some information on under-utilized fruit-producing trees, shrubs and palms in the savanna belt in Central Sudan.

Results

Several savanna trees yield edible fruits. These fruits are widely used and a considerable diet for rural people. They provide vitamins, proteins and minerals and ensure food and nutritional security especially during periods of climatic stress as well as nutritional and financial deficiency. The fruits have an exceedingly wide range of uses, i.e. food source, beverage, medicine and cattle feed. A number of very important species with interesting fruits have been identified during field studies in the savanna belt of the Sudan. The 13 priority species are listed in Table 1.
Fruits which are extensively eaten as fresh fruits include 'Gambil' (*Cordia africana*), 'Homeid' (*Sclerocarya birrea*), 'Medaika' (*Ximenia americana*), 'Joghan' (*Diospyros mespiliformis*) and 'Tamarhindi' (*Pithecellobium dulce*). 'Medaika' is a very delicious fruit. The juicy, yellow plum-like fruit is eaten fresh but can be stored only for a short time. Some fruits are very popular among children, they are harvested by them and eaten as 'snacks'. Examples are 'Joghan' (*Diospyros mespiliformis*) and 'Tamarhindi' (*Pithecellobium dulce*). The kids pick them from the tree and eat them directly. However, most of the fruits are dry and have very good storage capacity like 'Aradaib' (*Tamarindus indica*), 'Gudeim' (*Grewia tenax*), 'Gunguleiz' (*Adansonia digitata*), 'Lalob' (*Balanites aegyptiaca*) and 'Nabak' (*Ziziphus spina-christi*). They are often stored for several month during the dry season.
Local beverages are prepared in different ways from the fruit pulp of 'Aradaib' (*Tamarindus indica*), 'Gudeim' (*Grewia tenax*), 'Gunguleiz' (*Adansonia digitata*) and 'Lalob' (*Balanites aegyptiaca*).
There are two important fruit-bearing palms in Central Sudan: 'Dalaib palm' (*Borassus aethiopum*) and 'Dom palm' (*Hyphaene thebaica*). The 'Dome' is a branching palm producing sweet edible fruits. The very hard and stable seeds (4 cm in diameter) are used in some areas for making buttons, pearls and various small carvings. The fruits of 'Dalaib' can also be eaten and in addition to the food source they spread a very nice and intensive smell. For this reason they are put in houses and rooms for better air condition.
There is considerable variation within species in different regions of Sudan. There is enormous variation in the size, shape and color of fruits and seeds, respectively. They are different ecotypes which bear various fruit shapes and qualities in the different areas of Sudan. One example for differences in fruits is 'Higlig' (*Balanites aegyptiaca*). The fruits of the trees in the Wad Medani area are longish and yellow in contrast to the round and red fruits from Damazin area (Fig. 1). There are differences in taste as well, the fruits from Damazin area are more sweeter.
Seeds of the fruits are grounded and are an important ingredient for thickening soups or even to make bread (DIRAR 1993). Examples for using the seeds are 'Aradaib' (*Tamarindus indica*), 'Gambil' (*Cordia africana*), 'Gunguleiz' (*Adansonia digitata*) and 'Homeid' (*Sclerocarya birrea*). Oil is extracted from the dried and chrushed kernels of 'Lalob' (*Balanites aegyptiaca*) and is used in various ways for preparing food.
Examples for strong medicinal use of fruits are 'Garad' (*Acacia nilotica*) and 'Gudeim' (*Grewia tenax*). The fruits of *Acacia nilotica* is used against colds and fever and the fruits of the woody shrub *Grewia tenax* is supposed to be very rich in iron. From the small reddish brown fruits people produce a drink and give it to pregnant women. The fruits are highly recommended and one sack of 'Gudeim' (*Grewia tenax*) is equal in price to tree sacks of weed on the Khartoum market.
Fruits like 'Aradaib' (*Tamarindus indica*), 'Dom' (*Hyphaene thebaica*), 'Gunguleiz' (*Adansonia digitata*), 'Lalob' (*Balanites aegyptiaca*), 'Nabak' (*Ziziphus spina-christi*) are available over the whole year on the market, because of a high demand and their excellent storage capacity (Fig.2). They even sold in big cities like Khartoum. They are a very important source of income for the rural population.

Tab. 1: Under-utilized fruit species with great future potential.

species	family	short description
Acacia nilotica	Mimosaceae	deciduous tree, up to 20 m high, fruits edible, wood hard and durable
Adansonia digitata	Bombacaceae	deciduous tree, up to 25 m high, fruits edible, wood spongy and very soft
Balanites aegyptiaca	Balanitaceae	deciduous tree, up to 10 m high, fruits edible, wood hard and durable
Borassus aethiopum	Palmae	evergreen palm, up to 15 m high, fruits edible, wood hard and durable
Cordia africana	Boraginaceae	deciduous tree, up to 15 m high, fruits edible, wood hard and valuable
Diospyros mespiliformis	Ebenaceae	evergreen tree, up to 20 m high, fruits edible, wood hard and durable
Grewia tenax	Tiliaceae	deciduous shrub, up to 2 m high, fruits edible
Hyphaene thebaica	Palmae	evergreen, branching palm, up to 15 m high, fruits edible, wood hard and durable
Pithecellobium dulce	Mimosaceae	deciduous tree, up to 15 m high, fruits edible, wood hard and durable
Sclerocarya birrea	Anacardiaceae	deciduous tree, up to 15 m high, fruits edible, wood soft and light
Tamarindus indica	Caesalpiniaceae	evergreen tree, up to 15 m high, fruits edible, wood hard and durable
Ximenia americana	Olacaceae	deciduous tree, up to 8 m high, fruits edible, wood hard and durable
Ziziphus spina-christi	Rhamnaceae	evergreen shrub, up to 5 m high, fruits edible, wood hard and durable

Beside the intensive use of the fruits the leaves, sprouts ore even young roots are used as vegetable. The leaves and young roots of the ‘Tebaldi tree’ (*Adansonia digitata*) and the ‘Aradaib tree’ (*Tamarindus indica*) are important food in rural Sudan. They are cooked fresh or after

drying. The germinating young radicles of the 'Dalaib palm' (*Borassus aethiopum*) are either cooked or roasted and eaten in some parts of Sudan as vegetable.

The use of trees as cattle feed is extremely important in the savanna areas of Sudan, especially in the semi-arid zones, where livestock obtain much of their nourishment in the form of pods and leaves from trees. An important example is the leguminous 'Sunut' (*Acacia nilotica*), of which pods and leaves are feed to the animals. Other examples for intensive use as fodder are 'Aradaib' (*Tamarindus indica*) or 'Tebaldi' (*Adansonia digitata*). Sometimes it seems that the trees are "aerial pastures". The trees in areas around villages are often severely damaged, due to cutting of leafy young branches as animal feed.

Most of the under-utilized fruit trees provide multipurpose use, such as the 'Tebaldi tree' (*Adansonia digitata*). The fiber of the bark is used for making ropes, baskets and cloths and the leaves are an important vegetable beside the common use of the fruit. In Sudan the over-use of those multipurpose fruit trees has become a significant problem. Some of them are nowadays endangered like 'Dalaib' (*Borassus aethiopum*), 'Dom' (*Hyphaene thebaica*) and 'Higlig' (*Balanites aegyptiaca*). Moreover the under-utilized fruit trees provide fuel wood, building structural material, tannins, gums, resins, beeswax, honey, mushrooms, edible caterpillars and shad for humans, animals and the soil.

In spite of the high demand of indigenous fruit-bearing trees no plantations have ever been seen in Sudan. All the fruits are extensively collected from wild standing trees. The major collectors of the fruits in the savanna area are mainly children and adult women.

Fig. 1: Different fruit types of *Balanites aegyptiaca*.

Fig. 2: Under-utilized fruits on a market in Wad Medani.

Conclusion

As indicated above, several savanna trees, shrubs and palms play a important role in the diet of people in dry areas especially during famines and food shortages. They are an important attitude to the agricultural food crops and used in various ways. There is great potential for many of these fruits in local and even world markets. Beside the fruits the multipurpose trees provide a lot of other forest products which are often intensively used.

As a consequence greater attention should be given to their improvement through selection, breeding, germplasm conservation and increased overall production. Multipurpose tree species offer numerous opportunities for genetic selection and domestication, such as improvements in survival, growth rate and yield, as well as various quality attributes associated with different forest products (LEAKEY and NEWTON 1992).

Studies of intraspecific variation in tree species are necessary, and useful in their selection, breeding an utilization. The genetic background of indigenous fruit trees has received little attention. Many of these valuable under-utilized tree species could be lost by the high deforestation rates. Due to the existing market for charcoal, natural woodlands are increasingly being overexploited, resulting in land degradation and lower land productivity. Among the species that are lost in this process, these indigenous fruit and food trees.

In Central Sudan little replanting is carried out for any of these species. In contrast, communities normally rely on supply form wild trees. There is often a lack of awareness by the local people on the need to plant, protect and manage under-utilized fruit species.

Most of the woody plant species are highly adapted to harsh conditions like drought or heavy winds. They are very important for soil conservation and protection and play a important role to slow down the desertification process in Central Sudan. Leguminous and non-leguminous trees also act as “nutrient pumps” in bringing up nutrients that have been leached to deeper soil horizons to the top soil, in the form of litter fall and decaying organic plant residues. Therefore

they are very important in multiple cropping systems where multipurpose trees and shrubs are associated with seasonal and perennial food crops and livestock. The success of these agroforestry systems lies in a high overall biomass yield, good nutritional value of the edible products, and a wide diversity of products.

Finally, it is suggested that priority should be given to the following research areas:

1. Detailed survey of the indigenous fruit tree reservoir of the entire savanna region in Sudan
2. Identifying genetically outstanding natural populations and individuals for propagation
3. Selection, breeding and conservation of germplasm of priority species
4. Investigations on propagation techniques, tree physiology and phenology
5. Introduction and establishment of tree nurseries to raise seedlings for planting
6. Establishment of screening plots and pilot plantations of under-utilized fruit species
7. Studies for processing and marketing of indigenous fruits

Acknowledgement

We are grateful to 'Studienstiftung des deutschen Volkes' for providing a research grant to the first author.

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