Potentially Important Trees of South Sudan




FOOD PLANT SOLUTIONS
ROTARIAN ACTION GROUP

Solutions to Malnutrition and Food Security

Australian Aid

World Vision

A Project of the Rotary Club of Devonport North, District 9830 & Food Plants International

www.foodplantsolutions.org

The South Sudan Integrated Food Security and Livelihood Project, which is funded by the Australian Government - Department for Foreign Affairs and Trade (DFAT) through the Australia NGO Cooperative Programme (ANCP) funding mechanism, aims to achieve improved household food and income security through increasing agricultural production, productivity and increasing incomes, which can be used to enable families to purchase food and diversify diets. Food Plant Solutions publications provide educational resources to different stakeholders in South Sudan, with special support to FMNR (Farmer Managed Natural Regeneration) introduction and promotion work, by providing good reference to food plant trees, creating awareness and enabling a better understanding of the nutritional value of their local food plants.

Farmer Managed Natural Regeneration

Farmer Managed Natural Regeneration (FMNR) is a low-cost land restoration technique used to combat poverty and hunger amongst poor subsistence farmers by increasing food and timber production and resilience to climate extremes.

In practice, FMNR involves the systematic regrowth and management of trees and shrubs from felled tree stumps, sprouting root systems or seeds. The regrown trees and shrubs – integrated into crops and grazing pastures – help restore soil structure and fertility, inhibit erosion and soil moisture evaporation, rehabilitate springs and the water table, and increase biodiversity. Some tree species also impart nutrients such as nitrogen into the soil.

As a result, FMNR can double crop yields, provide building timber and firewood, fodder and shade for livestock, wild foods for nutrition and medication, and increased incomes and living standards for farming families and their communities.

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Dedication

This book is dedicated to the 3 billion hard working farmers and families around the world who cultivate these, and other, food plants for their own subsistence, and who help conserve them in their rich diversity for other people to enjoy.

Food Plant Solutions Field Guide – South Sudan, Version I, June 2018

Preface

This guide is based on information from the Food Plants International (FPI) database developed by Tasmanian agricultural scientist Bruce French. The source material and guidance for the preparation of the book has been made possible through the support of Food Plants International, the Rotary Clubs of District 9830, particularly the Rotary Club of Devonport North who founded Food Plant Solutions, (previously the Learn◊Grow project), and many volunteers who have assisted in various ways.

The selection of plants included in this guide has been developed by Lyndie Kite working in a voluntary capacity using the selection criteria developed by Food Plant Solutions. These selection criteria focus on the local plants from each of the main food groups with the highest levels of nutrients important to human nutrition and alleviation of malnutrition. It is intended as a **Guide only** to indicate some important food plants that serve as examples for this purpose. Other important nutritious plants may be equally useful, and it is recommended that the FPI database be used to source information on the full range of plants known to occur in South Sudan. This guide has been developed with the best intention to create interest and improve understanding of the important local food plants of South Sudan and on the understanding that it will be further edited and augmented by local specialists with appropriate knowledge and understanding of local food plants.

Food Plant Solutions was initiated by the Rotary Club of Devonport North to assist in creating awareness of the edible plant database developed by Food Plants International, and its potential in addressing malnutrition and food security in any country of the world. In June 2007, Food Plant Solutions was established as a project of Rotary District 9830, the Rotary Club of Devonport North and Food Plants International. The primary objective of the project is to increase awareness and understanding of the vast food resource that exists in the form of local plants, well adapted to the prevailing conditions where they naturally occur, and how this resource may be used to address hunger, malnutrition and food security. For more information, visit the website www.foodplantsolutions.org. More detailed or specific information on plants, including references to material by other authors, is available on DVD on request.

Disclaimer: This Field Guide has been produced using information from the "Edible Plants of the World" database compiled by Bruce French of Food Plants International. Although great care has been taken by Food Plants International and Food Plant Solutions, neither organisation, or the people involved in the compilation of the database or this Field Guide:

- makes any expressed or implied representation as to the accuracy of the information contained in the database or the Field Guide, and cannot be held legally responsible or accept liability for any errors or omissions
- can be held responsible for claims arising from the mistaken identity of plants or their inappropriate use
- assume responsibility for sickness, death or other harmful effects resulting from eating or using any plant described in the database or this Field Guide

Always be sure you have the correct plant, and undertake proper preparation methods, by consulting with specialist scientists or local users of the plant. The Food Plants International database, from which the information in this Field Guide is drawn, is a work in progress and is regularly being amended and updated.

Contents

Introduction

This book is designed as a simple introduction to the more common food plants of South Sudan. It is hoped people will take greater pride and interest in these plants and become confident and informed about how to grow and use them. Many of the local food plants that occur in every country are very good quality foods. Unfortunately, people often reject traditional food plants and grow more of the introduced vegetables, such as ballhead cabbage. These do not have the same food value as many traditional, tropical, dark green, leafy vegetables.

Growing food

Growing food to feed a family is, without doubt, one of the most important things anyone can do. The more interest you take in your garden and the more you learn about plants and how to grow them well, the more interesting and fun food gardening becomes.

A country with very special plants

The local food plants of most countries have not been promoted and highlighted in the way they deserve. Visiting a local food market will quickly show what a rich variety of food plants can be grown in this country. Good information about these plants is often still in the minds and experience of local farmers, and has not been written down in books. This can make it hard for the next generation of young people to find out how to grow them.

In many countries, some of the traditional food plants are only harvested from the wild and others are only known in small areas. Others have hundreds of varieties and are the main food for people in different regions. Information on all these plants, their food value and the pest and diseases that damage them is available in the Food Plants International database.

Getting to know plants

People who spend time in gardens and with their food plants get to know them very well. It is a good idea to learn from someone who grows plants well. Each plant grows best in certain conditions and there are often special techniques in getting it to grow well. There are lots of unique things about every plant and learning about these helps a good gardener produce more food.

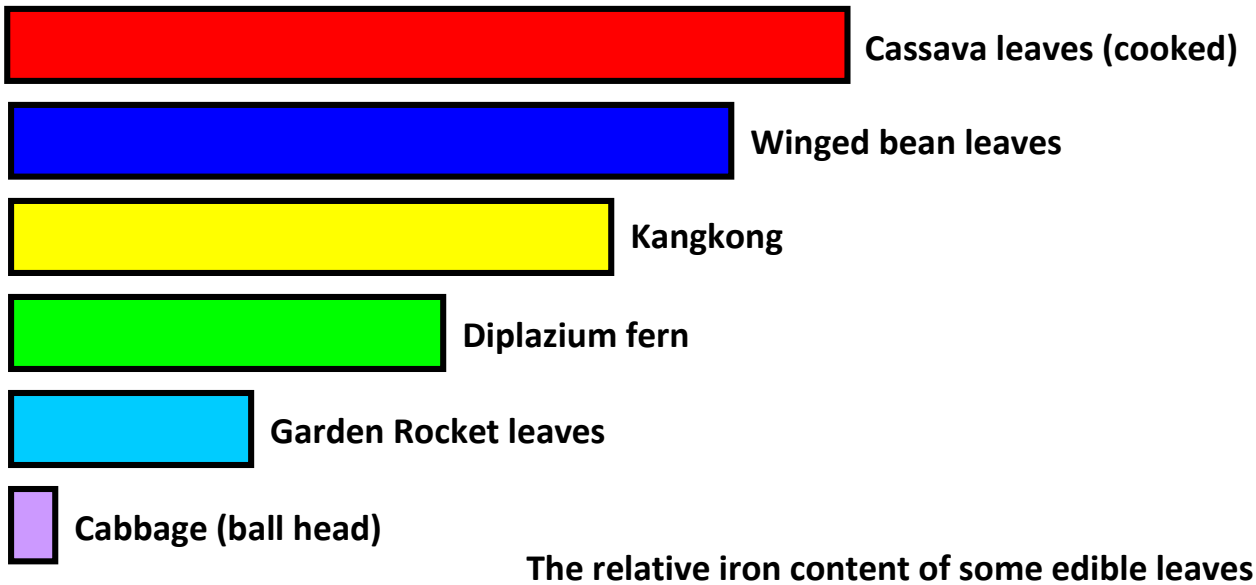
Naming of plants

Many food plants have local names, as well as a common English name. Every type of plant also has its own scientific name. Although the scientific name might not be widely recognised, this is the link by which people in different countries and with different languages can recognise the same plant. We know that many plants are grown in many different countries, but relying on local or common names, we might not recognise the same plant grown in different places. By using scientific names to accurately identify plants, we can get useful information from people in other countries. Wherever possible, plants in this book are named by their common English name and their scientific name.

Local food plants are often very good

People sometimes think that local food plants are not very special and that any food plant that is new or comes from another country must be a lot better. This is often not true. Many of the newer or introduced food plants, such as the round or ballhead cabbages, have very little food value. Many traditional tropical green, leafy vegetables and ferns have 10 times or more food value as ballhead cabbage or lettuce. It is important to find out more information about the food value of different foods if we want to eat well. Citrus fruit, such as lemons and oranges, are often grown for vitamin C that helps keep people healthy. These fruits do not grow well in the tropics - the common guava fruit has three times as much vitamin C and is loved by children. This is just one example that there are often much better choices of local foods with higher levels of important nutrients.

Our bodies need a variety of food plants to enable us to grow, stay healthy and have enough energy to work. Different foods are needed to provide energy, protein, vitamins and minerals. The following diagram highlights the iron content value of some traditional edible, tropical plant leaves, compared with cabbage. Iron is a nutrient that is very important for our bodies and especially our blood. People who are short of iron become anaemic and lack energy.



The relative iron content of some edible leaves

A healthy balanced diet

Good nutrition, or eating a healthy balanced diet, is really very simple. If people eat a wide range of food plants, their bodies will normally get a balanced amount of all the different nutrients they require. If a nutrient is lacking in one food plant, then they are likely to get it from another plant if they are eating a range of food plants. For this reason, everybody should eat a range of different food plants every day. The food group that is especially important for young people is the dark green leaves. Everyone should eat a good serving of dark green leaves every day. They have many vitamins and minerals, as well as protein. There are many spices or flavouring plants that can improve the taste of foods, but taste should be considered separately from food value.

Learning to cook well

Even though some nutrients in food can lose some of their value during cooking, it is normally much safer to cook all food plants, at least for a short time. Bacteria, which cause diarrhoea, can occur in gardens and on food plants. These are killed during cooking. Many plants in the tropics develop cyanide, a chemical that makes them bitter and poisonous. This happens often with cassava (tapioca, manioc) and beans, but can also occur in many other plants. Boiling the food for two minutes normally destroys cyanide and makes the food safe to eat. Some of the nutrients our bodies need (such as vitamin A for good eyesight) only become available when food is cooked in oil.

Learning to grow "wild" food plants

Many plants grow wild in the bush and are not cultivated by people. We can normally find someone who has taken an interest in them and has learned to grow them. This may be people from a different language group. It may be that in their area they have found better types than the ones that simply grow wild.

Saving better types of plants

If we simply allow plants to grow from seed, the improvements that have been made in finding sweeter or better types may get lost. Some fruit trees are like this and the fruit produced may not be sweet at all. It is often necessary to take cuttings from a tree to be sure the new plant is exactly the same as the old one. If the plants won't easily grow from cuttings simply by sticking a piece of the branch in the ground, there are other ways of helping these plants to form roots and start to grow. One good way is to make a small cut in the bark of a young branch and then wrap soil around the cut and cover it with plastic. With plants like guava, new roots will start to grow from this cut and grow into the soil wrapped around the branch. It can then be cut off and planted. This is called air-layering. A similar method is used with the roots of breadfruit. A shallow root is uncovered and a small cut made from which a new sucker will start to grow. This can be cut off and replanted.

Growing from cuttings and suckers

Many food plants are grown from cuttings and suckers. This is very important, as it allows all the different kinds of yams, taros, bananas, and sugarcane to be continually grown and ensures the varieties are preserved. Each plant has its own special propagation method. It is important to use healthy planting material, as diseases can be spread in planting material.

Saving seed

Some food plants are grown from seed. Sometimes this is very easy as the seeds are large, store well, grow easily and grow the same as the original plant. It is more difficult with other plants. Many large fleshy seeds, such as breadfruit, need to be planted while still fresh as they do not store easily. Other seeds do not "breed true" or do not grow into new plants that are the same as the original plants. For example, the fruit may not be as large or sweet or have the same colour or taste. With many of these plants, it may be necessary to find ways of growing them from cuttings or other methods such as grafting. Some plants "inbreed" and get smaller or poorer. This happens when a plant self-pollinates or receives pollen from a close relative. Some seeds develop a hard seed coat and need to be scratched, soaked in water, or even put into hot water, before they will start to grow. Saving local seeds is often a good idea as they are already adapted to local conditions. For example, seed saved from pumpkins grown locally will produce plants with less pest and disease damage than those grown from imported seed. *If you can't get seeds or planting material from local gardens – it is probably not a suitable local plant!*

Growing a garden of mixed plants

In nature, one variety of one plant never grows alone. There are always lots of different plants of different kinds and sizes, all growing together. Anyone who has ever walked into a tropical jungle will know this very well. The reason people all over the world want to save the rainforest is because it has so many different kinds of plants all growing together. Growing plants in a food garden in a way similar to how they grow in nature, as a mixed group of plants, is very good agriculture. Mixing plants in a garden usually gives more reliable food production, as any disease from one plant will wash off in the rain onto a different plant, where it cannot survive. Small plants fill the gaps and reduce the need for weeding.

Different types of plants for food security

There is another reason for growing a range of food plants in a local garden or around a village. If something goes wrong, like extreme insect damage to plants, some disease occurring in the garden, or a poor growing season, some plants will be more damaged than others. With a variety of plants, there will still be some food to eat until the other plants recover and grow again. Also, a wide variety of plants will mean that different ones will be maturing at different times, which helps ensure a continuous supply of food. There are shrubs that can be planted as edible hedges around houses, and fruit and nut trees that need to be planted as a gift for your children, several years before they will be able to enjoy them. Some nuts can be stored and eaten when other foods are not available. Most yams will store well for a few months.

Looking after the soil

Gardeners in traditional tropical agriculture usually move their gardens often by shifting to a new piece of land. There are usually three reasons for this:

- In the tropical lowlands, weeds can become a very big problem. There are usually a lot fewer weeds in the first year or two after clearing and burning the land, but weeds increase in the following years.
- Some of the nutrients in the soil are used each year and the soil becomes poorer and plants do not grow as well. There are ways of reducing this loss of nutrients.
- Very small worms called nematodes build up in the soil after a few years and get into the roots, especially of annual vegetable plants, and stop their roots working properly. For example, root knot nematode will cause the roots of plants like tomatoes and beans to become twisted resulting in poor growth of the plant.

Building up the soil

When a new garden has been cleared, it has lots of leaf mulch and other old plant material. This provides plant nutrients for new plants to grow. There is a simple rule for growing plants and improving the soil - “If it has lived once, it can live again.” Any old plant material can provide nutrients for new plants to grow, but it must be allowed to rot into mulch or compost for this to happen. If this plant material is burnt, some nutrients, especially phosphorus and potassium (“potash”), get left behind in the ashes for new plants to use, although it also allows these important nutrients to be lost by being washed away by rain. But with burning other important nutrients, such as nitrogen and sulphur, get lost in the smoke and disappear from the garden and soil. These last two plant nutrients are especially important for growing green leaves and when their levels are low, plants grow small or pale green. When nitrogen is lacking, the old leaves of the plant go pale and fall off early, and when sulphur is lacking, the young leaves go pale. Wherever possible, old plant material should be covered with some soil to allow it to rot down and not simply dry out or get burnt.

Poor soils where crops won't grow

When soils are very acid (or sour), plants cannot get the necessary nutrients. Natural chemicals in the soil that are toxic to plants when present at higher levels become soluble, get into plants, and stop them growing. Adding limestone to these soils can improve them. Using compost will not make them less acid, but will keep the plant nutrients in the soil in a more readily available form that plants can use.

Soil nutrients

Plants need 16 different kinds of plant food or nutrients in different amounts to grow properly. A plant that has already been growing will have these nutrients in them and probably even have them in a balanced amount. That is why composting old plant material is so important. Plants usually show some signs or symptoms if any of these nutrients is running out.

One of the most common and important nutrients for plant growth is nitrogen, which actually comes from the air, but gets into plants through the soil. When plants are short of nitrogen, their older leaves often become yellow or pale. When grass family plants, like sugarcane and corn, are short of nitrogen, the centre of the oldest (lowest) leaves starts to develop a dry or dead V-shape. The plant cannot find enough nitrogen in the soil so it gets it from an old leaf to grow a new leaf. This causes the old leaf to die, forming a characteristic V-shape in the centre of the leaf. The plant does not get any bigger as an old leaf dies each time a new leaf is produced. Village farmers often walk through grassland before they clear it for gardens, looking to see if the grass leaves are dry and dead, because they know gardens on this soil won't grow well. It is necessary to use compost or legumes (such as beans) to put nitrogen back into the soil. Growing plants from the bean family (legumes) is the most efficient way to increase the level of nitrogen in the soil.

Corn is a good plant for indicating which nutrients are running short in the soil. If the older leaves go dry along the edges, the soil is running out of potash. If leaves that are normally green develop a bluish colour, the soil is short of phosphorus. Generally, leafy crops need lots of nitrogen, and root crops need lots of potash.

Making compost

Compost is old plant material that has been allowed to rot down into a fine, sweet smelling mulch that is full of nutrients that can be put back on the soil to grow new plants. Making good compost is very simple. A simple heap of plant material can be made in the corner of a garden or near a house. The composting process is carried out by small bacteria that live in the soil and feed on decaying plants. They break down old plant material into compost. These bacteria are living, so they need air, water and food. A good compost heap must have air, so don't cover it with plastic or put it in a container. This makes a foul smelling compost, as different bacteria that don't need air turn it into an acid mixture that preserves it. Good compost must have moisture, so keep the heap damp, but not too wet. The compost bacteria like a balanced diet, which means that both green material and dried material is needed to balance the carbon and nitrogen in the compost pile. If the compost material gets too dry and brown, it will not break down, and if it gets too green, it will go slimy. Using a little bit of compost from an old heap will make sure the right bacteria are there to start the whole process off. As soon as the plant material is broken down to a fine mulch it can be put onto the garden. It is best if it is dug in, but if it is regularly put onto the surface of the garden, worms will mix it into the soil.

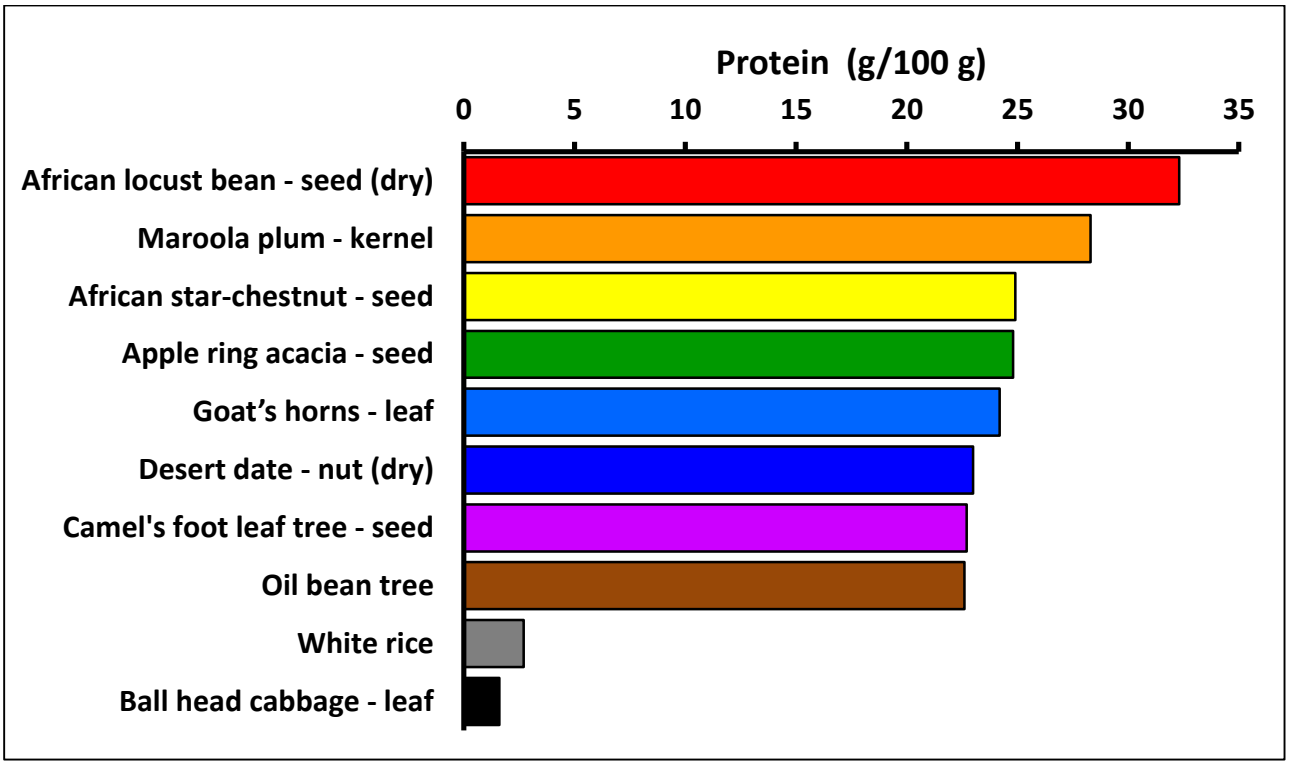
Pests

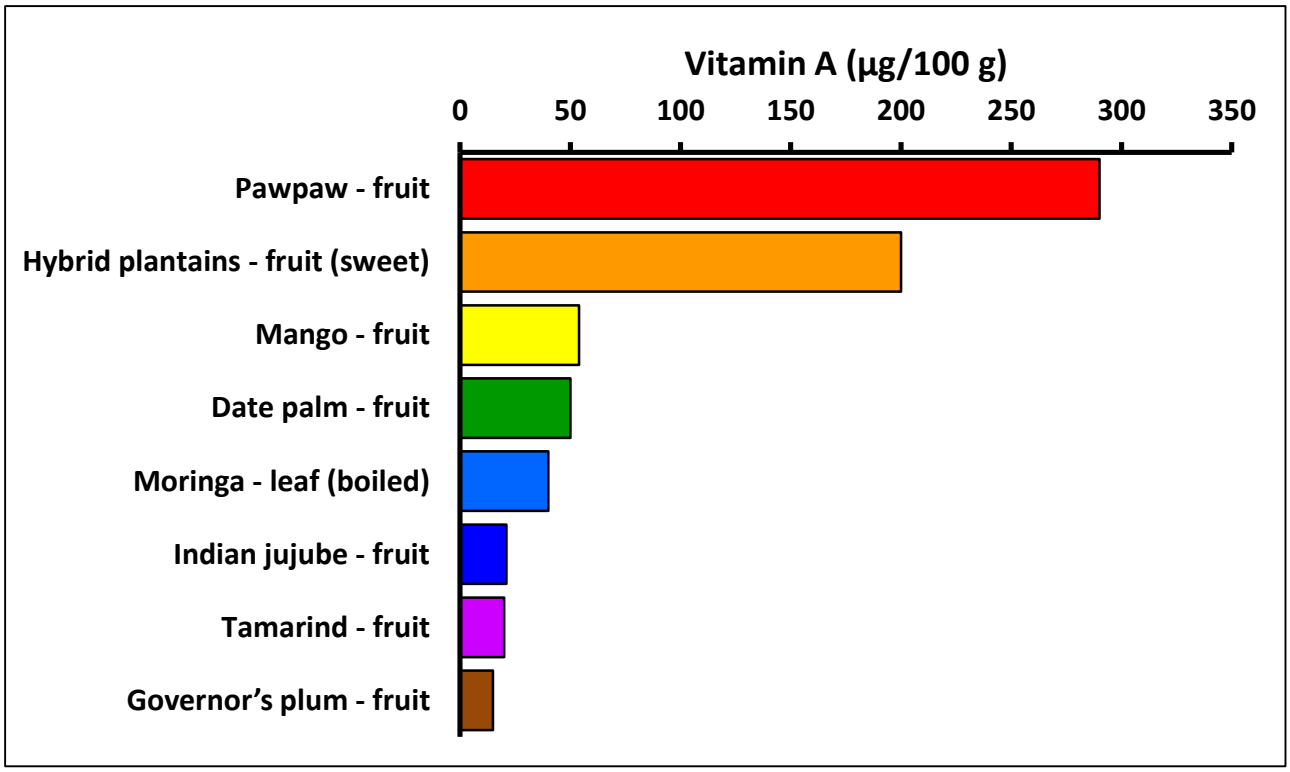
There are a large number of insects that enjoy sharing our food with us! We should not try to kill all these insects as they have an important role to play in keeping everything in nature in balance. What we need to do is to learn to manage these insects so we can all get some food to eat! Some insects are attracted to lights, and if the garden is near village lights some insects can cause a lot of damage. If large areas of one particular crop are planted, insects can breed more quickly and cause a lot of damage. As an example, insects called armyworms can breed up in large numbers on the shade trees of cacao and then move "like an army" into gardens. Some insects are large and breed slowly and can be picked off and removed. Some insects do not like sunlight. The very small moth than damages banana fruit is like this. Simply pulling off the leafy bracts over the banana fruit reduces the damage, as this lets sunlight in and the insect flies away. The best rule for reducing pest damage is to grow healthy plants, as they suffer less damage.

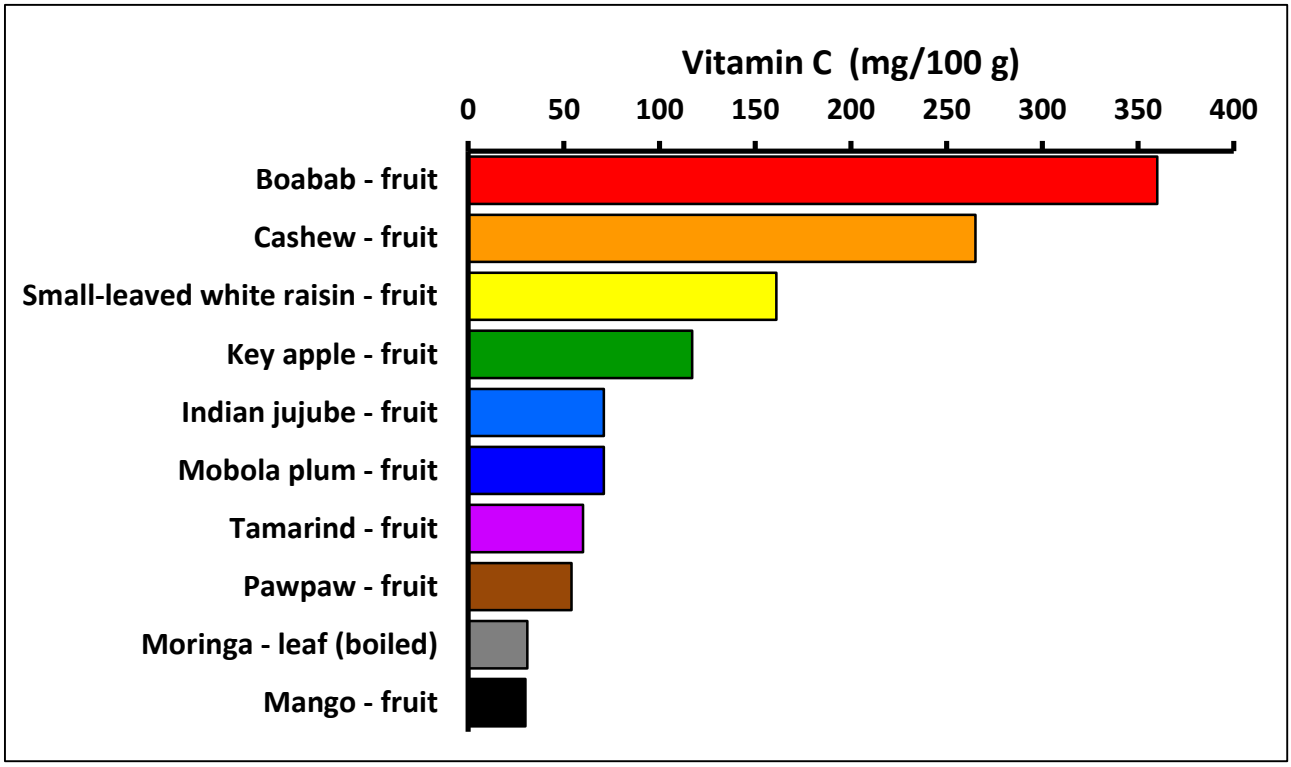
Diseases

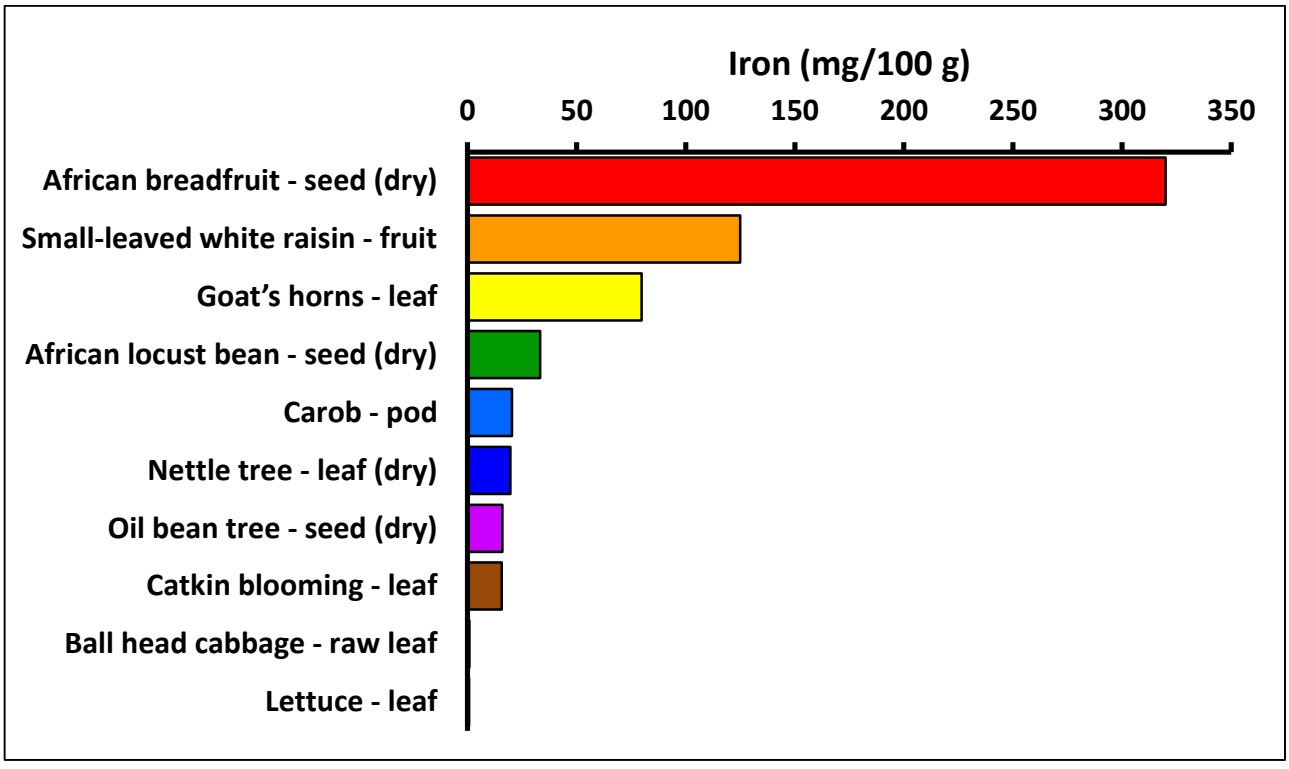
The living organisms that cause disease are much smaller than insects. These disease organisms can often only be seen with a microscope. There are three main kinds of disease organisms - fungi, bacteria and viruses. Fungi are like the mushrooms we eat, only very much smaller. They usually make distinct dry spots on leaves and other plant parts. Fungi have spores that often blow in the wind. Bacteria are often smaller and live in damp places. They usually make plants go soft and squashy, and they may cause a smell. Bacteria are mostly spread with rain and in water. Viruses are very, very small and usually make irregular stripes and patterns on leaves and other plant parts. Viruses usually spread in planting material or in the mouths of small sucking insects. The general rule is that healthy plants that are growing well will suffer less damage from disease.

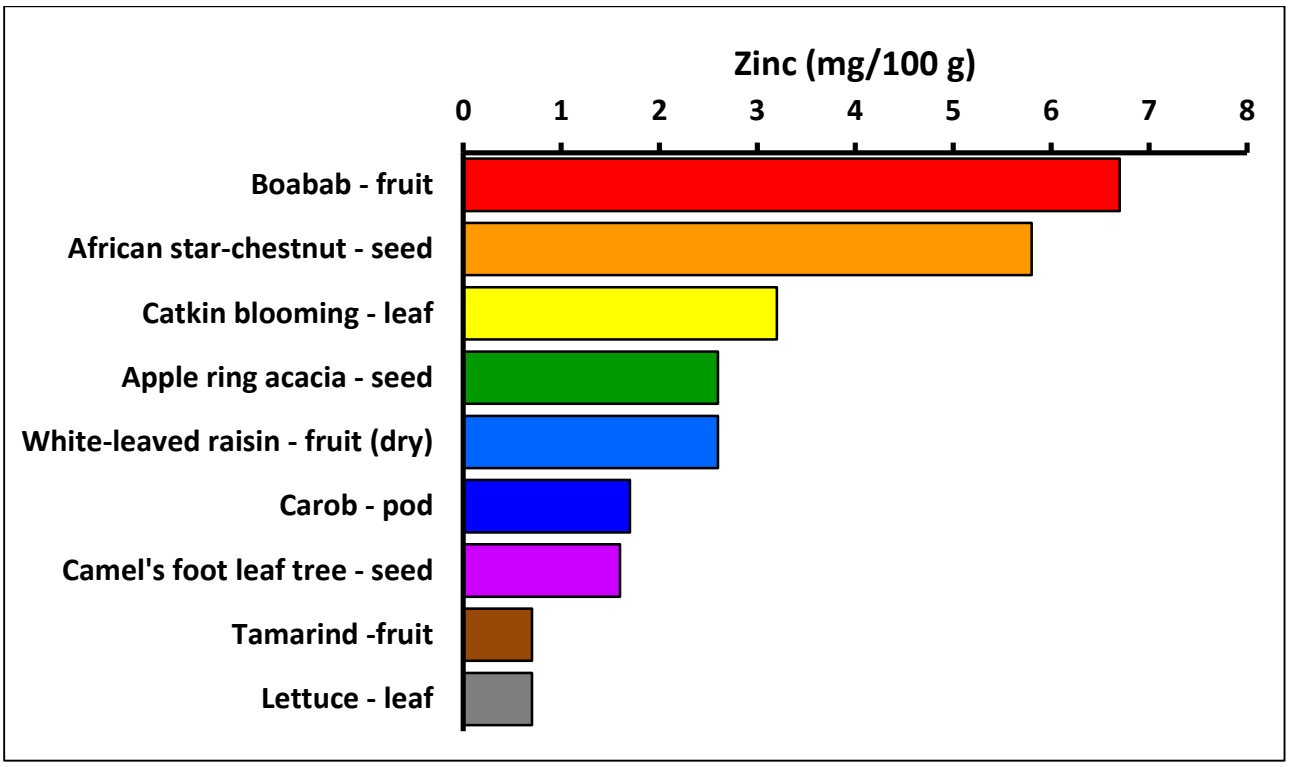
Food value charts for a selection of plants from South Sudan






Vitamin C (mg/100 g)
0
50
100
150
200
250
300
350
400
Boabab - fruit
Cashew - fruit
Small-leaved white raisin - fruit
Key apple - fruit
Indian jujube - fruit
Mobola plum - fruit
Tamarind - fruit
Pawpaw - fruit
Moringa - leaf (boiled)
Mango - fruit


Iron (mg/100 g)
0
50
100
150
200
250
300
350
African breadfruit - seed (dry)
Small-leaved white raisin - fruit
Goat's horns - leaf
African locust bean - seed (dry)
Carob - pod
Nettle tree - leaf (dry)
Oil bean tree - seed (dry)
Catkin blooming - leaf
Ball head cabbage - raw leaf
Lettuce - leaf



Note regarding plant selection: In compiling these field guides, we acknowledge that some staple foods and commercial crops which are grown widely in the target country may be omitted. Such foods are often in the starchy staple category (e.g. rice, corn). This does not mean that they are not useful, but merely reflects a desire for the Food Plant Solutions project to concentrate on plants that are less well known and/or underutilised.

Starchy staples

English: African breadfruit / Jackfruit
Dinka: Penne in from uganda
Arabic:

Scientific name: *Treculia africana*
Plant family: MORACAE

Description: An evergreen tree. It grows to 15 - 30 m tall. It can grow up to 50 m tall. It has a dense spreading crown. The trunk is fluted. The bark is dark grey and smooth. It is thick and produces a white latex when cut. This later turns rusty red. The leaves are simple and alternate. They are very large. Leaves can be 30 cm by 14 cm or larger. They are dark green and smooth above but paler and slightly hairy underneath. The leaves are tough. They have 10 - 18 pairs of clear veins. The leaf stalk is 1.5 cm long and the leaf tip is pointed. Young leaves are red or yellow. The flower heads are rounded ad a yellow-brown. They are 2.5 - 10 cm across. Male and female flowers are usually separate. Flowers can grow in the axils of leaves or on older wood down to the trunk. The fruit is a compound fruit. It is rounded and very large. It can be 30 - 45 cm across. It grows on the trunk and main branches. Inside there are many orange seeds about 1 cm across. They are in a spongy pulp. The outer fruit surface is covered with pointy growths.

Distribution: A tropical plant. It suits hot, tropical lowland climates. It grows in forests near rivers. It can grow in swampy areas. It grows from sea level up to 1,500 m in Uganda or 1,200 m in Tanzania.

Use: The seeds can be dried, fried and eaten. They are also boiled, roasted or ground into flour. The flour is used in soups and nut milk. An edible oil can be extracted from the seeds.

Cultivation: Plants are grown from seed. Seed can be planted in pots then transplanted or they can be sown direct. There are about 5,000 seeds per kg. Seeds will only store for a few weeks but seed treatment is not needed before sowing.

Production: The tree is fairly fast growing. A fruit can weigh 12 kg.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed (dry)	9.2	1555	12.6	-	-	320	-

Starchy staples

English: Mobola plum
Dinka:
Arabic:

Scientific name: *Parinari curatellifolia*
Plant family: CHRYSOBALANACEAE

Description: A tree which grows up to 12 - 20 m tall. The trunk is clean. The bark is rough and fire resistant. The young branches are hairy. The leaves are simple and oblong. They are 4 - 11 cm long by 2 - 5 cm wide. They narrow towards the base. The upper surface is shiny dark green and the lower surface is dull and covered with felt. The veins are conspicuous and run straight to the edge of the leaf. The flower buds occur in sprays at the ends of the branches. The flowers are pale green and have a strong sweet scent. The fruit are 2.5 - 4 cm long. They are olive green covered with rough grey spots. They become yellowish-red when ripe. The flesh of the fruit clings to the kernel. The fruit are edible. There are 2 subspecies.

Distribution: A tropical plant native to tropical Africa. It is common on sandy soils and in open deciduous woodland. It is very sensitive to frost and cold. It grows in areas with an annual rainfall between 700 - 1,500 mm. It is often in poorly drained soils with a high water table. Plants can re-grow after fire. It grows in areas between sea level and 2,100 m above sea level. It can grow in arid places. It grows in Miombo woodland in Africa.

Use: The fruit are eaten. The fruit are gathered after they fall. The skin and seeds are discarded but the pulp eaten. The fruit are used to make drinks - both intoxicating and non-intoxicating. The seeds are used for flavouring and as raw nuts.

Cultivation: Plants can be grown from seeds. Seeds should be collected fresh from fruit on the tree. The flesh is removed and the seeds dried in the shade. The seeds are sown shallowly. The seedlings need to be transplanted carefully to avoid damage to the taproot. They can be transplanted after 2 years.

Production: Trees from seed can reach 3.9 m after 9 years. Fruit production often only occurs every second year. Fruit matures in 250 days.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
nut	2.6	2737	28.7	-	-	5.5	3.1
fruit	64.6	533	1.6	-	70.9	0.9	0.4

Image accessed from: http://www.plantzafrica.com/plantnop/parinaricurat.htm

Starchy staples

English: Date palm
Dinka: Akarap
Arabic: Belah, Nakhla

Scientific name: *Phoenix dactylifera*
Plant family: ARECACEAE

Description: An unbranched, evergreen palm that grows to 30 m tall. The trunk can be 30 - 40 cm across. The trunk is covered with fibres and has the bases of old leaves along it. It produces suckers on the trunk and at the base. The fronds are grey-green. The leaves are 6 - 7 m long. The leaflets are 20 - 40 cm long. They are spaced in two irregular rows along each side of the stalk. Male and female flowers are produced on separate trees. The flowers spadices are yellow-brown. There are 1,000 - 1,500 fruit in a cluster. The fruit is small, brown and very sweet. It has one grooved seed. The fruit is 2.5 - 5 cm long. When ripe, the fruit is dull yellow and the flesh soft. The skins of the fruit darken when dried. Strands of fruit have 25 - 35 dates. The fruit are edible.

Distribution: They suit dry, subtropical climates. It needs hot, dry arid climates while fruit mature. It can tolerate salty or brackish water. It can also grow in alkaline soils but with reduced yields. In cold temperate regions the palm grows but rarely flowers. It does best in areas with long dry summers and sufficient heat for fruit to ripen. It should not have rain during flowering and fruit set. It needs 3,400 heat units above 10°C for fruit to fully mature. It suits plant hardiness zones 9 - 12.

Use: The fruit is eaten fresh or dried. They are also used for jams and preserves. The date stones can be fermented or roasted and used as a coffee substitute. They can be pressed for oil. Dates are also pressed for juice. The sap is used for jaggery and sugar. The male flower can be eaten. The pollen is eaten.

Cultivation: Plants are grown from seed and take 4 - 5 months to germinate. They begin bearing 5 - 6 years after planting and reach full production by 15 years. A palm lasts about 80 years. Female plants need to be pollinated before they bear fruit. A single male is sufficient to pollinate 50 females. Taking suckers from good producing plants is a more reliable means of growing new plants. A well-established palm can give 8 - 18 good suckers over a 6 year period. These suckers should have some leaves cut off during transplanting. About 10% of plants should be male, for pollination. Selection of a good pollinator tree is important. Fruit thinning is often needed to give good sized fruit. Three to four bunches per tree are sufficient.

Production: Trees take about 6 years to reach good production. There can be 45 - 70 kg of fruit per tree. Trees continue to bear for 50 years.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit (dry)	22.5	1151	2.0	5	-	1.2	0.3
fruit	58.5	598	0.9	50	6	1.3	-

Starchy staples

English: Maroola plum / Marula tree
Dinka: Gumel
Arabic: Akamil

Scientific name: *Sclerocarya birrea*
Plant family: ANACARDACEAE

Description: A shrub or tree. It grows 9 m high and spreads 6 m wide. It can be 15 m tall. It loses its leaves during the year. The crown is dense and rounded. The bark is grey and finely cracked. The leaves have leaflets along the stalk. The leaves are near the tips of the branches. The edges of the leaflets can be wavy. Plants are separately male and female. Female flowers are reddish and on long stalks at the ends of branches. The fruit are oval or round and 3 - 4 cm long. They are green but turn yellow as they ripen. The skin is tough and leathery. The pulp is juicy and white. There is one large stone. There are some subspecies.

Distribution: A tropical plant. It grows in the lowlands. It grows in equatorial Africa. It grows in dry areas. It grows in the Sahel. It can grow in arid places. It grows in Miombo woodland in Africa.

Use: The fruit are eaten. The juice is also fermented to produce a cider-like drink. The oily kernel is eaten.

Cultivation: Plants can be grown by seeds but the seeds do not easily germinate. They need to have a hole cut in the hard seed coat or put into sulphuric acid. The seeds can be soaked overnight in water before planting. It can be grown from cuttings and root suckers. Using fertilizer, manure and early irrigation reduce the survival and growth of young plants. They are adapted to low fertility and seasonal rainfall.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
kernel	3.9	2704	28.3	-	-	0.4	-
fruit	87.0	226	0.5	-	-	-	-

Image sourced from: www.plantzafrica.com

Starchy staples

English: Hybrid plantains
Dinka: Muuth
Arabic: Musa

Scientific name: *Musa x paradisiaca*
Plant family: MUSACEAE

Description: These are the main group of cultivated bananas. They can be classed into diploid, triploid and tetraploid kinds with various amounts of the A or B parents. They grow 2 - 9 m tall. They are large non-woody herbs with broad long leaves. Most kinds have several suckers. Bananas grow a soft firm false stem from an underground corm. The fruiting stalk eventually emerges from the top of this false stem and normally curves over to point towards the ground. Fruit occur in clumps or hands along this stem. The male flowers are in a red bud at the end of the flower stalk. The colour of the stem, bracts, bud and fruit varies considerably depending on the variety. The fruit can be 6 - 35 cm long depending on variety. They can also be 2.5 - 6 cm across.

Distribution: A tropical and subtropical plant that grows from sea level up to about 2,000 m altitude in the tropics. They are rarely an important food above about 1,600 m. They do best in warm and humid tropical climates. Temperatures need to be above 15°C. The best temperature is 27°C. The maximum growing temperature is 38°C. Bananas grow best in full sun. For best growth, a rainfall of 200 - 220 mm per month is needed. A deep friable soil is best. They can tolerate a pH of 4.5 - 7.5. It suits hardiness zones 10 - 12.

Use: Fruit are eaten raw or cooked depending on variety. Male buds and flowers are eaten on some varieties. They are cooked as a vegetable. The central pith of the false stem and the underground rhizome are also sometimes eaten. Although it has little food value, the corm can be boiled, dried and eaten with the false stem.

Cultivation: They are planted from sword suckers. Diploids need re-planting annually but many triploids can be re-suckered from the base on the same site. Spacing depends on variety. A population of 1,000 – 3,000 plants per hectare is used, depending on variety. Suckers are usually planted 30 cm deep.

Production: Time to maturity varies from 6 - 18 months depending on variety and altitude. Triploids have larger bunches than diploids. Tetraploids are very large plants.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit (cooking)	65.3	510	2.0	113	18.4	0.6	0.1
fruit (sweet)	70.7	337	1.1	200	10	0.4	0.2
stem	88.3	176	0.5	-	7	-	-
flower bud	91.3	109	1.6	-	-	1.0	-

Starchy staples

English: Chewing gum tree
Dinka: Adook
Arabic: Arabic gum

Scientific name: *Azanza garckeana*
Plant family: MALVACEAE

Description: A bushy shrub or small evergreen tree that grows 3 - 10 m tall. The bark is brown and rough. The small branches have shaggy, woolly hairs. The leaves are alternate and simple, with 3 - 5 lobes. They can be 20 cm long by 20 cm wide. There are hairs on both surfaces. The leaf stalk is 13 cm long. The flowers are yellow and turn orange with age. They have a maroon patch at the base of each petal. They are 6 cm across. They occur singly in the axils of leaves. The fruit is an almost round, woody capsule. It is 2.5 - 4 cm across. They have dense short hairs. They are divided into 5 sections. They are yellowish to brownish-green when mature. The fruit are edible.

Distribution: It is a lowland tropical plant. It grows in savannah country. It grows in hot arid places and in areas with an annual rainfall of 255 - 1,270 mm. It often grows in termite mounds. It grows in Miombo woodland in Africa.

Use: The whole fruit, except the seeds, is chewed like chewing gum. A sweet slime is produced. The seeds are not edible. The fruit need to be fully ripe. The hard outer layer is peeled off. Dried fruit are used for jellies. They are cooked and eaten in large quantities during famines. The fruit can be boiled, and dried with a little salt added, and then stored for about 4 months.

Cultivation: Plants can be grown from seeds. It is best to remove the seed coat. Seeds germinate in 20 - 60 days. Seedling trays should not be kept too moist. Seedlings can be transplanted at the 3 leaf stage. Often seeds are sown directly in the field.

Production: It is reasonably slow growing.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	14.8	1042	5.0	-	-	5.0	0.4

Legumes

English: Apple ring acacia / The fertiliser tree
Dinka:
Arabic: Haraz, hiraz

Scientific name: *Faidherbia albida*
Plant family: Fabaceae

Description: A very large spreading tree that grows 20 - 31 m tall. The trunk is light grey and can be 1 m across. The leaves are fine and drooping and can be light green or blue-green. The twigs are white and smooth. It has thorns which are straight and 4 cm long. They are white at the base and brown at the tips. They occur in pairs. Each leaf has 4 - 8 side branches although there can be 2 - 12 branches. These carry 6 - 23 pairs of small oblong leaflets. The leaf stalk does not have glands. It is leafless during the rainy season and has leaves during the dry season. The flowers are long cream spikes. The pods are large, about 10 cm long by 2.5 cm wide. They are red brown and twisted or almost curled into a ring. The pods do not burst open. The pods contain several hard shiny seeds. These are edible after processing. The seeds are 9 - 11 mm long by 6 - 8 mm wide.

Distribution: A tropical plant that mostly grows on river banks and river flats and can grow on sandy soils. It can be damaged by frost. It grows in dry savannah but prefers damp sites and river banks. In southern Africa it grows from 40 - 1,070 m altitude. It grows in areas with an annual rainfall between 20 - 1,800 mm. It can grow in arid places.

Use: The seeds are boiled, then re-boiled and the skins removed then eaten in times of food scarcity. This is done to remove toxic components. The pods are sometimes eaten. The pods are used for flavouring. **Caution:** The seeds can contain hydrogen cyanide and need to be cooked.

Cultivation: Plants can be grown from seeds. The seeds are put in boiling water and soaked overnight then planted. It can be cut back and will re-grow.

Production: Trees grow quickly. They can be 7 m tall in 3 years. It develops its first fruit after 2 - 15 years. A large tree can yield a ton of pods.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	6.5	1437	24.8	-	-	6.8	2.6

Legumes

English: Dila
Dinka: Akondok
Arabic: Mokheit

Scientific name: *Boscia senegalensis*
Plant family: CAPPERACEAE

Description: An evergreen shrub. It normally grows 1 - 2 m high but can be 4 - 10 m tall. It has a spreading round crown. The young twigs have short soft hairs. The bark is smooth and grey. The leaves are a matt green colour. The have many distinct veins. They are oval and 12 cm long by 4 cm wide. Under the leaf the veins are white and form a many-sided pattern. The flowers are hairy and greenish white. They occur in small clusters on small stalks. The fruit are round berries about 1.5 cm across. They become yellow when mature. They have a hard crust. The flesh lets light through and is jelly like. There are usually 1 - 2 seeds per berry. The seeds are flattened on the under-side. There are 2500 - 3500 seeds per kg.

Distribution: It is a tropical plant. It grows naturally in the dry savannah regions of Africa. It grows in the Sahel and the Sahara. It can tolerate very high temperatures. (40 - 45°C). Plants grow from sea level to 1300 m altitude. They grow best with a rainfall of 250 - 600 mm but can grow with rainfalls of 100 - 300 mm. They grow on a range of poor arid soils.

Use: The outer flesh of the berries is eaten while they are young. The seeds are used as a famine food in emergencies. They need to be treated. They are soaked for several hours with several changes of water. The seeds are then boiled with potash then soaked in cold water. The roasted seeds are used as a coffee substitute. The leaves are sometimes eaten after crushing in water, drying then reduced to a powder and cooking.

Cultivation: Plants are mostly self-sown from seed. They can also be grown from stem cuttings.

Production: Flowering occurs in the cool dry season. Fruit ripen at the beginning of the rainy season.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	11.4	1425	21.2	-	-	6.8	-

Image sources from: https://commons.wikimedia.org/wiki/File:Boscia_senegalensis_fruits.jpg

Legumes

English: Desert date
Dinka: Thou, Apamthou
Arabic: Higlig, Lalob

Scientific name: *Balanites aegyptiaca*
Plant family: ZYGOPHYLLACEAE

Description: A small, spiny, evergreen tree that grows 6 - 15 m tall. It produces a rounded crown of tangled thorny branches. The bark is dark brown or grey and has patterns on it. It becomes corky and cracked with age. The branches are stiff and brittle and have stout, single spines up to 8 cm long. The thorns are soft at first then become woody. The leaves occur as distinctive pairs of grey-green leaflets. They are 2.5 - 6 cm long by 1.5 - 4 cm wide and are leathery and slightly hairy. The leaves are slightly different shape in each half. There are 4 - 6 prominent veins which are clearly seen on the underside of the leaf. The flowers are in small, hairy clusters. They are 1.4 cm across. They are yellow-green and have a sweet smell. The fruit is yellowish-green and 5 cm long by 2.5 cm wide. The fruit are date like. Both ends of the fruit are rounded. There is a hard pointy seed about 4 cm long by 2 cm wide. The flesh around the seed is yellow and bittersweet. The seed is easily separated from the flesh.

Distribution: A tropical plant that is found all over Africa. It grows in the lowlands and Miombo woodland in Africa. It occurs from arid to sub-humid areas. It suits hot, dry areas, such as the Sahel. It grows from sea level to 2,000 m altitude. It prefers valley soils but will grow on a range of soils. It suits a rainfall of 200 - 800 mm. It needs an average temperature of 20 - 30°C.

Use: The nut or seed is used to make meal. The seeds are boiled in several changes of water then eaten with sorghum. A yellow edible oil is produced by the seeds after long boiling. The fruit and dried pulp are eaten. The fruit is bitter unless very ripe. The fruit are used for syrup and alcoholic drinks. The leaves and flowers are eaten as a vegetable. The resin from the cut bark is chewed. The fruit can be used to treat water supplies to kill the snail hosts of Bilharzia, and the water-flea which carries Guinea worm disease.

Cultivation: It is grown from seed, either in a nursery in pots, or direct. Root suckers can also be used. There are 600 - 1,200 seeds per kg. Seed removed from the fruit can be stored for a year. Seed should be sown vertically with the stem end down for best results. Seeds germinate in 1 - 4 weeks. Soaking the seed helps them germinate. They can be soaked in cold water for 2 days with the water being changed after 24 hours. Seedlings are slow growing but root suckers are faster.

Production: Trees produce after 5 - 8 years. Fruit mature in 60 days. In Tanzania, fruit are collected between April and June. A good tree can produce 10,000 fruit in one year. Ripe fruit can be sun dried and stored. Seed kernels can be 60% oil.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	63.5	249	10.5	-	-	4.9	0.4
nut (dry)	5.0	2286	23.0	-	-	7.0	-
fruit (dry)	19.0	1150	5.0	-	-	3.1	-
fruit	64.0	510	2.2	-	-	-	-

Legumes

English: Carob tree
Dinka:
Arabic: Khurub

Scientific name: *Ceratonia siliqua*
Plant family: FABACEAE

Description: An evergreen tree that grows 12 - 15 m tall and up to 4 m across. It has a dark green round crown of compound leaves that almost hide the trunk. The trunk is short, erect and thick. The leaves are leathery. The tree flowers in autumn. Male and female flowers are on separate trees. They grow in flower clusters on the previous year's growth. The flowers are small and red. The pods develop in spring and are 30 cm long and 2.5 cm wide. They are thick, brown, rough and leathery. The seed are constant in size and were used for the carat weight (200 mg). There are several cultivated varieties.

Distribution: It is a subtropical plant that is native to Arabia. It suits warm temperate zones and hot, semi-arid regions. It tends to grow in rocky places near the sea shore. It needs a well-drained, moderately fertile soil. It does well on calcareous soils but can grow in alkaline soils. It is commonly seen on deep chalky soils where the limestone is cracked. It is very drought resistant and has deep roots that find moisture. It grows in areas with an annual rainfall of 300 - 4,030 mm. It can tolerate some salt spray. It is frost tender. Symbiotic relationships with soil bacteria enable it to fix nitrogen. It does not fruit well in high rainfall areas. It grows in Miombo woodland in Africa. It suits hardiness zones 8 - 11.

Use: The sweet seed pods can be eaten green or dried. The pulp can be used as a chocolate substitute. The seed can be ground to make flour. An edible gum can be extracted from the seed. It is a thickening agent and egg substitute. The roasted seed is a coffee substitute. The leaves can be used as a green vegetable. **Caution:** The leaves are probably purgative. The pods contain tannin and can be toxic in large amounts.

Cultivation: Plants can be grown from seed. Seed should be pre-soaked for 24 hours in warm water prior to sowing. They should be sown in soil at about 30°C. Germination can take 2 months. Better yielding shoots can be grafted into seedling rootstock. Cuttings can also be used. These should be from firm shoots 10 cm long. A spacing of 7 - 10 m is suitable.

Production: It is very slow growing. Mature trees can yield 400 kg of seedpod per year. Fruit are produced after 10 - 12 years when grown from seed. Grafted trees bear fruit in the fifth or sixth year. Trees can remain productive for 80 - 100 years. Pods are usually shaken off the tree. They are sun dried for 1 - 2 days.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	6.9	1534	4.8	-	-	-	-
pod	11.2	753	6.5	-	-	20.3	1.7
flour	11.2	753	1.4	-	-	-	-

Legumes

English: African locust bean
Dinka: Akon
Arabic: Um Rashad, Mudus

Scientific name: *Parkia filicoidea*
Plant family: FABACEAE

Description: A deciduous tree that grows up to 35 m tall. It has a spreading flat crown. The trunk has small rounded buttresses. The grey to yellow-brown bark can be scaly or smooth, and becomes dark and cracked with age. The bark has an orange coloured resin. The leaves are feathery. A leaf is made up of 6 - 9 pairs of leaflets each divided into 16 - 24 pairs of smaller leaflets. These are about 2 cm long and 5 - 8 mm wide. The flowers are small and in bright red club shaped heads. These hang down on stalks 30 cm long. The flower heads are up to 8 cm long. The fruit are dark brown to purple pods which hang down in clusters. They are 30 - 60 cm long and 2 cm wide with their stalk. The pod is narrowed slightly between the seeds. The seeds are red-brown in a dry, mealy, edible, yellow pulp.

Distribution: A tropical and subtropical tree of lowland rainforests. It grows in Africa in forests near streams. It occurs in sub-humid and humid places with an annual rainfall of 950 - 1,750 mm annually. It grows from 250 - 1,370 m above sea level. It can grow in arid places.

Use: The pods and the pulp are eaten. The seeds are boiled and fermented then eaten. This has a strong smell but is removed by frying or roasting. The seeds can also be powdered and used for flavouring soups and rice dishes. The leaves are cooked as used as a vegetable.

Cultivation: Plants can be grown from seed. The pod is crushed and the seed removed from the pulp. The seed they should be boiled briefly, then allowed to cool and soaked for 12 hours, before sowing.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed (dry)	7.0	1780	32.3	-	6	33.2	-
fruit	13.2	1263	3.4	-	-	3.6	-

Image accessed from http://farm8.staticflickr.com/7277/7804911110_92bcd0012a_b.jpg

Legumes

English: Oil bean tree / African oil bean
Dinka:
Arabic:

Scientific name: *Pentaclethra macrophylla*
Plant family: FABACEAE

Description: A large tree, with a spreading crown, that grows to 30 m tall. The leaves are twice divided. There are 12 - 20 pairs of secondary leaflets. The flowers are in groups 30 cm long in the axils of leaves or at the ends of branches. The fruit are pods 40 - 60 cm long. There are 5 - 8 purplish-brown, flat, oval seeds, 4 - 7 cm long by 2 - 3 cm wide.

Distribution: A tropical plant that grows in tropical Africa from sea level to 500 m altitude. It needs temperatures above 18°C. An average temperature of 25°C and an annual rainfall of 1,500 - 2,000 mm per year is best. It grows best on a well-drained soil but can tolerate waterlogging. It can grow in acid soils and arid places.

Use: The seeds (with skin removed) are soaked in water, then ground and cooked in leaves. They are also shredded and fermented. The seeds are rich in oil that is used in cooking. The seeds are used as a condiment.

Cultivation: Plants are grown from seed. Fresh seed should be used. Seed can be stored for 3 months at 15°C. They can be grown from cuttings, air-layering or budding. Young stem cuttings need to be used and rooting hormone helps.

Production: Trees from cuttings can produce seed after 4 years. Harvesting pods can occur throughout the year but is a difficult task.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed (dry)	6.2	2332	22.6	-	-	16.0	-

Image accessed from
http://database.prota.org/PROTAhtml/Photfile%20Images%5CPentaclethra%20macrophylla%20fruit%20and%20seed.JPG

Legumes

English: Camel's foot leaf tree
Dinka: Pac
Arabic: Abu Khamira/Khuf

Scientific name: *Bauhinia thonningii*
Plant family: FABACEAE

Description: It is a leafy shrub or a spreading tree. It loses its leaves during the year. It can grow to 12 m tall. The leaves are broad and lobed. The bark is rough and brown. The leaves are simple and can be 20 cm across. The tip of the leaf has lobes and the base of the leaf has notches. The veins spread out from this notch. The upper surface of the leaf is green and the lower surface a lighter colour and with red veins. The leaves are on thick stalks. The male and female flowers are carried separately. The male heads have fewer flowers than the female. The flower buds are fat and oval. They are velvety and in long strings on sturdy stalks. The flowers are 2.5 cm wide. Only one or two flowers open at one time in a bunch. They hang downwards and drop off easily. The pods are large and woody. They are up to 23 cm long by 8 cm wide. They are green but turn brown. They are covered with tiny raised lines. The pods do not break open but fall off. The pods and seeds are edible.

Distribution: A tropical plant. It grows in open woodland and often near streams. It grows in the Sahel. In Ethiopia it grows at low and medium altitudes especially between 900 - 1,700 m. It cannot stand cold temperatures or frost and is tolerant of drought. It grows in areas with an annual rainfall between 400 - 1,200 mm. It can grow in arid places. It also grows on termite mounds. It grows in the lowlands. It grows in Miombo woodland in Africa.

Use: The dried pods and seeds are eaten when food is scarce. The young leaves are chewed to relieve thirst. The bark and dried leaves can be used to make tea.

Cultivation: Plants can be grown from seeds. The seeds are removed from a dry pod by breaking it open with a hammer. The seeds are put in hot water and soaked overnight. Then they are planted. Seeds germinate in 5 - 10 days. Seedlings are transplanted when the first adult leaves appear.

Production: It grows slowly. Fruit are produced during the rainy season.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Seed	9.9	1381	22.7	-	-	4.7	1.6
pod	7.0	1079	4.8	-	-	6.8	0.3

Legumes

English: Scotsman's rattle
Dinka:
Arabic: Hashrajat almawt

Scientific name: *Amblygonocarpus andongensis*
Plant family: FABACEAE

Description: A large spreading tree. It can be 15-20 m high. The bark is dark and scales into squares. The leaves are compound. They have 2 - 5 pairs of stalks each with 4 - 7 pairs of leaflets. The leaflets are rather large. They are oblong and 3 cm long by 2 cm wide. The flowers are of both sexes. They are cream and in spikes in the axils of leaves. They can be in pairs and hang down. The fruit is a very distinct pod. It is 17 cm long by 3.5 cm wide. They are glossy brown with 4 marked ridges. This makes the pods almost square in cross section.

Distribution: It is a tropical plant. It grows in low altitude deciduous forest. It is often on Kalahari sands. In Zimbabwe it grows up to 1,370 m above sea level.

Use: The pods are gathered as they fall in the wind. The seeds are roasted and eaten whole, or pounded into a dry powder and usually seasoned with salt.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	-	1708	12.1	-	-	15	-

Leafy greens

English: Moringa
Dinka:
Arabic: Shajarat alfajl

Scientific name: *Moringa oleifera*
Plant family: MORINGACEAE

Description: A small, soft-wooded tree that grows 9 - 12 m tall. The tree loses its leaves during the year. The bark is grey, thick, corky and peels off in patches. The leaves are pale green and the leaf is divided 3 times. The whole leaf is 30 - 60 cm long and the leaflets are usually oval and 1 - 2 cm long. The leaflets are jointed with a gland near the joint. The flowers are pale yellow. They occur in long sprays 30 cm long. Each flower has 5 petals and of these one is erect and 4 are bent backwards. The fruit is a long capsule 30 - 100 cm long by 2 cm wide. The seed capsules are up to 45 cm long. They are roughly triangular in shape. The seeds have 3 wings. Often the fruiting kinds are grown as annual plants.

Distribution: A tropical and subtropical plant. They suit the dry lowland areas and grow up to 1,350 m altitude in the tropics. They are not hardy to frost. They cannot tolerate water-logging. A pH of 6 - 7.5 is suitable. It can grow in arid places. It suits hardiness zones 9 - 12.

Use: The young tops and leaves are eaten cooked. They are eaten as potherbs or used in soups and curries. They can be dried and stored for later use. The very young long pods are eaten cooked, especially in curries and soup. They are also pickled. The young seeds are eaten roasted or fried. Sometimes the roots are used as a horseradish substitute. A gum from the bark is used as seasoning. The bark is used for tea. The roots, leaves, flowers and fruits are eaten cooked in water and mixed with salt and chili peppers. The oil expressed from the seeds is used in salads.

Cultivation: It is best to grow plants from 1 metre long cuttings but they can be grown from seed. They can be used as a hedge and pruned regularly to produce more leaves. Properly dried seed can be stored for a long time in sealed containers in a cool place. Normally perennial types are grown from cuttings and annual types are grown from seed.

Production: Trees are fast growing. They can be pruned or topped. With one variety the tree flowers and fruits continuously while with the other variety there are flowers and fruit once per year. The fruit ripens 3 months after flowering. Annual types produce fruit 6 months after planting. Leaves are best dried in the shade to retain more of their Vitamin A.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	76.4	302	5.0	197	165	3.6	-
flower	84.2	205	3.3	-	-	5.2	-
leaf (boiled)	87	189	4.7	40	31.0	2.0	0.2
pod (raw)	88.2	155	2.1	7	141	0.4	0.5
seed	6.5	-	46.6	-	-	-	-

Leafy greens

English: Nettle tree / African celtis
Dinka: Abyei, Ariek, leer
Arabic: Ibnu, Mahagai

Scientific name: *Celtis integrifolia*
Plant family: ULMACEAE

Description: A large tree that grows to 25 m tall. The trunk is 1.5 m across and can have short buttresses. The branches occur low down. The bark is grey and smooth. The oval leaves are alternate and oblique, and taper to the tip. The twigs are green with white hairs. The flowers occur in clusters in the axils of leaves on one year old shoots. The fruit are oval, about 1 cm long, with one white seed.

Distribution: A tropical plant that grows in the Sahel in West Africa. It needs rainfall of 500 - 700 mm per year. It often grows in depressions and near waterholes. It can grow in arid places.

Use: The leaves are used in soups. Sometimes they are used with boabab leaves. Young leaves can be eaten in salads. The fresh fruit are eaten.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf (dry)	10.8	1058	8.0	-	-	19.7	-

Leafy greens

English: Goat's horns / Country mallow
Dinka: Gem thok, ladha
Arabic: Um hebiba, Um

Scientific name: *Sida cordifolia*
Plant family: MALVACEAE

Description: An erect, woody shrub that grows about 0.4 - 1 m high. It keeps growing from year to year. It is covered with short and long hairs that make the plant feel soft. The leaf stalk is 1 - 2.5 cm long. The leaves are one after the other and heart shaped at the base. They are toothed at the edge and 1.5 - 4.5 cm long. The flowers are yellow and occur in the axils of the leaves. The fruit are about 6 - 8 mm across and have 20 fine bristles on the top.

Distribution: A tropical plant that grows in open waste places in the tropics and sub-tropics. It grows in hot arid places with a marked dry season. It grows in places with an annual rainfall below 520 mm. It grows in dry sandy soils and can grow in salty soils. It grows below 1,100 m altitude. It can tolerate shade and can grow in arid places.

Use: The leaves are edible when cooked.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	6.6	1296	24.2	-	-	79.8	-

Image accessed from
http://upload.wikimedia.org/wikipedia/commons/f/f4/Sida_cordifolia_(Bala)_in_Hyderabad,_AP_W_IMG_9420.jpg

Leafy greens

English: Catkin blooming
Dinka: Aladhooc, Acinguan
Arabic:

Scientific name: *Opilia amentacea*
Plant family: OPILIACEAE

Description: A shrub or woody climber. It grows off other trees and plants. It grows to 4 - 10 m tall and has stems 20 cm across. The bark is rough and light grey. It has furrows along it and is corky. The aerial branches often hang downwards. The leaves are fairly smooth and leathery. They are 5 - 14 cm long by 2 - 5 cm wide. The midrib is prominent underneath the leaf. The leaf has a pointed tip. The leaf stalk is 0.3 - 0.7 cm long. The new leaves are bright shiny green. The base of the leaves is slightly curved backwards. The flowers are very small and yellow green. They are star shaped. They have a sweet scent. Many flowers occur together on short stalks around a central stem. These occur in the axils of leaves and are 2 - 3.5 cm long. The white-fleshed, edible fruit can occur singly or in clusters and are oval and fleshy. They are 1.5 - 3 cm long by 1.2 - 1.8 cm wide. They are pale yellow or orange when ripe. They have one seed inside. The seed is 21 mm long by 15 mm wide.

Distribution: A tropical plant that grows in tropical Asia. They occur near the beach in monsoon areas. They are often on sandy soil. They need fresh water so are often near streams. It can grow in arid places.

Use: The fruit are eaten fresh. **Caution.** If eaten in large quantities, the fruit can irritate the lips and tongue. Leaves are cooked as a vegetable.

Cultivation: It can be grown from fresh seed. The seed need to be placed on the ground surface, not buried.

Production: It fruits in the wet season. In Tanzania, leaves are collected from April to November.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	9.2	-	14.8	-	3.9	15.7	3.2

Image accessed from:
http://www.westafricanplants.senckenberg.de/images/pictures/opil_opilia_amentacea_rvbli_4_1163_e5e841.jpg

Fruit

English: Boabab
Dinka: Dunydud, Zuony
Arabic: Tebeldi, Humar

Scientific name: *Adansonia digitata*
Plant family: BOMBACACEAE

Description: A large tree. It grows up to 25 m tall. It loses its leaves during the year. The branches are thick, angular and spread out wide. The trunk is short and stout and can be 10 - 14 m around. Often the trunk has deep grooves or is fluted. The bark is smooth and grey but can be rough and wrinkled. The leaves spread out like fingers on a hand. There are 5 - 9 leaflets. Often the leaves are crowded near the ends of branches. The flowers are large and 12 - 15 cm across. The petals are white and the stamens are purple. The fruit hangs singly on a long stalk. The fruit has a woody shell. This can be 20 - 30 cm long and 10 cm across. Inside the fruit are hard brown seeds. They are about 15 mm long. The seeds are in a yellow white floury pulp. The pulp is edible. The thick roots end in fattened tubers.

Distribution: It is a tropical plant that grows in the lowlands. It grows in the hot dry regions of tropical Africa, such as the Sahel. It survives well in dry climates. It grows where rainfall is 100 - 1,000 mm a year. It can tolerate fire. It grows where the annual temperatures are 20 - 30°C. In most places it grows below 900 m altitude but occasionally grows to 1,500 m altitude. It requires good drainage. It can grow in arid places and suits hardiness zones 11 - 12.

Use: The young leaves are eaten as a cooked vegetable. The dried leaves are also used to thicken soups. The fruit pulp is eaten raw. It is also used for a drink. The flowers are eaten raw or cooked. The seeds can be eaten fresh or dried and ground into flour then added to soups. They yield a cooking oil. The shoots of germinating seeds are eaten. The young tender roots are eaten. The fattened root tubers are cooked and eaten. The bark is eaten and the dried leaves are used as flavouring.

Cultivation: Trees are grown from seed. The seed remain viable for several years but before planting the seeds must be treated to break the hard seed coat, by soaking the seeds in hot water for several minutes or by cutting the seed coat. Seeds that float in water should not be used. Seeds can be planted in nurseries in plastic bags then transplanted after 6 months. Plants can also be grown from cuttings.

Production: Trees grow quickly reaching 2 m in 2 years. Trees produce fruit after 2 - 15 years. The plant is pollinated by bats, insects and winds. Trees can last 600 or more years. Fruit can be stored for about a year.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
nut (dry)	7.8	1832	33.7	-		13.9	-
fruit	16.0	1212	2.2	-	360	7.4	6.7
leaf	77.0	290	3.8	-	50	-	-

Fruit

English: Cape fig / Wild pig
Dinka: Ngaap
Arabic: Gameiz

Scientific name: *Ficus sur*
Plant family: MORACEAE

Description: This tree varies in form. It can be a small tree up to 6 m tall in dry places or a large spreading tree up to 12 - 24 m tall in forest. It normally loses its leaves for a short period. The bark is smooth and brownish grey. It has a thick trunk and shallow spreading roots. The leaves are alternate and leathery. They are oval with a pointed tip. The leaves are 10 cm long by 3 cm wide. They can be 23 cm long by 13 cm wide. They are red when young becoming green when mature. They are smooth and sometimes slightly hairy underneath. The leaf stalks are long and with a furrow on the upper surface. Twigs and leaves have milky juice. There are only a few small male flowers near the opening of the fig and many female flowers. The fig is pollinated by a small wasp. The figs are roughly round and about 2-4 cm across. They have a prominent opening at the end. They are reddish-yellow when ripe. They hang from the trunk and old main branches. The pulp is sweet. Many figs form one long bunch.

Distribution: A tropical plant. It occurs from sea level to 1,600 m altitude. It can be up to 2,100 m. It occurs in areas where the rainfall is 700 - 1,200 mm. It grows in the Sahel. It grows in wet soils. It usually grows near streams. It cannot tolerate cold. It can be grown in sun but is best in shade. It can grow in arid places. It grows in Miombo woodland in Africa. It suits hardiness zones 10 - 12.

Use: The figs are edible but often infected with insects. They can be eaten raw. The seeds are removed. The fruit are eaten in porridge. They can be used for jam or preserves. The young leaves are cooked and eaten. The roots above the ground are eaten when young. The bark is chewed with cola nuts to reduce thirst.

Cultivation: Plants normally grow naturally from seed. The seeds are very fine. They can be grown from cuttings. Stem cuttings can be treated with rooting hormone. It can be cut back and will re-grow.

Production: Trees are quick growing. Fruit are usually collected at the end of the rainy season.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	87.0	129	1.1	-	12.0	0.7	0.4

Fruit

English: Wild custard apple / African custard apple
Dinka: Yerber, Pac
Arabic: Gisshta

Scientific name: *Annona senegalensis*
Plant family: ANNONACEAE

Description: A shrubby tree which loses its leaves during the year. It grows to 2-6 m high. The bark is grey and smooth. The young stems are hairy and orange. The older bark becomes thick and folded. It peels off to expose paler patches. The leaves are oval and blue-green. They are 18 cm long. They are curved like a spoon. Under the leaf is hairy. The leaves have a peculiar smell when crushed. The flowers are yellow green. They occur as one to three together hanging down below the twigs. The fruit is rounded and 2-7 cm across. It is smooth but divided like lots of small parts fused together. It is green when unripe and turns orange-yellow when ripe. It has a smell like a pineapple. It has many seeds. They are pale brown. The sweet pulp around the seeds is edible.

Distribution: A tropical plant. It grows in the lowlands. It is found throughout Africa. It grows in tropical and warm regions. It grows in semi-arid to sub humid regions. It grows in the Sahel. The young trees need light shade. They need well drained soil. It is a tree of the savannah regions. It grows in the lowlands. It is best with a temperature range of 17 - 30°C and a rainfall of 700 - 2,500 mm per year. It can grow in arid places. It grows best with a pH between 5.5 - 7. In Malawi it grows below 1,200 m altitude. In Kenya it grows from sea level to 1,750 m above sea level.

Use: The flower buds are eaten. They are used in soups and as a flavouring. The flesh of the ripe fruit is eaten fresh. It has a pleasant taste. The leaves are edible cooked.

Cultivation: It is grown from fresh seeds. It is probably best to grow seedlings in a nursery and then to transplant them. Seed grow easily but not all at the same time. There are 2,500 - 3,000 seeds per kg. Seed can only be easily stored for 6 months. Plants can be cut back and allowed to re-grow. Plants can be grown by root suckers.

Production: Trees are slow growing. Trees flower from October to December in the southern hemisphere. The fruit is ready from January to March. Fruit mature in about 120 days. It is best to pick fruit before they ripen and to ripen them in a dark warm place.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	77.2	329	1.7		18.1	0.7	0.3

Image accessed from: www.prota4u.info

Fruit

English: Key apple
Dinka:
Arabic:

Scientific name: *Dovyalis caffra*
Plant family: SALICACEAE

Description: A spiny shrub. It grows up to 6 - 9 m tall. It has long straight spines on the trunk and branches. They are about 3 cm long. The bark is white when young. The leaves are simple and carried one after another along the stem. The edges of the leaves roll back slightly. The leaves are dark green and glossy. Plants are separately male and female. The female flowers are 3 mm long and light green. They occur as 1 - 3 together in the axils of leaves. The male flowers are in dense short clusters in the axils of leaves. The fruit are medium sized and yellow. They are round and 2.5 - 4 cm across. The skin is tough. The fruit are edible.

Distribution: It is native to Southern and Eastern Africa. It is subtropical. It can withstand drought but cannot tolerate frosts. They grow naturally in areas with temperatures in the range 14 - 22°C. They grow between 800 m and 1200 m altitude but grow up to 2450 m altitude in Kenya. The rainfall where it grows naturally is 1000 - 1700 mm per year. It needs well drained soils. It is often on termite mounds. It can grow in arid places. It suits hardiness zones 9 - 10.

Use: The fruit are eaten fresh and used in jams and desserts. The fruit are acidic. Because the fruit are high in pectins they can be added in small amounts to help jams to jell and set. The green fruit are also pickled.

Cultivation: Plants are grown from seed. Seed are collected from fruit. The ripe fruit are cracked and allowed to rot for one week before removing the seed. There are about 20 seeds in each fruit. The seeds should be sown immediately in a nursery bed. Seedlings come through the soil in 12 days. When bushes are established they need to have their crown thinned out to allow more fruit to be produced. The trees can be used as a fence or hedge. Trees can be grown from cuttings, air layering and grafting.

Production: Trees produce fruit in 5 - 6 years from seed and 2 - 3 years from cuttings. Fruit need to be fully ripe when harvested. Fruit can be harvested after they fall. Fruit mature in 90 days.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	85.9	238	0.4	-	117	0.1	-

Fruit

English: Indian jujube / Buffalo thorn
Dinka: Laang
Arabic: Nabak

Scientific name: *Ziziphus mauritiana*
Plant family: RHAMNACEAE

Description: A medium sized thorny tree that loses many of its leaves during the year. It grows up to 12 m tall. The bark is grey, brown or pale red. Branches and the under surface of the leaves are densely hairy when young. The thorns arise from the base of the leaves. The leaves are alternate and simple. They are finely toothed. They can be oval or round and 8 cm long by 5 cm wide. The flowers are green and have a scent. They occur as 3 - 5 flowers together. The flowers are 1 - 2 cm long and on slender branches. The sweet fruit are small, oval and yellow or brown. They are 2 - 5 cm long and 2.5 cm wide. The fruit are green when young and turn yellow or brown when ripe. The pulp is fleshy, acid and edible. The fruit have one seed imbedded in the flesh in a hard stone. The fruit wrinkle on drying. Many varieties exist.

Distribution: A tropical plant that grows well on sandy soils. It can survive droughts. It grows rapidly in dry places such as the Sahel. It can tolerate temperatures up to 44°C as well as periodic frosts once the trees are mature. It grows best when the mean annual temperature is 22 - 30°C. It thrives in hot dry climates. It needs adequate water during the fruiting season. It can grow at elevations up to 1,000 m in the tropics but does best below 600 m. It grows in areas with annual rainfall of 150 - 900 mm and is most common where annual rainfall is 300 - 500 mm. It does not like excessive humidity for fruiting. It will grow on a range of soils but deep sandy loams with a pH of 7 or slightly higher are best. It can tolerate some salinity and waterlogging and can grow in arid places. It grows in most tropical and sub-tropical countries.

Use: The fruit is eaten fresh, dried, in jelly or candied. They can be used in jellies, preserves, chutney, sauces, and drinks. The unripe fruit are pickled. Young leaves are cooked and eaten. They are also used in soups. Seed kernels are eaten. The roasted seeds are used as a coffee substitute. The fruit are used to make an alcoholic drink.

Cultivation: Plants are grown from seed. The hard seed coat makes them difficult to germinate. The shell can be carefully cracked and seed should be sown fresh. They can be soaked for 50 hours or put in concentrated sulphuric acid for 6 minutes to improve germination. Seed can be sown in plastic bags then transplanted after 18 - 24 weeks. It does not transplant easily so direct planting is best. Grafting can be used. It is also budded onto the rootstocks of wild species. Light pruning during the dry dormant season is recommended to train the tree. Regular pruning in the hot dry season encourages new growth. A spacing of 6 - 12 m is recommended. For larger fruit better varieties are grafted into rootstocks of *Ziziphus nummularia* or *Ziziphus jujuba*.

Production: A budded tree fruits after 4 years and produces for 50 years. Seedling trees take a year longer to fruit. Yields of 80 - 130 kg of fruit per tree per year occur. Fruit development takes 4 - 6 months. As fruit does not all ripen at once several harvests are needed. Unripe fruit do not ripen after picking.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	77.0	360	0.8	21	71	0.4	0.4
fruit (dry)	17.4	1201	4.3	-	-	-	-

Fruit

English: Shea butter nut
Dinka: Raak
Arabic: Lulu

Scientific name: *Vitellaria paradoxa*
Plant family: SAPOTACEAE

Description: A compact deciduous tree, it grows 15 - 25 m tall and has a spreading crown. The trunk is short and stout and can be 2 m across. The corky bark is dark with cracks making it look like a crocodile skin. White latex comes out when the bark is cut. The branches bend backwards almost to the ground when the leaves are wet. The leaves are oblong with wavy edges and clustered at the ends of branches. They are 10 - 25 cm long and 5 - 8 cm wide. The leaves are leathery and shiny and reddish when young. The flowers have both sexes and are produced in the dry season before the leaves. The flowers are white and clustered at the ends of shoots. They are about 1 cm long. They have a sweet smell. The fruit are a flattened round shape and 4 - 5 cm across. The fruit stalk is 1 - 3 cm long. The fleshy layer is about 1 mm thick. When the fruit is green, it exudes latex. The fruit turns brown when ripe. There can be 1 - 4 seeds which are shiny brown with a white scar down the side. They have a white kernel and a fragile husk.

Distribution: A tropical plant that grows in hot tropical lowland in areas with a low rainfall. It is common in drier parts of equatorial Africa and occurs between latitudes 0 - 15°N. It occurs in savannah with a shallow water-table, most often between 500 and 1,000 m altitude. It grows in areas with an annual rainfall of 600 - 1,000 mm and a marked dry season of 6 - 8 months. It suits places with average temperatures of 24 - 30°C. It grows best with a minimum temperature of 21°C and a maximum of 36°C. It does best on dry alluvial sandy soils which are rich in humus. It cannot tolerate areas which flood. It can re-grow after fire. It can grow in arid places.

Use: The fruit pulp is eaten raw when very ripe or is lightly cooked after removing the seed. The roasted kernels are pounded and then ground to give an oily shea butter paste. This must be boiled, then the oil skimmed off along with the impurities. Purified shea butter is edible and used in cooking. The fat is used in margarine.

Cultivation: Plants grow naturally in several areas in Africa and are grown from seed, which germinates easily. It is best to plant seeds where they are to grow. Fresh seed are sown 5 cm deep. Young plants cannot tolerate weeds or fire. A spacing of 8 m apart is suitable, with 30 - 50 trees per hectare. Fruit are harvested from the ground as soon as they fall. The fleshy pulp rots and splits to expose the nut. Burying the fruit in a shallow pit for a few days quickens this process. The nuts are then dried for about 12 days in the sun.

Production: Seedlings are slow growing and start producing fruit after 12 - 15 years. They take 30 years to mature. Yields of 15 - 20 kg of fruit per tree are average. Trees often only produce every second or third year. The fruit takes 4 - 6 months to ripen. About 50 kg of fresh nuts will give 12 - 20 kg of dry kernels which yield 4 kg of shea butter. The fruit is collected as it falls.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
nut (dried)	6.9	2420	6.8	-	-	3.0	-
fruit (pericarp)	74.3	393	1.9	-	-	4.7	-

Image sourced from http://www.globalshea.com

Fruit

English: White-berry bush
Dinka:
Arabic:

Scientific name: *Flueggea virosa*
Plant family: EUPHORBIACEAE

Description: A shrub or small tree. It grows 4 m high. It is densely leafy. The leaves are alternate and simple. The leaf blade is round or broadly oval. They are 3 cm long by 1.5 cm wide. The male and female flowers are small and on separate plants. They are creamy-green. The fruit are slightly fleshy. They are round and white. They are 5 mm across. They are on slender stalks 4 mm long. The seeds are 2 mm long.

Distribution: It is a tropical and subtropical plant. It grows on river flats and well drained rocky slopes. It can grow in hot arid places. It needs an annual rainfall above 150 mm. It can grow in stony and sandy soils. It needs a sunny position. In Ethiopia it grows between 400 - 2,050 m altitude. It can grow in arid places.

Use: The ripe fruit are eaten raw. **Caution:** The fruit should probably not be eaten in large amounts due to the presence of alkaloids.

Cultivation: Plants can be grown from seed.

Production: It is fast growing.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	75.9	476	1.4	-	1	8.9	0.3
fruit (stewed)	85.7	96	1.1	-	31	0.8	-

Image sourced from: www.plantzafrica.com

Fruit

English: Governor's plum / Madagascar plum
Dinka:
Arabic: Bariq alhakim

Scientific name: *Flacourtia indica*
Plant family: FLACOURTITACEAE

Description: A shrub or small tree that grows 5 - 15 m tall. The trunk is crooked and low branched and armed with scattered slender spines. The leaves are alternate, pointed at the base and rounded at the tip. The edges of the leaves are toothed with rounded lobes. Leaves are dark green on top and pale green underneath. They are 6 - 17 cm long and 3 - 7 cm wide. Male and female trees occur. The flowers are small and white; occur singly or in pairs in the axils of leaves or near the ends of short branches. The edible fruit are rounded, fleshy, purple or nearly black. They are smooth and about 1 cm across. The flesh is yellowish, juicy and acid. There are 6 - 10 small flattened seeds inside.

Distribution: A tropical plant that grows in the lowlands. They thrive in dry, shrubby areas at low altitudes. Trees grow in coastal areas and up to 700 m or higher. In Africa it grows from sea level to 2,400 m above sea level. It grows in sub-tropical, broadleaved, evergreen forest. It can grow in arid places. It also grows on limestone.

Use: The fleshy pulp of the fruit is eaten raw when ripe or can be cooked and eaten or made into jelly. Fruit can be dried and stored.

Cultivation: Trees are normally grown from seed. Because the seeds have a hard seed coat it helps to scratch the seed to assist germination. Cuttings and air layering can be used. Groups of trees containing both male and female trees need to be grown from root suckers or by budding. Some kinds are self-pollinating. A spacing of 12 - 16 m apart is needed.

Production: Fruit matures in 60 - 90 days from pollination.

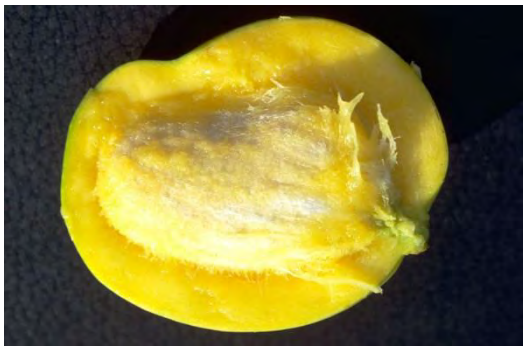
Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	69.5	452	0.5	15	14	12	-

Fruit

English: Mango
Dinka: Mango
Arabic: Manga

Scientific name: *Mangifera indica*
Plant family: ANACARDIACEAE



Description: An erect, branched evergreen tree. It can grow to 10 - 40 m high and is long lived. (Trees grown by vegetative means are smaller and more compact.) Trees spread to 15 m across. It has strong deep roots. The trunk is thick. The bark is greyish-brown. The leaves are simple and shaped like a spear. Some kinds of mangoes have leaves with a wavy edge. They can be 10 - 30 cm long and 2 - 10 cm wide. They are arranged in spirals. The leaf stalk is 1 - 10 cm long and flattened. Leaves are often brightly coloured and brownish-red when young. These tender leaves which are produced in flushes become stiff and dark-green when mature. The flower stalks are at the ends of branches. They are 10 - 50 cm long and branching. Up to 6,000 flowers can occur on a stalk. Most of these are male and up to 35% have both male and female flower parts. Fruit are green, yellow or red and 2.5 - 30 cm long. The fruit hang down on long stalks. The outside layer of the seed is hard and fibrous and there is one seed inside. Several embryos can develop from one seed by asexual reproduction. The fruit shape and colour vary as well as the amount of fibre and the flavour. India has many varieties and they cannot tolerate humidity.

Distribution: A tropical and subtropical plant. It grows in the lowlands. It grows from sea level up to 1300 m altitude in the tropics. It does best in areas below 700 m and with a dry season. Rain and high humidity at flowering reduces fruit set. It thrives best where temperatures are about 25°C but will grow with temperatures from 10 - 42°C. Temperatures of 0°C will damage young trees and flowers. Low temperatures (10 - 20°C) at flowering time will reduce fruiting. As temperatures get lower due to latitude or altitude, fruit maturity is later and trees become more likely to only have good crops every second year. Mangoes can grow on a range of soils. In wetter areas soils with less clay are better. They can withstand occasional flooding. A soil pH of 5.5 - 6.5 is best. Soils with pH above 7.5 cause plants to develop iron deficiency. It grows in the Sahel. It can grow in arid places. It suits hardiness zones 11 - 12.

Use: Ripe fruit are eaten raw. Unripe fruit is pickled. Seeds can be eaten cooked. They are boiled or roasted. They are made into meal by powdering. Young leaves can be eaten raw or cooked. Amchur is made from the dried unripe fruit. This is used in curries, and pickles and chutneys. The seed kernels are used for famine food in India. They are boiled, roasted or soaked to remove the bitterness. **Caution:** The sap from the tree or fruit can cause skin problems with some people.

Cultivation: Trees are grown by planting fresh seed and they can be transplanted. Mangoes vary in their ability to breed true from seed. When more than one seedling emerges from the seed some of these are asexual and breed true. Clean seed germinate best if they are treated at 50°C for 20 minutes, then planted on their edge with the round bulge upwards and near the soil surface. The husk around the seed should be removed. Seeds germinate in 3 - 6 weeks. The strongest growing seedlings from this seed are used and the others thrown away. The seedlings from the folds of the seed are vegetative while the seedling from the centre of the seedling near the stalk end may be sexual and show variation from type. Other seeds only produce one seedling and these normally vary and can be different from the parent tree. Plants can be propagated by budding, or by grafting

using in-arching. This is not easy and care is required. In wetter places, flowers need to be protected with fungicides to enable fruit to form. If organic manure is used this should not be directly in the planting hole nor immediately against the new plant. Young transplanted seedlings need regular watering. A spacing of 6 - 12 m between plants is used. Wind protection is advisable to prevent fruit rubbing and getting damaged. Trees should only ever be lightly pruned as fruit develop on new growth and heavy pruning can reduce flowering. Flowering can be brought about by foliar sprays of potassium nitrate.

Production: Seeds germinate after about 20 days. Seedling trees produce after 4 - 6 years and increase in production up to 20 years. Trees often bear better each second year. Rain at flowering reduces fruit setting. Fruiting is at the end of the year. Fruit take 4 - 5 months to mature. Fruit vary in weight from 200 - 1,000 g. Trees can produce one million flowers but only 500 fruit. Trees last for many years.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	83.0	253	0.5	54	30	0.5	0.04
leaf	82.1	226	3.9	-	60	2.8	-

Fruit

English: White-leaved raisin
Dinka:
Arabic:

Scientific name: *Grewia bicolor*
Plant family: MALVACEAE

Description: A small tree or shrub that grows 3 - 8 m tall. It often has many stems. The young branches are covered with soft hairs. The leaves are oval or sword shaped. They are smooth above and white below, with fine teeth along the edges. The leaves are 1 - 8 cm long. The flowers are in bunches and are bright yellow. They have 5 narrow petals. The edible fruit are orange-brown and 6 mm across.

Distribution: A tropical plant that grows in lowlands and highlands. It grows in drier regions such as the Sahel, with annual rainfall of 400 - 900 mm. It often grows rocky slopes near the sea. In grows on calcareous soils and is often found on termite mounds. It grows best between 800 - 1,800 m altitude. It grows in Miombo woodland in Africa and in the Sahara.

Use: The ripe fruit are eaten raw and fresh. The seeds are not eaten. The fruit are also dried as candy. The fruit juice is drunk and added to porridge. It is also fermented into beer. The leaves are eaten and are used as a binding agent for sauces. Fresh leaves are made into a tea drink.

Cultivation: Plants are grown from seeds, which need treatment to germinate well. The hard surface needs breaking. Cuttings root poorly but if they have a heel they perform better. It can be cut back and will re-grow.

Production: In Tanzania it grows between April to June.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit (dry)	13.2	1302	10.3	-	9.3	5.9	2.6

Fruit

English: Rough leafed boscia
Dinka: Akondok
Arabic:

Scientific name: *Boscia angustifolia*
Plant family: CAPPARACEAE

Description: A small evergreen tree. It grows to 8 - 12 m tall. The dark is pale grey. The trunk is fluted. The leaves are alternate or in groups of 2 - 4. They are oblong and 2 - 7 cm long by 0.7 - 2 cm wide. They are leathery. They are dark green above and much paler underneath. The flowers are small and sweet-smelling. They occur in crowded heads near the ends of branches. The fruit is round and 10 mm across. It is yellow and almost black. The seeds are in a sticky pulp.

Distribution: A tropical plant. It grows in dry type of woodland. It grows in dry sites with rainfall between 200 - 400 mm per year. It grows in the Sahel. It grows from sea level to 2,100 m above sea level. It can grow in arid places. It is often on termite mounds.

Use: The leaves are cooked and eaten. The seeds are cooked and eaten. The fruit is bitter but eaten. The stems are sweet and provide sugar. The roots can also be used to make tea.
The inner bark is used for tea and added to soups. It is also used to sweeten milk. The flowers are used as flavourings and in relishes. The flower buds are pickled in vinegar and used like capers.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	81.5	345	7.0	-	-	-	-

Image sourced from: http://www.westafricanplants.senckenberg.de/root/index.php?page_id=14&id=218

Fruit

English: Monkey guava / Jakal berry
Dinka: Cum
Arabic: Abu sebala

Scientific name: *Diospyros mespiliformis*
Plant family: EBENACEAE

Description: An evergreen tree. It grows up to 15 - 20 m tall. It can grow to 45 m tall in forests. It has a dense wide spreading round crown. The trunk sometimes has buttresses. Young branches have soft hairs. The bark is dark grey. The bark is smooth in young trees and becomes rough in older trees. The small twigs are pink. The leaves are simple. They are 4 - 17 cm long and 1.5 - 5.5 cm wide. The midrib is sunken on top and prominent underneath. The flowers occur as male and female flowers on separate trees. The male flowers occur in clusters and the female flowers occur singly. The fruit are round and 3 cm across. They have sweet edible pulp. The fruit are green and with hairs when young and become yellow or purple when ripe. They contain 4 - 6 seeds. The seeds are brown. They are oblong and flattened.

Distribution: A tropical plant. It can grow in the tropical lowlands. It occurs in tropical Africa south of the Sahara. It grows in the Sahel. It grows in semi-arid woodland. In occurs where the mean temperatures are between 16°C and 27°C. In Tanzania it grows between 350 - 1250 m altitude. It is more common where rainfall is 500 - 1270 mm per year. It does best on heavy soils. It often grows near streams and freshwater. It can grow on termite mounds. It can grow in arid places. It grows in Miombo woodland in Africa.

Use: The fruit are eaten fresh or dried. They are also made into a porridge. The fruit can be dried and stored. The seeds are also edible. The fruit are also used to make beer, or wine.

Cultivation: Plants are grown from seed. Seeds take about one month to germinate. Seeds can be covered in boiling water and left to soak overnight before planting. They can also be grown by coppicing and by root suckers. They can be grown by cuttings. Seeds need plenty of moisture to germinate well. Fruit are often collected from the ground but can be picked from the tree.

Production: Small plants are slow growing, but they grow taller after a few months. Flowering occurs during the rainy season and fruiting during the dry season. It is about 6 - 8 months from flowering to mature fruit. Fruit mature faster in hot dry places.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	64.5	523	1.1	-	-	2.0	-

Fruit

English: Pawpaw
Dinka: Papaya
Arabic: Pawpaw

Scientific name: *Carica papaya*
Plant family: CARICACEAE

Description: Pawpaw is a tropical fruit that grows 3 - 5 m tall and only occasionally has branches. The stem is softly woody with scars from fallen leaves along it. There is a clump of leaves at the top of the plant. The leaves are large (50 cm wide) deeply lobed and on leaf stalks up to 90 cm long. Trees can be male, female or bisexual. Male flowers are small and white and on long stalks. Female and bisexual flowers are on short stalks. These have no fruit, round fruit and long fruit respectively. There are three forms of long fruit. The seeds are black.

Distribution: It is a tropical plant that grows from sea level up to about 1,700 m altitude in the equatorial tropics. In cooler regions they have to be planted but in humid tropical regions are commonly self-sown. Sunlight allows germination when forest is cleared. It cannot stand frost. It needs a night temperature above 12°C and don't tolerate water-logging. Plants die after 48 hours in standing water. It needs a pH between 5 - 8 and suits hardiness zones 11 - 12.

Use: Fruit can be eaten ripe and raw. Green fruit can be cooked as a vegetable. The young leaves can be eaten cooked, but are bitter. The flowers and the middle of the stem can be eaten. Papayas contain papain which is a meat tenderiser. The dried seeds can be used as a spice.

Cultivation: Pawpaw seeds grow easily and plants grow quickly. Fresh seeds can be used. If dry seeds are used they should be soaked before planting. Seeds should be sown when temperatures are 24 - 30°C. They need a reasonably fertile soil. Seeds can be sown directly or the seeds can be put in a nursery and the seedlings transplanted. Seeds in a nursery should be sown 1 - 2 cm deep. Seedlings can be transplanted when they are about 20 cm high. Plants should be about 3 m apart. Continuous fruit production depends on fertility, temperature and moisture being adequate to maintain active growth. The fruit is produced year round but the growth and development rate decreases with temperature. The size and quality of fruit declines at lower temperatures. Pollination is by wind and insects and is not normally limiting. Normally cross and self-pollination both occur. Seeds are dispersed by birds, bats and people and remain viable for a few months.

Production: Seeds emerge in 2 - 3 weeks. Vegetative growth before flowering is 4 - 8 months. One or more fruit grow per leaf axil, about every 1 - 2 weeks under good growing conditions. With good growth, 100 fruit can be produced from one plant in a year. Pollination to maturity is about 2 - 3 months. On the coast in tropical equatorial regions, pawpaws start producing fruit after about 4 - 5 months, but in the highlands this may take 12 - 18 months. The first fruit are ready 6 - 11 months from planting. Tree life is about 2 - 3 years, although they may live for 10 - 12 years.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	75.4	378	8.0	-	140	0.77	-
fruit	88.0	163	0.5	290	54	0.4	0.18
fruit (unripe)	92.1	109	1.0	-	-	0.3	-

Nuts, seeds, herbs and other foods

English: Sebastan tree
Dinka: Akoc, Akuei
Arabic:

Scientific name: *Cordia myxa*
Plant family: BORAGINACEAE

Description: A shrubby, evergreen tree that grows to 12 m tall. The trunk can be 1 - 1.5 m wide. The leaves are broad and pointed and have teeth along the edges. The male and female flowers are white or cream and in loose panicles at the ends of branches. The fruit are small and nutlike. They are yellow, orange-pink or black and have sweet, sticky flesh.

Distribution: A tropical plant that grows on rocky soils.

Use: The leaves are boiled in water then mixed with salt and chilli peppers. The flowers, young and ripe fruit and seed kernels are eaten. They are mixed with honey to make a sweetmeat. The young fruit are pickled.

Cultivation: Plants can be grown from seed. Seeds are soaked in cold water for 6 hours before planting and then germinate in 40 - 60 days. Seedlings in a nursery can be planted out after 4 - 6 months. Stem cuttings can also be used to grow plants.

Production: It is fairly fast growing. It starts flowering when 3 - 5 years old. It flowers and fruits all year round. Fruit ripen in 30 - 45 days.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
nut (dried)	5.6	2103	34.8	-	-	-	-
fruit	66.4	577	2.1	-	-	0.3	0.6
leaf	64.0	272	5.1	-	-	7.2	-

Nuts, seeds, herbs and other foods

English: African wild mango
Dinka:
Arabic:

Scientific name: *Irvingia gabonensis*
Plant family: IRVINGIACEAE

Description: A tree that grows to 40 m high. The trunk grows to 1 m across. It has narrow buttresses. The bark is light grey and smooth. The leaves are simple and alternate, and are 3.5 - 16 cm long and 2 - 8 cm wide. The yellowish-green scented flowers are small and occur among the leaves. The fruit are 10 - 13 cm long and 3 - 4 cm wide. The fruit has a thick covering and one seed.

Distribution: A tropical plant that grows in the humid forest zone in central Africa. It grows below 1,000 m altitude. It grows in areas with a rainfall of 1,500 - 3,000 mm per year and temperatures of 25° - 32°C.

Use: The seed provides oil used in cooking. It is used to make Gabon chocolate or Dika bread. The kernels are ground and eaten in dishes of mixed vegetables. The kernels are extracted from the stones then roasted. They are then pounded and poured into a mould. This cheese is then scraped and added to boiling meat or vegetables. It is like a relish, especially for plantain bananas. The pulp of the fruit is eaten fresh.

Cultivation: Plants are grown from seed that germinate in about 14 days. It can be grown from stem cuttings under mist. Plants can also be budded.

Production: Young trees are slow growing. Fruit are usually harvested from the ground.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
nut	4.0	2918	8.5	-	-	3.4	-
fruit	81.4	255	0.9	-	-	3.4	-

Image sourced from:
https://www.researchgate.net/profile/Ebimieowei_Etebu/publication/270721748/figure/fig1/AS:295085292965893@1447365224580/Figure-1-Unripe-Irvingia-fruits-on-the-day-of-harvest.png

Nuts, seeds, herbs and other foods

English: African star-chestnut
Dinka: Boggo, Adhiak
Arabic: Baroot, Tartar

Scientific name: *Sterculia africana*
Plant family: MALVACEAE

Description: A medium to tall tree. It can be 15 m tall. It has a thick trunk. It can be 2.5 m across. The leaves are light green and crowded at the ends of branches. They are 5 - 15 cm long and 4 - 13 cm wide. They can be broadly egg shaped or 3 - 5 lobed. The lobes are pointed and the base indented. The flowers are in sprays at the ends of twigs. They are 1.9 cm across and with 5 - 6 petal like lobes. They are yellow with red stripes. The flowers are male and female. The fruit have 1 - 5 follicles or lobes. These are thick, hard, oblong pods. They have a tail like point. They open wide to reveal stinging hairs. There are blue-black seeds inside. These are edible. The seeds are rich in oil.

Distribution: A tropical plant. It often grows on hot, dry areas on rocky hills. In East Africa it grows from sea level to 1,000 m altitude. It can grow in semi desert. It can grow in arid places.

Use: The seeds are roasted and eaten. They can be eaten raw. The seeds are also pounded and sieved and the flour cooked with vegetables.

Cultivation: Plants can be grown from seeds.

Production: Seeds are collected during the dry season.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	4.2	-	24.9	-	5.1	13.3	5.8

Nuts, seeds, herbs and other foods

English: Small-leaved white raisin
Dinka: Apoor, Apormundy
Arabic: Ummageda, Gadein

Scientific name: *Grewia tenax*
Plant family: MALVACEAE

Description: A shrub that grows up to 2 m tall. It often lies along the ground. The leaves are small and nearly round. They are 5 cm long. They have 5 main veins. The tip of the leaf is pointed and the edge has teeth. The lower leaf surface has hairs. The flowers are white and occur singly. They are 2 cm across. They are on long slender branches. The fruit are orange-red, smooth and edible. They have 1 - 4 lobes. They are the size of a small maize grain.

Distribution: A tropical plant that grows in arid zones. It occurs in very dry woodland and semi-desert scrub. It grows on rocky and gravely soils. It grows in the Sahel. It is often near temporary pools. It grows in areas with over 200 mm rainfall. It can tolerate salt. In East Africa it grows between sea level and 1,500 m altitude.

Use: The fruit are eaten fresh and raw. They are also dried for eating later. They are added to grains in porridge. A drink is made by soaking the fruit overnight then pressing, sieving and sweetening the juice. The seeds are edible.

Cultivation: Plants can be grown from seeds.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit (dry)	9.2	1157	5.5				
fruit	59.1	-	4.5	-	161	125	-

Image accessed from:
http://www.southernafricanplants.net/photocollection/batch005/medium/G/TILLIACEAE_Grewia_tenax_Arandis_20090215_072_(1).jpg

Nuts, seeds, herbs and other foods

English: Tamarind
Dinka: Cuei
Arabic: Ardeib

Scientific name: *Tamarindus indica*
Plant family: FABACEAE

Description: A large spreading tree up to 24 m tall. It has a broad, dense, evergreen crown. The trunk can be 1 m across. The bark is rough and grey with a checkered pattern. The tree can lose its leaves in dry areas. The leaves are carried one after another along the branch. The whole leaf is 6 - 12 cm long and it is divided into 10 - 17 pairs of leaflets. These are oblong and without stalks. The whole leaf has a leaf stalk about 15 cm long. The leaflets are 1 - 2.5 cm long and 4 - 9 mm wide. They are a dull dark green with a rounded tip. The flowers are pale yellow with brown markings. The flowers are about 2.5 cm across and hang on long, many flowered stalks. The fruit is an oblong, thin-skinned, fleshy capsule. The brown seeds are inside this long rough surfaced, sausage-like fruit. This pod is 6 - 8 cm long and about 2 cm wide and contracted between the seeds. The pod cracks when mature. The seeds are shiny and hard. The edible pulp is date like and reddish brown.

Distribution: A tropical legume. The tree is cultivated in a number of coastal towns in the tropics as a street tree. It is probably best grown below 800 m altitude in the tropics. It is drought resistant and cannot stand water-logging. It does well on coastal dunes above high water level. It suits semi-arid areas. It grows in the Sahel and must be in frost free locations. In Kenya it grows from sea level to 1,600 m altitude. It suits hardiness zones 11 - 12.

Use: The pulp of the fruit is edible and is also used for drinks. The seeds are also edible when cooked. They can be roasted and ground into flour. The outer skin is removed. The young leaves, flowers and young pods are also edible and are eaten in curries. They are used to make dishes acid. They are used in sauces and chutneys. The young seedlings are also edible.

Cultivation: It can be grown by seeds or cuttings. It is best to sow seedlings in pots then transplant them, but seed can be sown direct. There are about 1,400 seeds per kg. Seed should be soaked in hot water or the seed coat nicked before sowing. Seed can be stored for 2 years if kept dry, cool and away from insects. Trees can be topped or cut back and allowed to re-grow. Nothing grows under the trees due to the acidity of the leaves. Trees can be grown by air layering or cuttings.

Production: Trees are long-lived and grow very slowly. Fruiting is seasonal from April to June. It takes 8 - 9 months from flowering to ripe fruit. If plants are grown for shoots, they are planted close together.

Food Value: Per 100 g edible portion

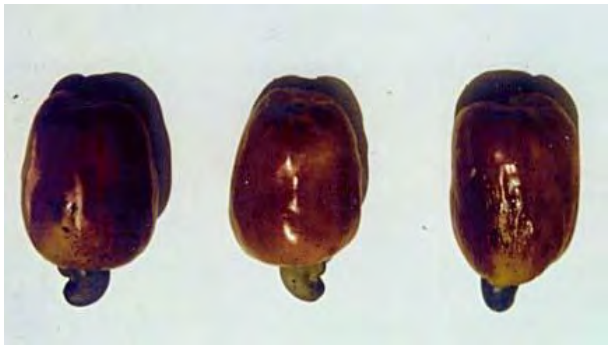
Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	38.7	995	2.3	20	60	1.1	0.7
flower	80.0	314	2.5	-	-	1.4	-
leaf	78.0	305	3.1	20	2.0	2.0	-

Nuts, seeds, herbs and other foods

English: Cashew
Dinka:
Arabic: Alkajw

Scientific name: *Anacardium occidentale*
Plant family: ANACARDIACEAE

Description: An evergreen tree, with spreading branches, growing 7 - 14 m tall. The canopy can spread to 12 m. The roots grow deeply and spread widely. The shiny leaves are pale green and large. They are 10 - 15 cm long by 6 - 8 cm wide. They have fine veins. The flowers are produced on the ends of the branches. They are red in colour. The kidney-shaped nut is about 3 cm long and is borne below the "apple" which is really a fleshy stalk.



Distribution: It is a tropical plant that suits the lowland tropics but will grow up to about 1,200 m altitude. It only bears well in dry areas because of blight of the flowers. It grows best in temperatures of 22° - 26°C. A rainfall of 1,750 mm per year is considered suitable but good yields have been obtained with rainfall of 750 mm. It can grow on poor soils but needs good drainage.

Use: The fleshy "apple" is edible but acid until very ripe. It is used for jams, drinks, candy, chutney and pickles. The nut is eaten after roasting. The young shoots and leaves are edible. They are picked during the rainy season and eaten fresh with hot and spicy dishes. **Caution:** The oil of the nut can blister the skin until roasted. The apple is used to make spirits.

Cultivation: It is usually grown from seeds. Seeds germinate poorly and slowly. Only nuts which sink in water (or a solution of 150 g of sugar in a litre of water) should be planted. Seeds are sun dried for 2 - 3 days to improve germination. Seeds can be sown in a nursery then transplanted, or more commonly, are sown directly. Trees are spaced 7 -1 0 m apart. The crop is cross pollinated mostly by insects. For good production, complete fertiliser or appropriate organic material should be applied. Pruning to shape the tree is often undertaken in the first 2 - 3 years. Cashews are often planted scattered in gardens or amongst other trees. Clearing under the tree prevents fire and makes finding nuts easier. Allowing nuts to fall before harvesting ensures only ripe nuts are collected. Resin in the cashew nut shell can damage hands and discolour the nuts. Roasting the nuts before removing the kernel avoids this.

Production: Trees commence bearing after 3 years. Fruit production is seasonal, normally October - January. Mature nuts are produced in 2 - 3 months. Yields of 80 - 200 kg of nuts per hectare are normal. Trees reach maximum production after 10 years and last for about 100 years.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
nut	4.0	2478	17.5	-	-	2.8	4.8
leaf	69.9	418	5.2	-	-	-	-
fruit	84.7	213	0.8	0.12	265	1.0	0.2

Nuts, seeds, herbs and other foods

English: Pomegranate
Dinka:
Arabic:

Scientific name: *Punica granatum*
Plant family: LYTHRACEAE

Description: A shrub that grows up to 10 m tall. It has short thorns. Trees usually lose their leaves in one season during the year. The trunk is covered by reddish-brown bark. Trees often sucker near the base. The leaves are opposite, entire and 8 cm by 1.5 cm. Leaves narrow towards the base. It has large scarlet flowers at the ends of branches. 1 - 3 flowers occur together. The fruit is round, leathery skinned and up to 10 cm across. It is yellow-brown in colour. Inside there are angular hard seeds in a juicy yellow pulp. The seeds are 10 mm long. There are many named varieties.

Distribution: It suits drier sub-tropical climates, and areas with a long, hot, dry summer and cool winter. A temperature of 35° - 38°C is best for good fruit development. A humid climate affects fruit formation. They can tolerate some salinity. They grow mostly from the coast up to 500 m in the tropics. Trees are severely damaged by temperatures below -11°C. It suits hardiness zone 8 - 11.

Use: The juicy pulp around the seeds is eaten. The juice can be used for a drink. It provides a red colour. The fruit are used in sauces, soups, meat dishes, salads and other dishes. The flowers are eaten. Boiled leaves are also reported as eaten.

Cultivation: They are easily raised from seed. They are best propagated by layering or grafting but cuttings or root suckers can be used. Cuttings root easily. Cuttings 30 - 50 cm long of one year old wood can be used. Pruning of sucker growth and surplus branches is needed. A spacing of 4 - 5 m is suitable.

Production: Trees bear after 2 - 3 years. Fruiting is seasonal from Dec - May. The tree loses its vigour after about 15 years but trees can live for many years. The pomegranate is self-pollinated as well as cross-pollinated by insects. Cross-pollination increases the fruit set. Fruit matures 5 - 7 months after flowering. Fruit need to be picked when mature to prevent splitting. Fruit do not ripen further after harvesting. Fruit develop a distinctive colour and when ripe, have a metallic sound when tapped. A well maintained tree can produce 150 - 200 fruit in a year.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit (raw)	81.0	285	1.0	-	6	0.3	0.1

Nuts, seeds, herbs and other foods

English: Banket mahogany
Dinka:
Arabic: Bank almahujuni

Scientific name: *Trichilia emetica*
Plant family: MELIACEAE

Description: A large tree. It is evergreen. It grows 8 - 20 m high. The crown is round and wide-spreading. The leaves have 4 - 5 pairs of leaflets and one at the end. They are oblong and 12 cm long by 5.5 cm wide. They are dark green and glossy above and have short hairs underneath. The leaf stalk is 7 - 12 cm long. The flowers are creamy-green. The petals are 1.6 cm long. They occur in sort branched heads in the axils of leaves. These are about 5 cm long. The fruit is an almost round creamy-brown capsule. It is 2.5 - 3 cm across. They split into 2 - 3 valves. The seeds are black and covered with a red seed coat (aril).

Distribution: A tropical plant. It grows at medium to low altitudes in forests along rivers and near the coast. In East Africa it grows from sea level to 1,835 m altitude. In West Africa it grows in the savannah. It grows in areas with a rainfall above 550 mm. It can tolerate drought. It cannot tolerate frost. It can grow in arid places.

Use: **Caution**: The seeds are reported to be poisonous. Oil extracted from the seeds, after the coat (aril) has been removed, is used. Hot water is poured over the seeds and they are left to soak for a few hours then rubbed between the hands. A sweet milky liquid is extracted from the layer around the seeds. It is used as a drink or added to food. The flesh of the fruit is eaten. The fleshy layer or aril around the seeds is separated from the seeds, soaked and cooked with sweet potato or squash.

Cultivation: Plants need to be grown from fresh seeds. Seeds germinate in 10 - 20 days. It can be grown by cuttings.

Production: It is fast growing. In Tanzania fruit can be collected from April to July and November to December. Dried seeds can be stored for several months.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Seed	49	1368	4.9	-	18.2	1.7	1.2
seed (dried)	6	2165	10.	-	-	1.3	-
aril (dried)	10.3	2149	5.8	-	-	7.8	-

Nuts, seeds, herbs and other foods

English: Sycamore fig
Dinka:
Arabic: Aljamiz altyn

Scientific name: *Ficus sycomorus*
Plant family: MORACEAE

Description: A deciduous tree. It grows to 13 - 25 m high and spreads to 14 m across. It has a rounded crown. The stem is erect. Sometimes the stem has buttresses. The base of the tree commonly spreads over the ground. The bark is yellowish. The leaves are olive green, oval or almost round. They are 5 - 12 cm long and 3 - 10 cm wide. The leaves are rough and leathery. They are hairy. The edge of the leaf is wavy and roughly toothed. The leaf stalk is 3 cm long. In dry seasons the tree may lose its leaves. The flowers are 2 cm across and roundish. The fruit are small and edible. They are 3 cm across. They grow in dense clusters in the axils of leaves or on main branches and on the trunk. The fruit are yellow-red when ripe.

Distribution: A tropical plant. They will grow on most soils. Soils need to be well drained. They prefer a sunny open position. It is drought and frost resistant. It is probably damaged by frost when in leaf. It can grow in hot and arid regions. It grows well near rivers. In Africa trees are commonly near rivers in dry regions. It grows in areas with an annual rainfall between 200 - 1,800 mm. It can grow in salty soils. It can grow in arid places. It grows in Miombo woodland in Africa. It suits hardiness zones 10 - 12.

Use: Fruit are eaten fresh. They can also be dried. They are used for jam. They are eaten with millet and used to make an alcoholic drink. Young leaves are cooked for food. They are used in soups or peanut dishes. The latex is used as a vegetable rennet.

Cultivation: In tropical places it can be grown from seeds. It can be grown by cuttings or layering. Trees can be pruned or lopped.

Production: Trees are fairly fast growing. The young fruit are gashed to assist ripening. In Tanzania fruit are collected at the end of the rainy season.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	82.7	210	1.4	-	7.3	1.7	0.4

Nutritional values of food plants by plant Family

Plant Family	Scientific name	Common name	Dinka	Arabic	Edible part	Moisture %	Energy kj	Protein g	Vit A µg	Vit C mg	Iron mg	Zinc mg	Page
ANACARDACEAE	Sclerocarya birrea	Maroola plum / Marula tree	Gumel	Akamil	kernel	3.9	2704	28.3	-	-	0.4	-	13
ANACARDIACEAE	Mangifera indica	Mango	Mango	Manga	fruit	83	253	0.5	54	30	0.5	0.04	36
ANACARDIACEAE	Anacardium occidentale	Cashew		Alkajw	fruit	84.7	213	0.8	0.12	265	1	0.2	47
ANNONACEAE	Annona senegalensis	Wild custard apple / African custard apple	Yerber, Pac	Gisshta	fruit	77.2	329	1.7		18.1	0.7	0.3	30
ARECACEAE	Phoenix dactylifera	Date palm	Akarap	Belah, Nakhla	fruit	58.5	598	0.9	50	6	1.3	-	12
BOMBACACEAE	Adansonia digitata	Boabab	Dunydud, Zuony	Tebeldi, Humar	fruit	16	1212	2.2	-	360	7.4	6.7	28
BORAGINACEAE	Cordia myxa	Sebastan tree	Akoc, Akuei		fruit	66.4	577	2.1	-	-	0.3	0.6	42
CAPPARACEAE	Boscia angustifolia	Rough leafed boscia	Akondok		fruit	81.5	345	7	-	-	-	-	39
CAPPERACEAE	Boscia senegalensis	Dila	Akondok	Mokheit	seed	11.4	1425	21.2	-	-	6.8	-	17
CARICACEAE	Carica papaya	Pawpaw	Papaya	Pawpaw	fruit	88	163	0.5	290	54	0.4	0.18	41
CHRYSOBALANACEAE	Parinari curatellifolia	Mobola plum			fruit	64.6	533	1.6	-	70.9	0.9	0.4	11
EBENACEAE	Diospyros mespiliformis	Monkey guava / Jakal berry	Cum	Abu sebala	fruit	64.5	523	1.1	-	-	2	-	40
EUPHORBIACEAE	Flueggea virosa	White-berry bush			fruit	75.9	476	1.4	-	1	8.9	0.3	34
FABACEAE	*Faidherbia albida*	Apple ring acacia / The fertiliser tree		Haraz, hiraz	seed	6.5	1437	24.8	-	-	6.8	2.6	16
FABACEAE	Ceratonia siliqua	Carob tree		Khurub	pod	11.2	753	6.5	-	-	20.3	1.7	19
FABACEAE	Parkia filicoidea	African locust bean	Akon	Um Rashad, Mudus	seed (dry)	7	1780	32.3	-	6	33.2	-	20
FABACEAE	Pentaclethra macrophylla	Oil bean tree / African oil bean			seed (dry)	6.2	2332	22.6	-	-	16	-	21
FABACEAE	Bauhinia thonningii	Camel's foot leaf tree	Pac	Abu Khamira / Khuf	seed	9.9	1381	22.7	-	-	4.7	1.6	22
FABACEAE	Amblygonocarpus andongensis	Scotsman's rattle		Hashrajat almawt	seed	-	1708	12.1	-	-	15	-	23
FABACEAE	Tamarindus indica	Tamarind	Cuei	Ardeib	fruit	38.7	995	2.3	20	60	1.1	0.7	46
FLACOURTITACEAE	Flacourtia indica	Governor's plum / Madagscar plum		Bariq alhakim	fruit	69.5	452	0.5	15	14	12	-	35
IRVINGIACEAE	Irvingia gabonensis	African wild mango			nut	4	2918	8.5	-	-	3.4	-	43

LYTHRACEAE	Punica granatum	Pomegranate			fruit (raw)	81	285	1	-	6	0.3	0.1	48
MALVACEAE	Azanza garckeana	Chewing gum tree	Adook	Arabic gum	fruit	14.8	1042	5	-	-	5	0.4	15
MALVACEAE	Sida cordifolia	Goat's horns / Country mallow	Gem thok, ladha	Um Hebiba, Um	leaf	6.6	1296	24.2	-	-	79.8	-	26
MALVACEAE	Grewia bicolor	White-leaved raisin			fruit (dry)	13.2	1302	10.3	-	9.3	5.9	2.6	38
MALVACEAE	Sterculia africana	African star-chestnut	Boggo, Adhiak	Baroot, Tartar	seed	4.2	-	24.9	-	5.1	13.3	5.8	44
MALVACEAE	Grewia tenax	Small-leaved white raisin	Apoor, Apormundy	Ummageda, Gadein	fruit	59.1	-	4.5	-	161	125	-	45
MELIACEAE	Trichilia emetica	Banket Mahogany		Bank almahujuni	aril (dried)	10.3	2149	5.8	-	-	7.8	-	49
MORACAE	Treculia africana	African breadfruit / Jackfruit	Penne in from uganda		seed (dry)	9.2	1555	12.6	-	-	320	-	10
MORACEAE	Ficus sur	Cape fig / Wild pig	Ngaap	Gameiz	fruit	87	129	1.1	-	12	0.7	0.4	29
MORACEAE	Ficus sycomorus	Sycamore fig		Aljamiz altyn	fruit	82.7	210	1.4	-	7.3	1.7	0.4	50
MORINGACEAE	Moringa oleifera	Moringa		Shajarat alfajl	leaf (boiled)	87	189	4.7	40	31	2	0.2	24
MUSACEAE	Musa x paradisiaca	Hybrid plantains	Muuth	Musa	fruit (sweet)	70.7	337	1.1	200	10	0.4	0.2	14
OPILIACEAE	Opilia amentacea	Catkin blooming	Aladhooc, Acinguan		leaf	9.2	-	14.8	-	3.9	15.7	3.2	27
RHAMNACEAE	Ziziphus mauritiana	Indian jujube / Buffalo thorn	Laang	Nabak	fruit	77	360	0.8	21	71	0.4	0.4	32
SALICACEAE	Dovyalis caffra	Key apple			fruit	85.9	238	0.4	-	117	0.1	-	31
SAPOTACEAE	Vitellaria paradoxa	Shea butter nut	Raak	Lulu	nut (dried)	6.9	2420	6.8	-	-	3	-	33
ULMACEAE	Celtis integrifolia	Nettle tree /African celtis	Abyei, Ariek, leer	Ibnu, Mahagai	leaf (dry)	10.8	1058	8	-	-	19.7	-	25
ZYGOPHYLLACEAE	Balanites aegyptiaca	Desert date	Thou, Apamthou	Higlig, Lalob	nut (dry)	5	2286	23	-	-	7	-	18

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