Potentially Important Food Plants of Chad

Rotary

FOOD PLANT SOLUTIONS
ROTARY ACTION GROUP
Solutions to Malnutrition and Food Security

A project of the Rotary Club of
Devonport North and District 9830

www.foodplantsolutions.org

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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 – Chad Version 2, January 2022

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 Hite 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 **Draft 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 Chad. This guide has been developed with the best intention to create interest and improve understanding of the important local food plants of Chad, 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

Potentially Important Food Plants of Chad has been produced to provide information on approximately 40 edible plants that are known to grow in Chad. These plants come from all the major food groups and have been chosen because of their high nutritional value. Many of the plants in this book may be neglected and under-utilised plants. This means they may not be well known. However, because they are high in many beneficial nutrients, and they are already adapted to the environment, and therefore likely to require minimal inputs, they could be important food plants that are likely to be superior to imported foods and plants. Commercially grown plants may also be included in the book, but only if they are significant foods for household consumption. It is hoped people will become confident and informed about how to grow and use these plants as many local food plants provide very good quality food.

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. For example, sweet potato will not form tubers if the soil is too wet, but it may still grow lots of green leaves. Taro will grow in light shade, but sweet potato will not. Ginger can grow in fairly heavy shade. Pruning the tips of betel leaf or pepper vines will cause more side branches to grow and therefore, produce more fruit. Stored yam tubers need special treatment if you want them to put out shoots early. There are lots of unique things about every plant and learning about these helps a good gardener produce more food.

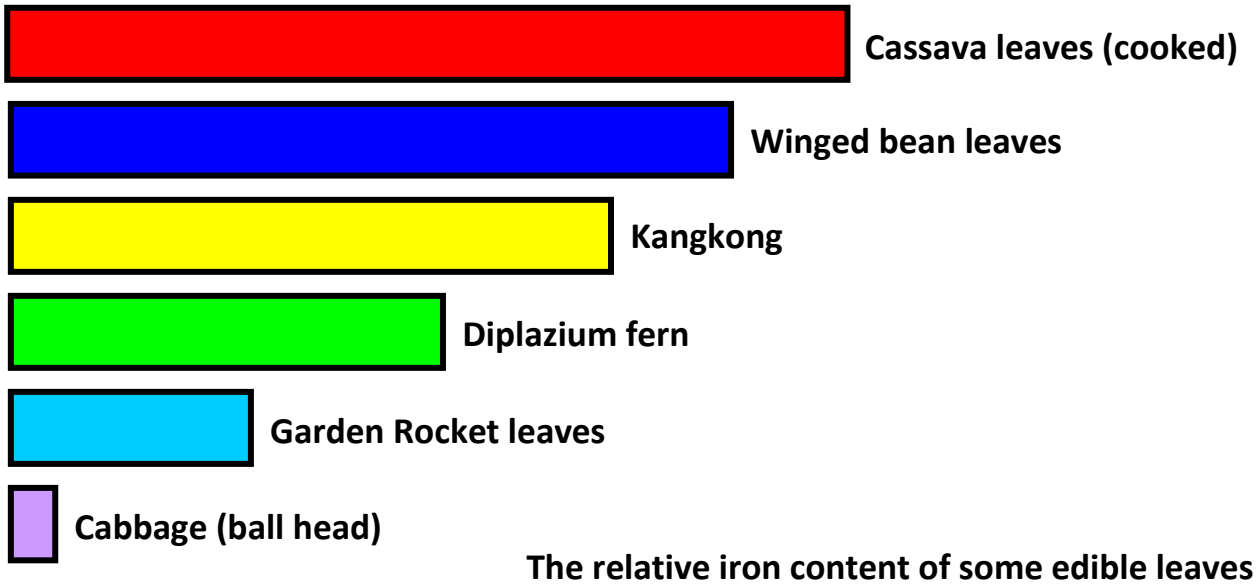
Naming of plants

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, sweet potato 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. Corn grown in small plots normally does this and the plants grown from seed grown in this situation get smaller and smaller each year. The seed needs to be saved from several different plants with different history and then mixed together before sowing. All the seeds on one cob are related and will inbreed. 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

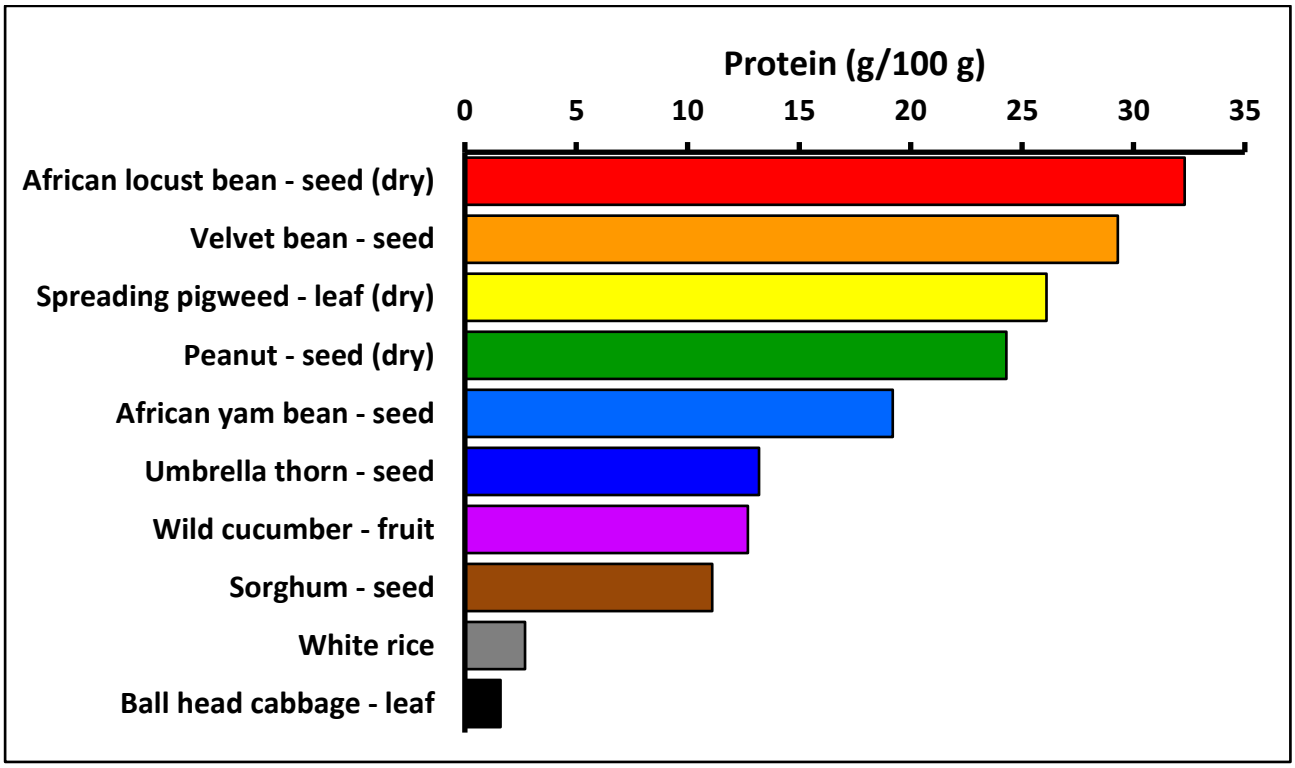
There are a large number of insects that enjoy sharing our food with us! We should not try to kill all these insects as they have an important role to play in keeping everything in nature in balance. What we need to do is to learn to manage these insects so we can all get some food to eat! Some insects 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. The large, green grubs with pointy tips that hide under taro leaves are best controlled by simply picking them off. Some insects, like taro beetles, can be a

serious problem, but the young curl grubs of this insect are tasty if you catch and cook them. 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.

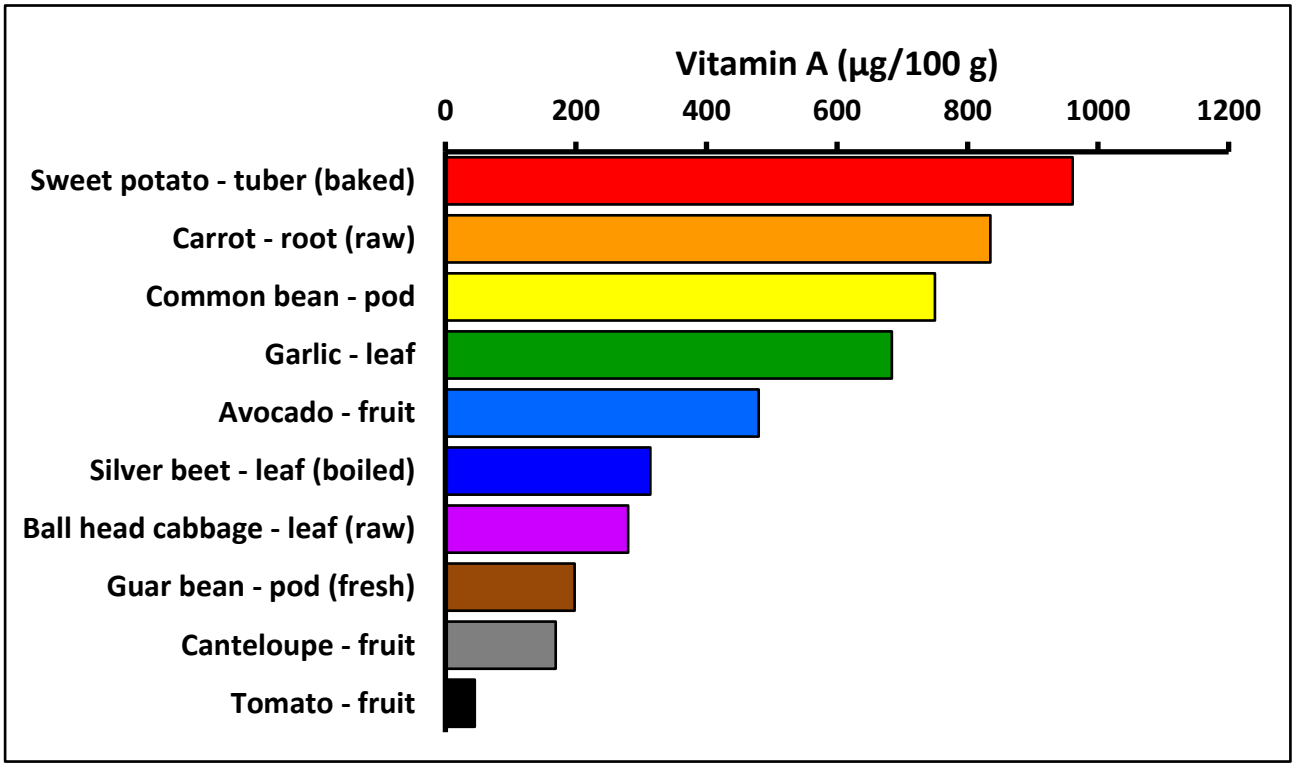
Diseases

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. One common fungus disease on sweet potato causes the leaves to become wrinkled and twisted. It usually gets worse in old gardens and where soils are running out of nutrients. It doesn't affect all kinds of sweet potato to the same extent. The answer is not to stop the disease, but to improve the soil. The general rule is that healthy plants that are growing well will suffer less damage from disease.

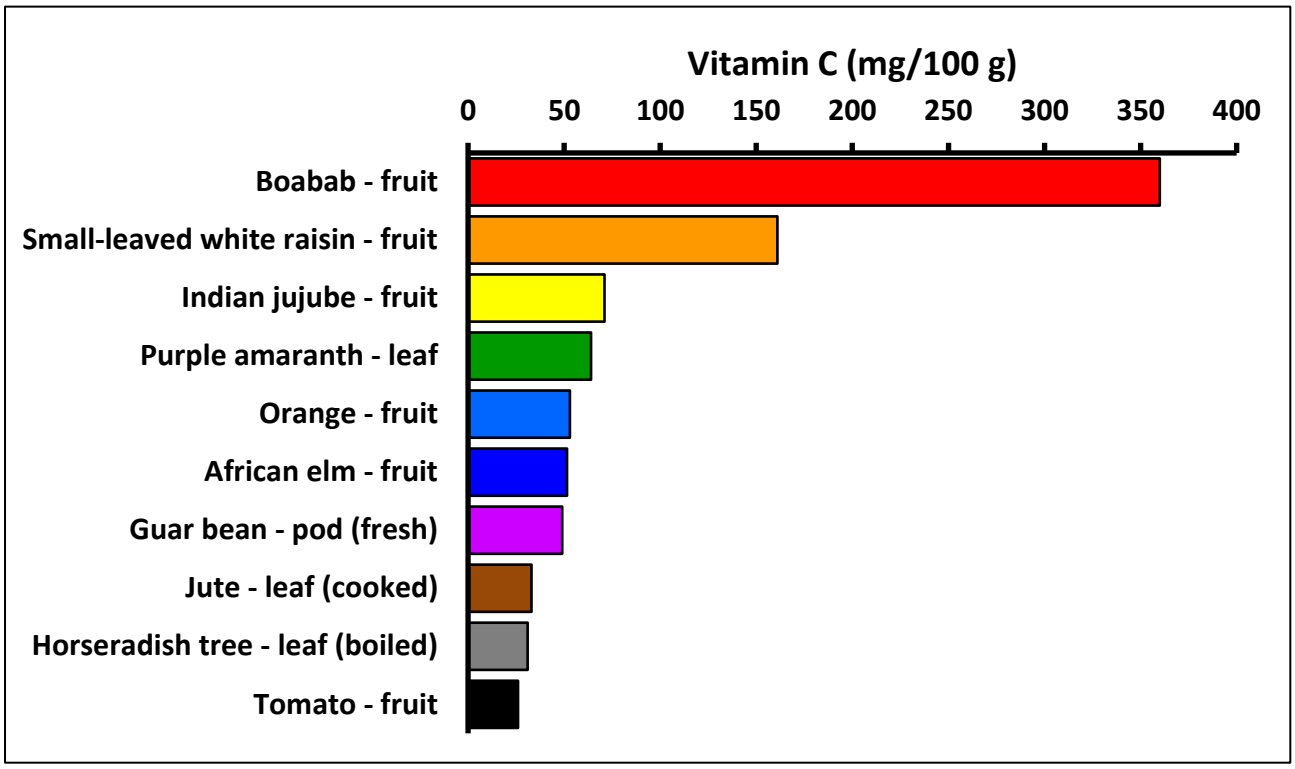
Food value charts for a selection of plants from Chad



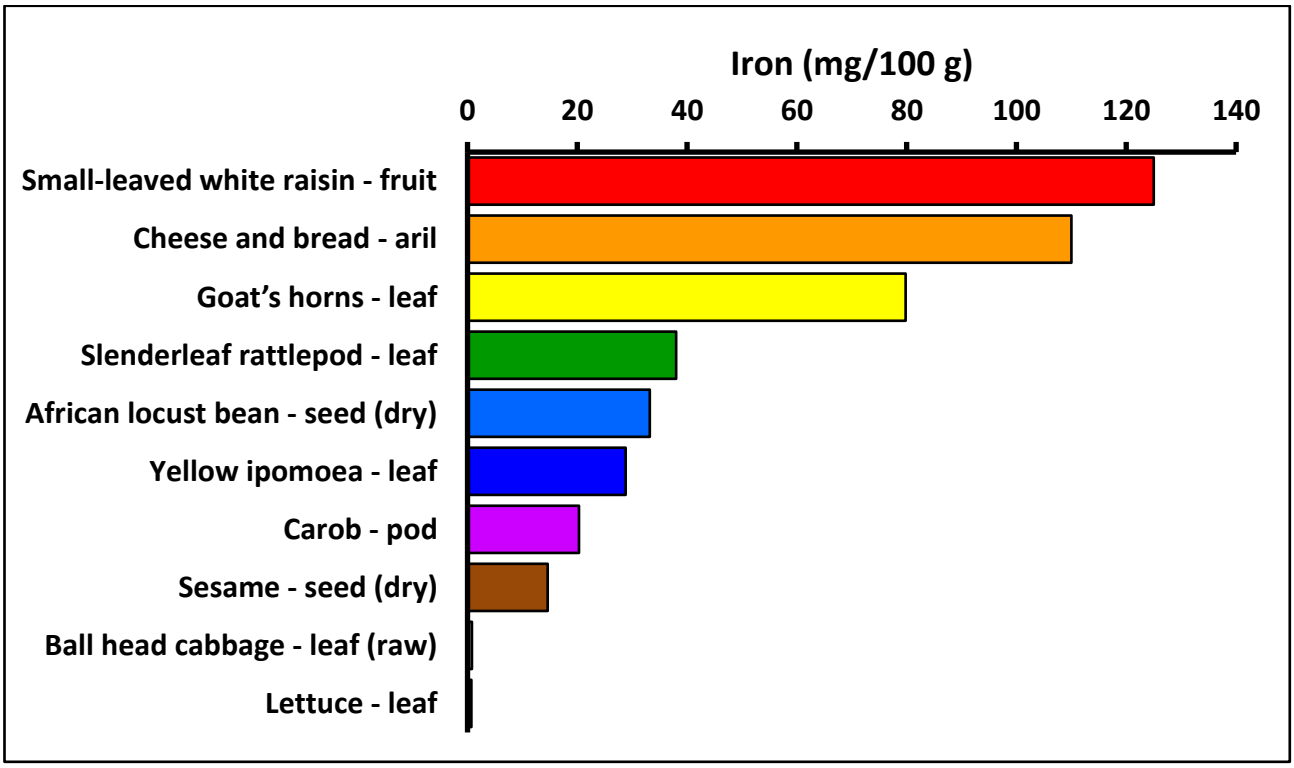
Protein helps the body repair cells and make new ones. Protein is also important for growth and development in children, teens, and pregnant women. Symptoms of protein deficiency include wasting and shrinkage of muscle tissue, and slow growth (in children).



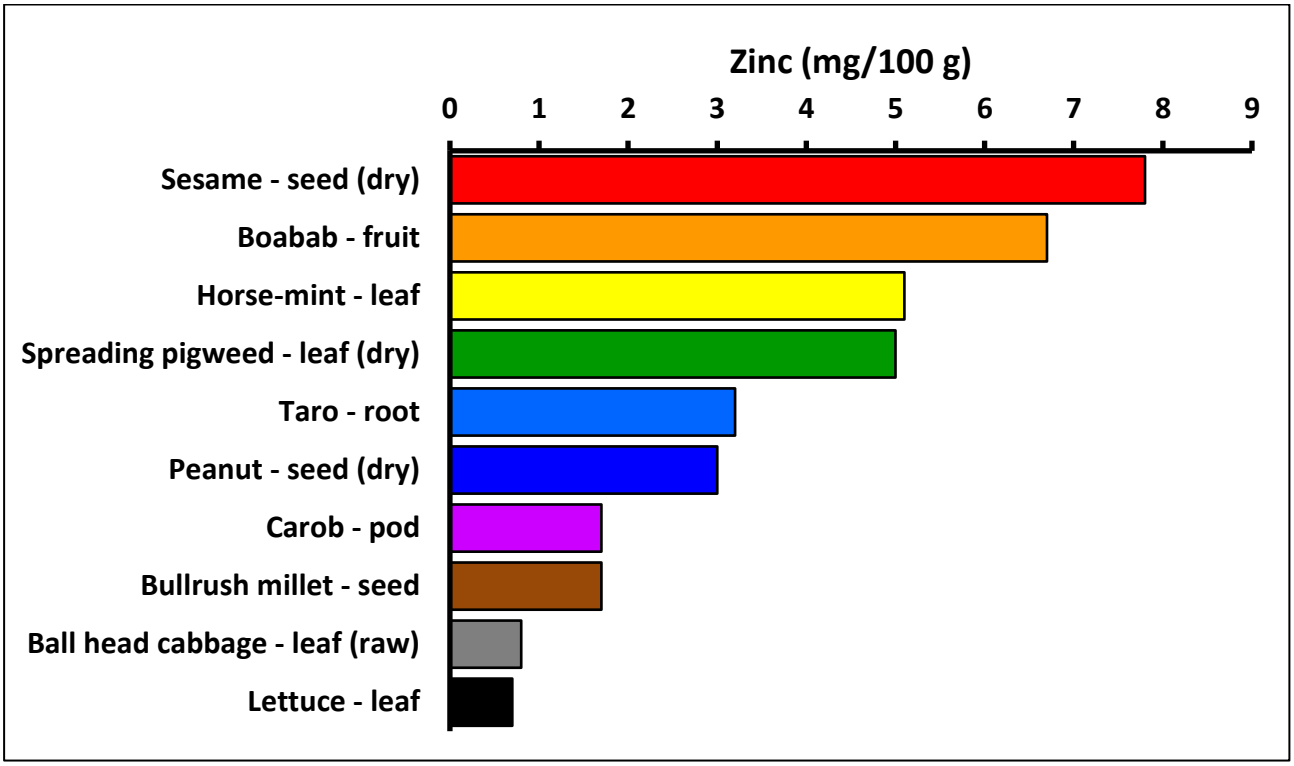
Vitamin A is very important for eyesight and fighting disease, particularly in infants, young children and pregnant women. People who are short of Vitamin A have trouble seeing at night.



Vitamin C helps us avoid sickness, heal wounds, prevent infections and absorb iron from food. Severe vitamin C deficiency increases the risk of scurvy with symptoms such as inflammation of the gums, scaly skin, nosebleed and painful joints.



Iron is important because it helps red blood cells carry oxygen from the lungs to the rest of the body. Low levels of iron cause anaemia, which makes us feel fatigued. Iron is also important to maintain healthy cells, skin, hair and nails. Iron is more available when Vitamin C is also present.



Zinc is particularly important for the health of young children and teenagers, and to help recovery from illness. It is needed for the body's immune system to work properly. It plays a role in cell division, cell growth, wound healing, and the breakdown of carbohydrates. Zinc is also needed for the senses of smell and taste. Zinc deficiency is characterized by stunted growth, loss of appetite, and impaired immune function.

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: Taro
Local:

Scientific name: *Colocasia esculenta*
Plant family: ARACEAE

Description: This plant has large flat leaves on the end of upright leaf stalks. It grows up to 1 m high. The leaf stalk or petiole joins the leaf towards the centre of the leaf. The leaves are 20-50 cm long. Near the ground a thickened rounded corm is produced. Around this plant their is normally a ring of small plants called suckers. Many different varieties occur. If left to maturity, a lily type flower is produced in the centre of the plant. It has a spathe 15-30 cm long which is rolled inwards. The flowers are yellow and fused along the stalk. There are many named cultivated varieties. Taro comes in two basic forms. The Dasheen type *Colocasia esculenta* var. *esculenta* and *Colocasia esculenta* var. *antiquorum* or the Eddoe type. The basic difference is the adaptation of the Eddoe type to storage and survival in seasonally dry places, while the dasheen type needs to be maintained in a more or less continuously growing vegetative stage.

Distribution: It is a tropical plant. Taro grows from sea level up to about 2300 m altitude in the tropics. It grows well in humid places. It can stand damp soil and grow under light shade. It suits hardiness zones 9-12.

Use: The corms, petioles and leaves are all edible after cooking. The leaves are also dried and stored. Fresh leaves can be stored for 4-5 days. **Caution:** Some varieties burn the throat due to oxalate crystals.

Cultivation: Taro can be planted from cormels or from the top of the central corm. Other sections of the corm could also be used but this is not commonly done. Flowering of taro and seed production can lead to new cultivars. Flowering can be promoted by the use of gibberellic acid. The general growth pattern is for an increase in top growth, in terms of leaf number, leaf area and petiole length, to continue for about 6 months under tropical lowland conditions then for each of these to decrease and tuber storage to continue to increase. Corm weight increases significantly from 5-11 months. Starch content also increases with time but protein content declines over the corm development period.

Taro can be grown under flooded conditions but root rots develop if the water becomes stagnant. For flooded cultivation, the land is cleared, ploughed, cultivated and puddled. The aim is to get a field that is flat with embankments allowing the impounding of water. Planting is done into 2-5 cm of standing water.

For dryland taro, the soil is prepared by digging, unless a fresh bush fallow is used where the natural friability of the soil allows plants to be put into the undug soil in a small hole that is prepared. Plants are put into a hole 5-7 cm deep or deeper. Mulching to conserve moisture and reduce weed growth in beneficial. Setts from corms normally give higher yield than that from cormels. The greater leaf area and root production may be responsible for this. Setts of about 150 g are optimum.

The time of planting is primarily determined by the availability of moisture. Planting is done shortly after the rainfall has become regular, if seasonally distinct wet and dry occur. Higher rainfall, higher temperatures, and higher hours of sunlight, enhance production and determine seasonality of production.

Evapotranspiration for flooded taro averages about 4 mm per day, ranging from 1.5-7.2 mm, with a total of about 1200 mm for the crop. Intermittent moisture can result in irregular shaped corms. Flooding has been found to be more effective than sprinkler irrigation, or furrow irrigation. Increased suckering, giving greater leaf area, seems to be the reason for this.

Taro is sensitive to weed competition throughout most of its growth, but it is more critical during early growth up to 3-4 months. About 7-9 weedings are required, to keep the crop clean under tropical lowland conditions, where flooding is not used. Due to the decrease in height and leaf area towards the end of the growth cycle when starch accumulation in the corms is maximum, weed competition and weed control are again significant. Mechanical weeding needs to be shallow to avoid damaging the superficial taro roots. A range of herbicides have been recommended in various situations.

Taro produces the highest dry matter yield under full sunlight, but it can still grow under moderate shade. Under shaded conditions it grows more slowly and develops fewer cormels. They require good moisture conditions and have little tolerance for drought. Taro residue has an allelopathic factor which can reduce the germination and growth of other plants, for example, beans.

Taro tends to demand high fertility, and is responsive to additional NPK fertiliser. Higher doses of K increases starch content and higher doses of N increases protein content. Both N and K applications increase oxalic acid content of the tubers.

Spacing affects total yield, and marketable, harvestable yield, of corms. Close spacing increases the corm yield per area, and the shoot yield per area, but decreases the corm yield per plant, and the contribution of sucker corms, to the yield. Where spacings of 30 cm x 30 cm are used, giving about 110,000 plants per hectare, a very large amount of planting material is required, which reduces the net return per unit of planting material. A spacing of 60 cm x 60 cm in more common. Wider spacings of 90 cm x 90 cm reduces overall yield.

Production: Crops mature in 6-18 months. Yields of 5-15 tonnes per hectare are probably average.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
root	66.8	1231	1.96	3	5	0.68	3.2
leaf	85.0	210	5.0	57	90	0.62	0.7
leaf stalk	93.0	101	0.5	180	13	0.9	-
leaf (cooked)	92.2	100	2.7	424	35.5	1.2	0.2

Starchy staples

English: Yellow nutsedge
Local:

Scientific name: *Cyperus esculentus*
Plant family: CYPERACEAE

Description: An upright grass-like sedge. It continues to grow from year to year. It is usually 30-90 cm tall. The shiny leaves are long and narrow. They are arranged on 3 rows around an angular stem. The leaves often have a pointed tip and are light green. The flowers are yellow spikes 1-1.5 cm long. There are many creeping underground stems (rhizomes). These spread out then end in a swelling. This tuber is round and 5-20 mm long. It has a thin brown skin and is crisp and nutty.

Distribution: A tropical plant that grows throughout the tropics and warm temperate zone. It is common in seasonally dry grasslands. It does not tolerate shade. High temperatures (27-30°C) and low nitrogen favours tuber production. It grows best in sandy soils with pH 5.5-6.5. It can tolerate salty soils. Day lengths of 8-12 hours favours tuber production. Day lengths of over 16 hours favour vegetative growth. It can grow in arid places.

Use: The tubers are eaten raw or baked. Sometimes they are ground into flour and boiled into a porridge. The oil from the tubers can be used for cooking. It is edible. The roasted tubers are used as a coffee substitute. The tubers are used as a source of potash for softening and flavouring green leafy vegetables.

Cultivation: Plants are grown from tubers. Tubers are soaked in water for 24-36 hours before being planted out. Sometimes tubers remain dormant but if they are chilled they grow better and produce more tubers. A spacing of 10-15 cm apart along rows 60-90 cm apart are suitable. Tubers should be placed 2.5-4 cm deep. The tubers are dug, washed and dried for 1-3 days before being sold or used.

Production: Yields of 800-900 kg per hectare of tubers are achieved on sandy soils. Yields of 8000-14000 kg per hectare are possible. Tiger nuts take 90-120 days to reach maturity.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
rhizome	36.5	1262	3.5	-	-	8.0	-
bulb	77.4	342	0.9	-	21	4.2	0.6

Starchy staples

Common name: Kaffir potato
Local:

Scientific name: *Plectranthus esculentus*
Plant family: LAMIACEAE

Description: A herb or small shrub that keeps growing from year to year. It grows 60 cm high and can lie along the ground. It loses it leaves during the year. The leaves are fleshy and opposite. They are 5-8 cm long by 1-3 cm wide. They are narrowly oval with rounded teeth along the edge. The stems are angular. Some of the branches near the base bend down and grow into the ground to form long tubers. They grow from a central point like fingers on a hand. The tubers grow in clusters and are large. They can be 10 cm long and 2 cm wide. The flowers are yellow. They have a faint smell of tar.

Distribution: A tropical plant that grows naturally in southern tropical Africa. It grows in dry rocky and sandy soils between 600-1900 m above sea level. It is hardy and needs frost free conditions. The best conditions for growth are 15-28°C. They need an annual rainfall of 700-1100 mm. A soil pH of 6.5-7 is suitable. It can grow in arid places.

Use: The tubers are boiled and often added to other vegetables in soups. The tubers are washed then boiled in their skins. They can be dried and stored. They can also be pickled.

Cultivation: Plants are normally grown from cuttings. They can be grown from tubers and small bulbils in the axils.

Production: Tubers are harvested 180-200 days after planting. Yields of 2-6 tonnes per hectare have been recorded. A tuber can weigh 1.8 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
tuber	78.0	351	1.9	-	-	6.4	-

Image sourced from: http://africanorphancrops.org/plectranthus-esculentus/

Starchy staples

English: Bullrush millet
Local:

Scientific name: *Pennisetum glaucum*
Plant family: POACEAE

Description: An annual grass that grows to 3 m tall. The leaf blades are 20-100 cm long by 2-5 cm wide. The flower is dense and 40-50 cm long by 1.2-1.5 cm wide. They also vary in shape and size. Plants that tiller produce smaller heads. The species varies a lot. There are 13 cultivated, 15 weed and 6 wild races of this grass. It has a cylindrical ear like a bullrush. The grains are small and round and have a shiny grey colour like pearls. There are thousands of cultivated varieties.

Distribution: A tropical plant that suits regions with a short growing season. It grows in areas with less than 600 mm of rainfall. It is replaced with sorghum between 600-1200 mm rainfall and then by finger millet or maize above 1200 mm rainfall. It is important in the drier areas of India and Pakistan. It can grow in arid places.

Use: The seeds are eaten like rice. They are also ground into flour and made into bread and cakes. They are used to make alcoholic drinks. They are mixed with other grains and seeds to make fermented foods. Some kinds have sweet stalks that are chewed. The young ears can be roasted and eaten like sweet corn.

Cultivation: Plants are grown from seed. It is usually sown directly into the field. The plant density is adjusted to suit rainfall and soil fertility. The spacing is 45 cm apart up to 200 cm apart. It is also intercropped with other crops such as cowpea, sorghum and peanut. Crops are normally weeded 2 or 3 times.

Production: It takes from 75-180 days to maturity. The heads can be picked by hand or the plant removed. Some types need to be picked 2 or 3 times as heads mature.

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	11.6	1442	10.5	-	-	6.5	1.7

Starchy staples

English: Sorghum
Local:

Scientific name: *Sorghum bicolor*
Plant family: POACEAE

Description: Sorghum is a millet grass. A mature sorghum plant resembles maize in its stature. Plants vary in height from 45 cm to 4 m. It is an annual grass with erect solid stems. The stems can be 3 cm across at the base. Prop roots occur at the base of the plant. There are numerous sorghum varieties. Some have one main stem while others produce multiple tillers. More tillers are produced when plants are widely spaced. The nodes on the stem are slightly thickened. Short types have up to 7 leaves while tall late varieties may have up to 24 leaves. The leaf blade can be 30-135 cm long. Leaves are bluish green and waxy. They have a prominent midrib. The large flower panicle can be 20-40 cm long. The flower occurs at the top of the plant. It can stick upright or bend over. The flower can be open or compact. Over 1000 cultivated varieties occur in China.

Distribution: Sorghum is a tropical plant. It suits the savannah zones in the tropics and can tolerate heat and drought. It can recover from drought even as a seedling. It can tolerate water-logging. It can be grown on heavy or light soils. Sorghum requires short day lengths to flower. Many kinds are adapted to specific day length and rainfall patterns. It suits hardiness zones 9-12.

Use: Sorghum seeds are eaten as a cereal. Flour can be made from the grain and then used for porridge or other dishes. It is used for dumplings, fried cakes and drinks. It cannot be used for bread as it contains no gluten. The stems of some kinds are sweet and can be chewed. The grains can be popped and eaten. The sprouted seeds can also be eaten.

Cultivation: Sorghum seeds will germinate soon after harvest. The seeds also store well if kept dry and protected from insects.

Production: Grain is ready for harvest 4-8 weeks after flowering.

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	-	1459	11.1	-	-	-	-

Starchy staples

English: Hungry rice
Local:

Scientific name: *Digitaria exilis*
Plant family: POACEAE

Description: An erect millet grass that grows from seed every year. It grows about 50 cm high. It forms tillers or new shoots are the base of the stem. The leaves are narrow. They can be 15 cm long. It has 2-4 racemes per inflorescence. These are 15 cm long. The grains are very small and usually yellow. They are about 1.5 mm across.

Distribution: A tropical plant that can grow on poor, shallow soils. It grows on the edge of the Sahel and in the savannah. It can tolerate drought and grows in arid locations. It can grow with 400 mm average rainfall. It can grow in acidic soils with a high aluminium content. It grows in areas with a temperature between 20°C-30°C. In West Africa it grows between sea level and 1500 m above sea level.

Use: The grain can be cooked for porridge or used in couscous. It can also be popped over a hot fire. It is ground into flour and used for bread and as a base for semolina.

Cultivation: Plants are grown from seed. Seed are sown very close together. They probably need a temperature above 25°C to germinate.

Production: The growing period is 3-4 months. The plants are harvested with a sickle and tied into sheaths. These are dried then threshed and hulled with a mortar. Yields of 600-800 kg per hectare are average. Some varieties reach maturity in 40 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 (raw)	11.2	1470	7.1	0	-	8.5	0.82
seed (cooked)	63.0	613	2.9	0	-	3.5	0.61

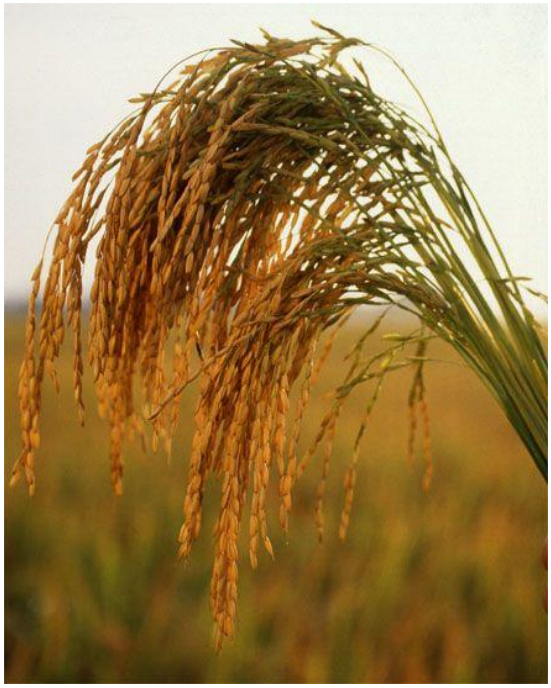
Image sourced from:
https://www.feedipedia.org/sites/default/files/images/Grains%20de%20fonio%20d%C3%A9cortiqu%C3%A9%20(JF%20Cruz%2C%20Cirad).jpg

Starchy staples

English: Floating rice
Local:

Scientific name: *Oryza glaberrima*
Plant family: POACEAE

Description: An annual grass. Most varieties have a reddish colour. It grows to 1.5 m tall but can be up to 5 m in some floating kinds. Dryland types often form tufts and floating rice often branches. The leaves are alternate and simple. The leaf sheath is 25 cm long. The leaf blade is 20-25 cm long and 6-9 mm wide. The flowers are in a compact group 25 cm long at the top of the plant. The fruit is a grain 9 mm long by 3 mm wide.



Distribution: It is a tropical plant that grows in swamps and on flood plains of savanna regions. It does best with temperatures of 30-35°C. It grows from sea level to 1,700 m altitude and can tolerate low soil fertility.

Use: The grain can be cooked and eaten, or ground into flour. This is sweetened with rice flour and honey for bread. It is fermented for beer.

Cultivation: Plants are grown from seed. Usually seeds remain dormant for a few months after harvesting. Seed usually emerge after 4-5 days. Seed are usually broadcast without using a nursery. The juvenile stage lasts for 3 weeks then tillering occurs for 3-4 weeks.

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	11.3	1538	7.4	-	-	3.4	-

Image sourced from: https://i.pinimg.com/474x/77/48/1f/77481fb8134243595c851b56ac63ea4c--natural-resources-mali.jpg

Starchy staples

English: Sweet potato
Local:

Scientific name: *Ipomoea batatas*
Plant family: CONVOLVULACEAE

Description: This is a root crop which produces long creeping vines. The leaves are carried singly along the vine. Leaves can vary considerably from divided like fingers on a hand, to being entire and rounded or heart shaped. Purple trumpet shaped flowers grow at the end of the vine. Fattened tubers are produced under the ground. There are a large number of varieties which vary in leaf shape and colour, tuber shape, colour, texture and in several other ways.

Distribution: A tropical and subtropical plant. They grow from sea level up to about 2700 m altitude in the tropics. Plants can grow with a wide range of rainfall patterns and in different soils. Plants are killed by frost and can't stand water-logging. Plants grow well with temperatures between 21-26°C. It can grow with a pH between 5.2-6.8. Sweet potato are not tolerant to shading. It suits hardiness zones 9-12.

Use: Tubers are boiled or baked. They can be steamed, fried, mashed or dried. They can be fermented into alcoholic drinks. They can also be used in pies, cakes, puddings and candies and jams. They can be used in noodles. The chopped and dried tubers can be boiled with rice or ground into flour and mixed with wheat flour to make cakes or bread. The young leaves are edible.

Cultivation: Vine cuttings are used for planting. In grassland soils it is grown in mounds, ridges or other raised beds. In bush fallow, it is mostly planted in undug loose soils. It needs a sunny position. Tubers won't form if the ground is waterlogged when tubers start to develop. Sweet potato is grown by cuttings of the vine. About 33000 cuttings are required per hectare. These weigh about 500 kg. Vine lengths of about 30 cm are optimum. As long as the vine is adequately inserted in the soil, the length of vine inserted does not significantly affect yield. Fresh sweet potato seeds germinate relatively easily and lead to continuous production of new cultivars under tropical conditions. Excess nitrogen restricts storage root initiation and therefore excess leaves are produced without significant tuber yield. Dry matter percentage increases with increasing age of the crop. Higher dry matter tubers are normally preferred.

Sweet potato are not tolerant to shading. Under shaded conditions, both foliage growth and storage root production are decreased. Some cultivars can be selected for increased production under mild shade but not heavy shade. The survival of cuttings at planting is also reduced under shaded conditions. Under shaded conditions, plant become more climbing and with fewer, larger leaves. With increasing shade, fewer tubers are produced and these grow more slowly. Sweet potato tends to be responsive to potassium fertiliser. Cultivars are often selected for yield under low fertility conditions.

Under lowland conditions in the tropics sweet potato tubers undergo active tuber enlargement from 6-16 weeks. Weed control is essential especially during early stages of growth. The rate of ground coverage by foliage varies greatly with growing conditions and cultivar, but once ground coverage has occurred, weed control is less of a problem. Sweet potato tuber initiation is subject to

aeration in the soil. Either heavy clay soils, waterlogged conditions or other factors reducing aeration can result in poor tuber production. For this reason, sweet potatoes are often grown on mounded beds. In well drained or high organic matter soils, digging or mounding is not as essential. Leaf scab (*Elsinoe batatas*) can significantly reduce yield especially in sites where leaf production is low due to low soil fertility. To reduce sweet potato weevil damage, plants need to be hilled or have the tubers well covered with soil. Cracking soils can allow the weevil access to tubers.

Production: The time to maturity ranges from 5 months to 12 months depending on the variety planted and the altitude at which it is being grown. Yields range from 6-23 t/ha.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
tuber (baked)	72.9	431	1.7	961	24.6	0.5	0.3
tuber (raw)	70.0	387	1.2	709	25	0.7	0.4
tuber (boiled)	72.0	363	1.1	787	15	0.6	0.3
leaf	86.3	168	3.9	105	58	2.9	-

Legumes

English: Peanut
Local:

Scientific name: *Arachis hypogea*
Plant family: FABACEAE

Description: Peanuts grow on spreading bushy plants up to about 40 cm high. The leaves are made up of 2 pairs of oppositely arranged leaflets. Flowers are produced in the axils of the leaves. Two main kinds of peanuts occur. The runner kind (Virginia peanut) has a vegetative or leafy branch between each fruiting branch and therefore produces a spreading bush. The bunch type (Spanish-Valencia peanuts) produces fruiting branches in a sequence one after the other along the branches. They grow as a more upright plant and grow more quickly. Pods are produced on long stalks which extend under the ground and they contain between 2-6 seeds. The stalk or peg from the flower grows down into the soil and then produces the pod and seed under the ground. The flowers need to be no more than 18 cm from the soil surface for the seed pod to develop underground.

Distribution: Peanuts grow in tropical and subtropical areas. They grow well from sea level up to about 1,650 metres in the equatorial tropics. They require temperatures of 24-33°C. Plants are killed by frost. They need a well-drained soil and cannot stand water-logging and often require raised garden beds. Peanuts need 300-500 mm of rain during the growing season. Dry weather is needed near harvest.

Use: The seeds can be eaten raw, cooked or sprouted. They are boiled, steamed, roasted, salted or made into peanut butter or flour. The young leaves and unripe pods are edible after cooking. An edible oil is extracted from the seeds. The remaining meal can also be eaten.

Cultivation: Peanuts require soil with good levels of calcium and boron or they produce empty pods. Peanuts have nitrogen fixing root nodule bacteria and therefore can give good yields in soils where nitrogen is low. The nuts are normally removed from the shell before planting and are sown 2-3 cm deep, with 10 cm between plants and 60-80 cm between rows. The soil needs to be weeded and loose by the time the flowers are produced to allow the peg for the seed pods to penetrate the soil.

Production: Flowering can commence in 30 days and it takes 3.5-5 months until maturity. Peanuts are harvested by pulling out the plant when the top of the plants die down. After harvesting, they should be left to dry in the sun for 3-4 days. Virginia peanuts have a longer growing season and the seeds need to be stored for 30 days before they will start to re-grow.

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)	4.5	2364	24.3	-	-	2.0	3.0
seed (fresh)	45	1394	15	-	10	1.5	-
leaf	78.5	228	4.4	-	-	4.2	-

Legumes

English: Lablab bean
Local:

Scientific name: *Lablab purpureus*
Plant family: FABACEAE

Description: A climbing bean which can have vines 1-5 m long. It keeps growing from year to year. The stems can be smooth or hairy. Leaves are made up of 3 almost triangular leaflets. The leaflets are 5-15 cm long and 3-14 cm wide. The side leaflets are somewhat asymmetrical. Often the plants are flushed purple. The flowering clusters are 5-20 cm long. Flowers are often white but can vary from red to blue. The pods are flattened, pointed and up to 12 cm long and 2 cm wide. They can be green, purple or white. Inside there are 3-5 white or dark seeds. Seed pods have a wavy margin. The seeds are 0.5-1.5 cm long. (This bean is similar to Lima bean but the keel of the flower in not spirally twisted, the pod ends more bluntly with a long thin style at the end and the hilum on the seed is longer.)

Distribution: It is a tropical and subtropical plant. It mostly grows between 750 m and 2175 m altitude in the tropics. It is drought resistant and can grow in quite low rainfall areas. Some varieties are short day and some are long day kinds. It suits hardiness zones 9-12.

Use: The young pods, ripe seeds and young leaves are edible, cooked. Flowers can be eaten raw, steamed or added to soups and stews. Dried seeds can be cooked as a vegetable. The seeds can also be sprouted then crushed and cooked. The large starchy root is edible. **Caution:** Many types can be poisonous. They should be boiled and the cooking water thrown away.

Cultivation: Seeds are sown at 30 x 60 cm spacing near stakes or trees. About 20 kg of seed per hectare are required. Fertilising with nitrogen and potash until flowering is recommended.

Production: Young pods are ready 4-6 months after planting and seeds 6-8 months. Pods are often harvested over 2 or 3 years. Pollination and seed setting are reduced in cold weather.

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)	10.0	1428	22.8	-	-	9.0	-
seed (young)	86.9	209	3.0	14	5.1	0.8	0.4
pod (fresh)	86.7	203	3.9	-	1.0	2.4	-

Legumes

English: Velvet bean
Local:

Scientific name: *Mucuna pruriens*
Plant family: FABACEAE

Description: An evergreen herb or shrub. It is a climbing vine. It climbs to 6 m high. It can re-grow each year or live for a few years. The stems are slender with long, slender branches. They are very hairy when young. The leaves are alternate with sword shaped leaves. The leaf stalks are hairy. There are 3 leaflets. The leaflets are 5-19 cm long and 4-16 cm wide. The leaflets are rounded at the base and the side leaflets are unequal in shape. The flowers are large and white with bluish butterfly shaped petals. They occur in clusters of 2 or 3. The flowers are 2-4 cm long. The fruit are thick, leathery pods covered with hairs. They are 10 cm long and contain 4-6 seeds. The pods are dark brown.

Distribution: It is a tropical plant. It does best in a rich, moist, well-drained soil. It needs a protected, sunny position. It is damaged by drought and frost. It grows from sea level to 900 m above sea level. They need a temperature above 8°C. It can grow in arid places.

Use: The pods are burnt over a fire to remove the prickles then the beans are soaked until they sprout and then washed and boiled or pounded. The young leaves are cooked as a vegetable. The ripe seeds are roasted and eaten. **Caution:** The seeds need special preparation.

Cultivation: Plants are grown from seed. The seeds need treatment to assist them to germinate.

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	7.3	-	29.3	-	4.8	-	-

Legumes

English: African locust bean
Local:

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 950-1750 mm annually. It grows from 250-1370 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://www.westafricanplants.senckenberg.de/images/pictures/fabmimo_parkia_filicoidea_cbch_6118_4049_b8ed36.jpg

Legumes

English: Pigeon pea
Local:

Scientific name: *Cajanus cajan*
Plant family: FABACEAE

Description: An upright perennial shrubby legume that can live for 3-4 years. They can grow up to 4 m tall and spread to 1.5 m wide. It has a bushy appearance and a strong deep taproot. The root nodules are round and sometimes lobed. The leaf consists of 3 narrow, green leaflets which are silvery-green underneath. The end leaflet is larger with a longer leaf stalk. The pea shaped flowers are red and yellow and occur on branched flower stalks which stick upwards in the axils of leaves. Pods are long, straight and narrow, often with 4-8 seeds. Seeds vary in shape, size and colour. The pods are slightly hairy. Pods are often 4-8 cm long and have a beak at the end. Pods are constricted between the seeds. Many varieties of pigeon pea occur. Some are dwarf and day length neutral.

Distribution: A tropical plant that requires a tropical or subtropical climate. Plants grow from sea level up to about 1800 m in the tropics. They can tolerate drought and are suited to a drier climate. They can grow in places with less than 600 mm rainfall per year. They do less well in the wet tropics. They suffer in waterlogged soils and are damaged by frost. It can also tolerate heat. It will grow on poor soils cannot grow on salty soils. It can grow in arid places and suits hardiness zones 10-12.

Use: Young leaves, shoots and pods are eaten. The pods can be used in curries. The leaves and shoots as potherbs. Young seeds are cooked and eaten like peas. Ripe seeds are also cooked and eaten in soups and curries. Bean sprouts can be produced and eaten. Preparation of the seeds for dahl is somewhat complicated.

Cultivation: They are grown from seeds. It is best to sow seeds where the plants are to grow. Seeds normally germinate easily and well. Before sowing seed it helps to soak them in cold water for one day. Seeds store well if kept cool and dry. A spacing of 1.5 m x 1.5 m is suitable. Plants can be cut back and allowed to re-grow. Plants can also be grown from cuttings.

Production: Plants are fast growing. Pods are ready after 5 months. Mature seeds take about 8 months. Plants will often live for 3-4 years. Plants are cross pollinated by insects, or self pollinated.

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	10.0	1449	19.5	55	-	15.0	-
pod (young)	64.4	477	8.7	-	-	2.0	-
seed (young, boiled)	71.8	464	6.0	2	28.1	1.6	0.8

Legumes

English: Mesquite
Local:

Scientific name: *Prosopis africana*
Plant family: FABACEAE

Description: A large tree that. It can grow to 25 m high. The trunk is 80 cm across. It grows straight and un-buttressed in forests and low and crooked in open conditions. The crown is open and the leaves droop. The bark is very dark and scaly. The leaves are alternate and twice divided. The leaves are 10-15 cm long. There are 9-16 pairs of leaflets along 3-6 pairs of opposite leaflets stalks. The leaflets are oblong and 12-30 mm long. The flowers are pale green to yellow. They have a scent. The fruit are dark brown pods. They are thick and hard and 15 cm long by 3 cm wide. There are about 10 loose rattling seeds in each pod.

Distribution: A tropical plant that can grow in forest, savannah and Sahel in West Africa. It grows in areas with an annual rainfall between 400-1200 mm. It grows between 720-1220 m above sea level. It can grow in arid places.

Use: The seeds are used to make a vegetable butter used in flavouring. They are fermented. They are also used in chutneys and relishes. The young pods are eaten.

Cultivation: Plants are grown from seeds. Seeds germinate best when treated with hot water before sowing. The seedlings can be transplanted after 14-18 weeks.

Production: It flowers shortly after 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(dry)	4.2	1450	15.4	-	-	-	-

Image sourced from: https://alchetron.com/Prosopis-africana

Legumes

English: Umbrella thorn
Local:

Scientific name: *Acacia tortilis*
Plant family: FABACEAE

Description: A flat topped shrub or tree. It grows to 4-21 m tall depending on rainfall. The flat, spreading crown occurs in layers. The bark is grey-brown and cracked when mature. It tends to shoot from the base rather than have a distinct trunk. It has two kinds of long spines. Some are hooked and others are straight. The leaves are divided twice. There are 2-10 pairs of small leaflets. The stalk is only 2-4 cm long. The round headed flowers are cream-coloured. The fruit are yellow to brown pods. These hang in dense bunches. The pods are twisted. Each pod has up to 10 brown seeds.

Distribution: It grows in Mediterranean and tropical places. It is common over much of Africa. It does best on alkaline soils and in hot, dry areas. Some forms have salt tolerance. It is drought resistant and cold tolerant. It grows between sea level and 2000 m above sea level. It grows in areas with an annual rainfall between 50-1000 mm. It can grow in arid places. It suits hardiness zones 9-11.

Use: The gum is eaten.

Cultivation: It is grown from seed. The seeds germinate slowly and only some seed germinate. The seed coat is very hard. To assist seed to grow, they should be soaked in hot water, then allowed to cool and then soaked for 24 hours. Seed can be stored for a long time and will still grow. The plant can be cut back and will re-grow.

Production: It grows slowly.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
pod	75	280	-	-	1.1	-	-
seed	8.3	-	13.2	-	-	-	-

Image sourced from: https://en.wikipedia.org/wiki/Vachellia_tortilis#/media/File:Vachellia_(ex_Acacia)_tortilis.jpg

Legumes

English: Guar bean
Local:

Scientific name: *Cyamopsis tetragonolobus*
Plant family: FABACEAE

Description: An upright bushy plant often only 1 m tall. Some kinds grow to 3 m. The branches are stiff and usually with white hairs. The branches stick upwards and are angled and with grooves. The leaves are produced alternately and have 3 leaflets. The leaflets are oval and with slight saw teeth around the edge. The leaf stalks have grooves. The flowers are small in clusters in the axils of leaves. The flowers are white with pink wings. It produces clusters of thick fleshy pods. They are stiff and straight. There is a double ridge along the top of the pod and a single one below. There are also 2 ridges along the flat sides. The pods have a beak at the end. There are 8-10 small oval seeds inside.

Distribution: A tropical plant. It is a hardy, drought resistant plant that suits dry areas. It grows well on alluvial and sandy soils and in areas with high summer temperatures and low rainfall. It can tolerate an alkaline soil with pH 7.5-8.

Use: The green immature pods are eaten cooked. They are added to curries. They can be fried in oil, salted or dried for later use. The seeds are eaten. The seeds contain a gum used as a thickening agent. It is used in ice cream, baked goods, gluten free foods and salad dressing. The sprouted seeds are also eaten.

Cultivation: They are grown from seed, often in mixed cropping situations. It requires 15-24 kg of seed to sow a hectare. Seeds are sown 2-3 cm deep. They are often put 20-30 cm apart in rows 65 cm apart. Seeds germinate within one week.

Production: Plants mature in 3-3.5 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	9.9	1452	30.5	-	-	-	-
pod (fresh)	82.0	-	3.7	198	49	5.8	-

Leafy greens

English: Purple amaranth
Local:

Scientific name: *Amaranthus cruentus*
Plant family: AMARANTHACEAE

Description: An annual erect plant. It grows to 2 m high. The stems are angular. It often branches in the upper section. It is smooth but may be hairy on younger plant parts. The young parts can be tinged purple. The leaves are oval to sword shaped and can be 10-15 cm long by 3-6 cm wide. They have a leaf stalk 1-7.5 cm long. The leaves often narrow towards the tip. They can also become thinner towards the base. There may be hairs on the midrib. The leaf may be tinged purple underneath. The flowers clusters are often branched and on side branches. The stiff branched flower arrangement at the top can be 15-25 cm long. The fruit is oval and the seed can be 1-1.3 mm across. The seed is dark brown but pale brown forms are used as grain in Central America.

Distribution: It grows in the tropics and more temperate regions. In the tropics it grows mainly in the highlands. In Papua New Guinea it occurs between 1200 m and 2200 m altitude. It needs a night temperature above 15°C and preferably a day temperatures above 25°C. It grows best in fertile, well drained soil and suits hardiness zones 8-11.

Use: The leaves and young plant are eaten cooked. They are also dried and stored. The seeds are ground into flour and used to make bread. **Caution:** This plant can accumulate poisonous nitrates if grown with high nitrogen inorganic fertilisers.

Cultivation: Plants can be grown from seed if the soil is warm. Seeds are small and grow easily. They can be put in a nursery and then transplanted after 2-3 weeks. Cuttings of growing plants root easily.

Production: Yields of 800-1500 kg per hectare are achieved. Plants can be harvested by pulling up the entire plant or by removing leaves over several harvests.

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	87.7	2006	14.7	-	0	3.8	-
leaf	84.0	176	4.6	-	64	8.9	-

Leafy greens

English: Horseradish tree
Local:

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 1350 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: Silver spinach
Local:

Scientific name: *Celosia trigyna*
Plant family: AMARANTHACEAE

Description: A branched and straggling herb that grows 25-120 cm tall. The lower leaves have long leaf stalks. The plant looks like *Amaranthus hybridus* until it starts to flower. Where the leaf stalk joins the stem there is a pair of small moon-shaped leaflets that lie around the stem. The small white or silvery flowers are crowded together in separate clusters. The fruit is a capsule which is almost round and has several seeds.

Distribution: A tropical plant that grows in tropical lowlands and highlands in Africa. It is often along the coast but grows from sea level to 1960 m above sea level. It needs an annual rainfall of up to 2500 mm and an average temperature of 25-30°C. It cannot tolerate a temperature below 15°C. It grows best on fertile, well drained soils.

Use: The young shoots and leaves are cooked and eaten. They are finely cut and used in soups, stews and sauces. Because they can be bitter, they need extensive cooking or mixing with other foods.

Cultivation: Plants are grown from seeds which germinate in 4-5 days. It grows for 90-120 days. Because the seeds are small, they are best mixed with sand to give a more even distribution when sowing.

Production: Plants can be uprooted and harvested or leaves removed. Harvests of 4-5 t/ha can be achieved from weekly harvests over 2 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
leaf	89.0	139	2.7	94	10	5.0	-

Image accessed from http://www.flickr.com/photos/36517976@N06/5063937939

Leafy greens

English:
Local:

Scientific name: *Leptadenia lancifolia*
Plant family: APOCYNACEAE

Description: A creeping shrub with many stems. The leaves are alternate and taper towards the tip. The stems are light green. Young shoots curve upwards and there are long spaces between the leaves. The leaves are up to 10 cm long. They are oval and light green. The flowers are greenish-yellow. The fruit are cone shaped and have 2 valves. These split open releasing cottony winged seeds. The plant has a sticky sap when crushed.

Distribution: A tropical plant that grows in dry savannah. In Ethiopia it grows between 500-1500 m altitude. It grows on sandy loams. It grows in areas with an annual rainfall between 1100-1500 mm. It can grow in arid places. It can tolerate drought. It is little damaged by insects.

Use: The young leaves are eaten. They are washed then cooked. They are usually cooked along with other leaves. They are slightly bitter and are eaten with beans, pigeon pea, or cowpeas.

Cultivation: It can be grown on the fences near houses to provide leafy greens. Plants are 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
leaf (raw)	81.0	226	4.9	4915	78	5.4	-

Image accessed from:
http://www.westafricanplants.senckenberg.de/images/pictures/leptadenia_hastata,_kafoutine,_senegal,_7116_6620915747_o_996_b0494d.jpg

Leafy greens

English: Goat's horns
Local:

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 is common and widely distributed in the Philippines. 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 1100 m elevation. 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: Slenderleaf rattlepod
Local:

Scientific name: *Crotalaria brevidens*
Plant family: FABACEAE

Description: A much branched herb. It lives for one or sometimes more years. It grows 2 m tall. The branches curve upwards and have soft hairs. The leaves are alternate. They have 3 leaflets. The leaf stalks are 2-6 cm long. The leaflets are narrow and 4-10 cm long by 1-2 cm wide. They are hairy underneath. The flowers are in a group at the top of the plant. These can be 50 cm long. There are many narrow flowers. They are yellow with red veins. The fruit is a narrow pod 4-5 cm long and 1 cm wide. It is slightly curved at the ends. There are many seeds that are 3 mm long and yellow to orange.

Distribution: A tropical plant. It grows between 500 m and 2700 m above sea level. It can grow in arid places.

Use: The tender leaves are cooked and eaten as a vegetable. They are cooked with potash and have peanuts added to improve the flavour. Leaves can be dried and stored for later use. **Caution:** It is bitter due to Pyrrolizidine alkaloids. If eaten with corchorus or with milk it is less bitter.

Cultivation: Plants are grown from seed. Seed germinate in 3-4 days. It responds well to natural compost and manures.

Production: Plants are ready for harvesting after 8 weeks. Harvesting can continue for 4 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
leaf	74.5		8.8	-	-	38	-

Image sourced from: https://en.wikipedia.org/wiki/Crotalaria#/media/File:Rattlepod.JPG

Leafy greens

Common name: Silver beet
Local:

Scientific name: *Beta vulgaris* subsp. *cicla*
Plant family: CHENOPODIACEAE

Description: A broad-leaf, annual plant. Stalks are smooth and often white with a dark green leaf. A clump of stalks and leaves are produced from the base. Plants can also be blue. The leaves can be 12-25 cm long. The flowers are small and greenish and occur in slender clusters. The fruit are dry and spiny.

Distribution: It needs to be over at least 500 m altitude in the tropics, and is mostly grown from 1000-2600 m altitude. It can tolerate frost.

Use: The leaves and stalks are cooked and eaten. The stalks of leaves can be cut from the leaf and cooked separately as an asparagus substitute. They can be braised and served with buttered breadcrumbs. Some kinds have edible roots.

Cultivation: It is grown from seeds. Under tropical conditions it is not normally possible to save your own seed. In cold climates, plants need to be sown when conditions are warmer so that the plants do not go straight to flower. A spacing of 30 cm between plants is suitable. Seed is sown 2.5 cm deep.

Production: The first leaves are ready after 8-10 weeks and can produce for 2 years. Only the outer leaves are picked off.

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 (boiled)	92.7	84	1.9	314	18	2.3	0.3
leaf (raw)	92.0	80	1.8	330	30	1.8	0.4

Leafy greens

English: Spreading pigweed
Local:

Scientific name: *Amaranthus graecizans*
Plant family: AMARANTHACEAE

Description: An annual plant that grows up to 50 cm high. The plant sprawls over the ground and has a taproot. The branches do not have hairs. The flowering shoots are leafy and the greenish flowers are in small clusters.

Distribution: It is a Mediterranean and tropical plant. In Ethiopia, it grows from 900-2380 m altitude. It can grow in arid places.

Use: The leaves and seeds are eaten cooked. The seeds can be ground and made into flat bread. **Caution:** This plant can accumulate poisonous nitrates if grown with high nitrogen inorganic fertilisers. The plant will cause diarrhoea if eaten in large amounts.

Cultivation: Plants can be grown from seed if the soil is warm. Seeds are small and grow easily. They need to be planted near the soil surface. Cuttings of growing plants root easily.

Production: It grows after rain and the first leaves can be harvested after 12 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
leaf (dry)	6.3	903	26.1	-	-	9.8	5.0

Fruit

Common name: Wild custard apple
Local:

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 700-2500 mm per year. It can grow in arid places. It grows best with a pH of 5.5-7. In Malawi it grows below 1200 m altitude. In Kenya it grows from sea level to 1750 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 2500-3000 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: https://i.pinimg.com/originals/53/4c/92/534c927f13c6aaf559ea818da08bf153.jpg

Fruit

English: Small-leaved white raisin
Local:

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 1500 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

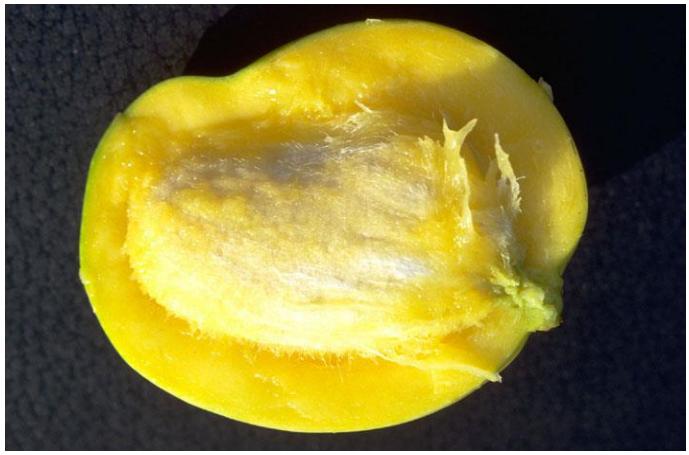
Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit (dry)	9.2	1157	5.5				
fruit	59.1	-	4.5	-	161	125	-

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

Fruit

English: Mango
Local:

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 6000 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 200-1000 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: Avocado
Local:

Scientific name: *Persea americana*
Plant family: LAURACEAE

Description: A small to medium sized tree that normally grows 8-10 m tall, but can reach 25 m. The leaf stalk is 1.5-5 cm long. Leaves are entire, oval and 5-40 cm long. Flowers are greenish, small and on the ends of branches. Clusters of flowers may contain 200-300 flowers. Normally only 1-3 fruit develop from each cluster. The fruit is round or pear shaped, and 7-20 cm long. The fruit are greenish-yellow with some red coloration. The fruit has greenish-yellow flesh and a large round seed. There are three named races-West Indian, Guatemalan and Mexican.

Distribution: A subtropical plant that grows from sea level up to 2250 m in the tropics. It cannot stand water-logging. Branches are easily damaged by wind. It needs a frost free location or where frosts are rare. West Indian varieties thrive in humid, tropical climates, freeze at or near 0°C and can stand some salinity. Mexican types come from dry subtropical plateaus and thrive in a Mediterranean climate. They are hardy to-7° C. They are salt sensitive, have the smallest fruits and the thinnest skin. The best daytime temperature is 25-33°C. Guatemalan types come from cool, high-altitude tropics and are hardy to-3° C. It does best with neutral or slightly acid and well aerated soil. Growth is disrupted when soil temperature is below 13°C. It needs high humidity at flowering and fruit set. It can grow in arid places.

Use: The fruit pulp is eaten raw or cooked. It is used in salads, soups, sandwiches, spreads, ice cream, and also in tortillas and wine. The fruit is mixed with sugar and water to make a drink. Oil is extracted from the flesh and is used in salad dressing. The leaves can be used for tea sweetened with sugarcane juice. Toasted leaves are used to season stews and bean dishes. **Caution:** Some people are allergic to avocado.

Cultivation: Plants are often grown from seed. Seeds remain viable for 2-3 weeks. Fresh seed held at 25°C day to 15°C night will germinate in 3 weeks. It is best to propagate vegetatively. Tip cuttings, layers and grafts can be used. Because different types have pollen at different times of day, a mixture of trees which have pollen and flowers receptive at different times gives best fruit set. Although trees will grow in shade, they need sun for fruiting. The leaves do not rot easily and can accumulate under trees. Other plants cannot be grown under avocado trees.

Production: Seedlings grow quickly and continuously in warm, moist conditions. Seedlings bear after 5-8 years. Grafted trees can fruit in 1-2 years. A good tree produces 400-600 fruit each year. A fruit can weigh 50 g-1 kg. In the subtropics, trees often produce 2 main flushes of fruit per year. From fruit set to maturity can take 6-12 months. Fruit ripen off the tree in 4-14 days. For the Mexican types, the fruit weigh less than 250 g and they ripen 6-8 months after flowering.

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	74.4	805	1.8	480	11	0.7	0.4

Image accessed from:
https://upload.wikimedia.org/wikipedia/commons/7/7d/Avocados_(Persea_americana)_(18159574242).jpg

Fruit

Common name: African elm
Local:

Scientific name: *Trema orientalis*
Plant family: CANNABACEAE

Description: A straight slender tree that grows to 10 m high. The trunk is 15-20 cm across. It may or may not lose its leaves during the year. The leaves have 3 conspicuous veins from the base. The leaves are heart shaped and with 3 veins. The leaves are often widest at the base. Leaves are often 6-15 cm long by 2.5-5 cm wide. There are fine teeth along the edge of the leaf. The leaves are rough and hairy when young. The flowers are small, green and no easily seen. They occur in short dense bunches. Mostly male and female flowers occur separately. The fruit are small and round and black. They are 4-6 mm across.

Distribution: A tropical plant that needs good rainfall and light. It can grow on thin, poor soils. It grows in areas with an annual rainfall between 1000-1600 mm. It grows below 2100 m above sea level. It can grow in acid soils and arid places.

Use: The young leaves are cooked and eaten as a vegetable. The fruit are eaten.

Cultivation: Plants are grown from seed. Seeds germinate easily. They can also be grown by cuttings.

Production: It is fast growing but short lived.

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	74.1	452	4.5	-	51.5	-	0.6

Image sourced from: https://commons.wikimedia.org/wiki/File:Trema_orientalis_14.jpg

Fruit

English: Indian jujube
Local:

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 1000 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

Common name: Cheese and bread
Local:

Scientific name: *Paullinia pinnata*
Plant family: SAPINDACEAE

Description: A woody creeper. It can be 5-10 m long. The leaves have 5 leaflets. The leaf stalk has wings. The flower racemes occur singly in the axils of leaves. They can be 10 cm long. The flowers are in clusters without stalks. The flowers are white. The fruit is an oblong or pear shaped capsule. It is 3 cm long by 1.4 cm wide. It is pinkish red and has fine lines along it. The valves are woody and there is 1 or sometimes 3 seeds inside. These are 1 cm long by 0.8 cm wide and 0.6 cm thick. They are shiny and blue-purple to black. There is a white aril or layer around the seed. This is edible.

Distribution: It is a tropical plant. It grows on coastal plains, swamps and sandy beaches. It grows in seasonally flooded forests. It grows along riverbanks and can grow on sand or clay. It grows from sea level tp 1600 m above sea level. It can grow in arid places.

Use: The aril or soft layer around the seeds and the pulp of the fruit are sometimes eaten. The flowers are eaten. The leaves 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
aril	83.0	1203	0.7	-	-	110	-

Image sourced from: https://www.zimbabweflora.co.zw/speciesdata/image-display.php?species_id=137290&image_id=9

Fruit

English: Canteloupe
Local:

Scientific name: *Cucumis melo*
Plant family: CUCURBITACEAE

Description: A pumpkin family plant. It is an annual climber with tendrils. It grows to 0.5 m high and spreads to 1.5 m across. The stems are soft and hairy and often angled. The leaves have lobes and often a wavy or toothed edge. They are on long leaf stalks. The leaves are often hairy underneath. The tendrils are not branched. The flowers are yellow and funnel shaped with expanded lobes. The male flowers occur in clusters and are produced before the female flowers. The fruit is round, mostly with a rough or streaky skin. It is green or yellow inside. The fruit is edible. Different kinds of melons occur. Some have a hard, warty, scaly skin. Others have a network of fine ridges over the surface.

Distribution: A tropical plant, but not suited to places with high rainfall. It suits hot dry places with a fertile well drained soil. It needs a sheltered sunny position. It is drought and frost tender. A temperature range of 24-28°C is best but much higher temperatures are tolerated. Mostly they are grown below 500 m altitude in the tropics. A pH of 6-6.7 is best. Acid soils are not suitable. It can grow in arid places. It suits hardiness zones 9-12.

Use: The ripe fruit are eaten raw. They are also dried, candied and made into jams, jellies and preserves. The seeds are sometimes eaten roasted. The seeds are blended with fruit juice to form a drink. Sometimes the immature fruit are cooked as a vegetable. The seeds contain an edible light oil. The young leaves are eaten as a potherb.

Cultivation: They are grown from seed planted about 1-4 cm deep. Plants need to be 1-2 m apart. Seedlings can be transplanted when about 10-15 cm high.

Production: Plants are ready 3-4 months after planting. Yields of 20 kg per10 sq m is average.

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	7.0	2319	15.8	-	-	-	-
leaf	85.0	172	4.2	72	-	-	-
fruit	93.0	109	0.5	169	30	0.4	0.2

Vegetables

English: Common bean
Local:

Scientific name: *Phaseolus vulgaris*
Plant family: FABACEAE

Description: There are many bush and climbing varieties of this bean. Climbing forms can be 2-3 m tall. Bush types are 20-60 cm tall. The leaves have three leaflets, one after another along the stem. The leaf stalk has a groove on the top. The side leaflets are unequal in shape, and can be 8-15 cm by 5-10 cm. The flowers are in the axils of leaves (where the leaves join the stem) and occur in a loose form. Flowers are white to purple. Pods are smooth, slender and 8-20 cm long by 1-1.5 cm wide. They are straight or slightly curved with a beak at the end and often have 10-12 coloured, kidney-shaped and seeds.

Distribution: It is a temperate plant that grows in many temperate and subtropical countries, including Solomon Islands. It mostly grows from 700-2000 m altitude in the tropics. It suffers from pest and disease damage in the lowlands, but can be grown to sea level. It is not suited to the wet tropics. It is shallow-rooted and damaged by excess moisture near the roots. A crop lifecycle needs about 350 mm of water. It is sensitive to frost and high temperatures. Flowers will not form below 9.5°C. Night temperatures above 37°C cause flowers to drop. The best temperature range is 15-21°C. It does not suit very acid soils. It suits hardiness zones 8-11.

Use: The young pods, leaves and mature seeds are edible. Dry seeds are soaked in water and boiled until soft.

Cultivation: Plants are grown from seed, preferably sown in raised beds. Seeds remain viable for 2 years. Germination is normally good if seed has been well stored. Climbing types need stakes. Plants are self-fertilised. These beans are intercropped with other plants in many places. If grown on their own, bush types can be spaced at 25 cm x 25 cm. They can be sown closer together in rows wider apart to make weeding and harvesting easier. For dried beans, once the pods are mature and turning yellow, the whole plants are pulled, then dried and threshed. About 50-75 kg of seed will sow a hectare. Flowering in most French bean varieties is not affected by day length.

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)	10.0	1386	25.0	10	1	8.0	2.8
seed (young)	92.0	142	3.0	-	20	0.8	0.2
pod	88.0	151	2.5	750	27	1.4	0.2
sprout	90.7	121	4.2	-	38.7	0.8	0.4

Vegetables

English: Carrot
Local:

Scientific name: *Daucus carota* subsp. *sativus*
Plant family: APIACEAE

Description: A root crop grown from seed. It normally grows a fattened root one year then forms a flower the next year. It can be 60 cm high and spread to 50 cm wide. The root is long in shape and orange in colour. The stem is erect, tough and furrowed. The leaves are feathery and divided 3 times. The leaves have a sheath clasping the stalk at the base. The flowers are white and lacy. They form a dense compound cluster at the top of the plant. Sometimes flowers are only produced into the second year of growth, depending on temperature.

Distribution: A temperate plant. In the tropics it is mostly grown in the highlands, but will grow from sea level to 2600 m altitude. Sometimes on the coast only leaves are produced. Carrots are frost resistant. In Nepal carrots are grown up to 1700 m altitude. It needs a deep loose soil. Seed germinate well in the temperature range 7-24°C. Plants grow well with a temperature about 15°C. It grows best with a pH of 6-7. It suits hardiness zones 3-9.

Use: Both the roots and the leaves are edible. The young leaves are used in soups. The roots can be eaten raw or cooked. They can be steamed, fried, pickled, made into jam, or used in stews. Carrot seed oil is used as a flavouring. The juice is used raw and fermented. The roots can be dried and the flour used to flavour and thicken soups.

Cultivation: They are grown from seeds sown directly. Because the seeds are very small, they are sometimes mixed with sand before sowing to allow a more even distribution of plants. A spacing 5 cm apart in rows 15-20 cm apart is suitable. Often this spacing is achieved by thinning out plants. For seed production, a low temperature of 4-9°C for 40-60 days is needed before flowering to break the dormancy.

Production: There are tropical varieties that mature within 90-110 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
root (raw)	89.9	180	1.0	835	6	0.6	0.4
root (boiled)	91.5	79	0.6	852	4	0.4	0.3
leaf	87.4	-	2.2	65	-	-	-

Vegetables

English: Wild cucumber
Local:

Scientific name: *Cucumis prophetarum*
Plant family: CUCURBITACEAE

Description: A herb from the pumpkin family with slender stems. It can lie along the ground or be climbing. The tendrils are simple and short. It has a taproot. The leaves are oval or round and 2-4 cm long. They can have 3-5 lobes. Male and female flowers are separate. Male flowers occur in groups of 2 or 3 and female flowers occur singly. The fruit are oval and hairy, with soft bristles. They have yellow and green stripes along them. They are 3-4 cm long by 2-3 cm wide. The seeds are pale. There are 2 subspecies.

Distribution: It is a tropical plant that grows to 2400 m altitude. It can grow in stony, sand or clay alkaline soils, often over limestone material. It grows in areas with an annual rainfall of 400 mm. It can grow in arid places.

Use: The unripe fruit are pickled. The ripe fruit are bitter but are boiled and eaten. The leaves are edible.

Production: Fruit are available 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
fruit	81.8	583	12.7	-	-	-	-

Image sourced from: http://www.asergeev.com/pictures/archives/2014/1512/jpeg/12.jpg

Vegetables

English: Broad bean
Local:

Scientific name: *Vicia faba*
Plant family: FABACEAE

Description: An upright plant up to 1 m tall. Plants vary in height from 30-180 cm. It has a well-developed taproot. It has square stems which are hollow and have wings at the angles. There can be 1-7 branches from near the base of the plant. The leaves have leaflets along the leaf stalk and end in a short point. There are 2-6 leaflets. These are 5-10 cm long. Flowers occur in the axils of leaves and there are 1-6 flowers on a stalk. The flowers are white with black spots. Pods are large and fat and contain several large beans inside. The pods are 5-10 cm long in field varieties and can be 30 cm long in garden varieties. They are fleshy with a white velvety lining. They become tough and hard at maturity. The seeds can vary a lot in shape and size. They can be flat or rounded and white, green, brown, purple or black. They are 1-2.6 cm long. The hilum along the seeds is prominent.

Distribution: A temperate plant only suitable for the highlands over about 1,200 m. in the tropics. It mainly occurs from 1900-2700 m altitude in equatorial zones. It is frost tolerant and is resistant to drought. It can grow with temperatures down to 4°C. In the lowland hot tropics it often flowers but does not set seed. It requires fertile soils. It does best with adequate lime needing a soil pH of 6.4-7.2. It can tolerate some salinity.

Use: It is mostly the young beans that are eaten. The ripe beans and leaves are also edible. The dried beans can be boiled, ground into flour and added to soups or used for making tofu. Sprouted seeds are cooked and eaten. The tender pods are eaten as a vegetable. **Caution:** Some people, mainly of Mediterranean origin can get a disease called Favism from these beans. The beans should be well cooked. They can react with some people using some antidepressant drugs.

Cultivation: The crop is grown from seed which are sown at 15-40 cm spacing. If the seed pod formation is poor, it can be improved by pinching out the tops of the plants when in flower. Hand pollination also helps. Plants are self-pollinated but also cross pollinated by insects.

Production: Time to maturity is 12-16 weeks. Yields in the cool tropics vary from 1-2 tons per hectare.

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)	10.0	1448	26.2	130	16	6.7	-
seed (fresh, raw)	76.0	315	7.1	35	140	1.9	0.6
seed (fresh, boiled)	83.7	259	4.8	27	20	1.5	0.5

Vegetables

English: Jute
Local:

Scientific name: *Corchorus olitorius*
Plant family: MALVACEAE

Description: An annual plant. It is upright, branching, and slightly woody. Plants vary in height, shape, leafiness and hairiness. Plants grown for leaves are usually only 30 cm tall. They also have many branches. Leaves are shiny and have leaf stalks. The leaves have teeth along the edge. The tips of the lowest leaves in each side, have long bristle like structures. Small clusters of yellow flowers grow in the axils of the leaves. The fruit are ridged capsules. They can be 7 cm long. These have partitions across them between the seeds. A ripe capsules contains 180-230 seeds. The seeds are dull grey and with four faces and one long point. Each seed has one pale line along it.

Distribution: A tropical plant. It is mostly coastal, below 250 m altitude. Temperatures of 22°-35°C are suitable. It can stand both drought (2-3 weeks) and water-logging, except when young. A well-drained soil is best. They require humus-rich soils. A soil pH of 5.5-7.0 is best, but they can grow in soils with pH up to 8.5. They also need adequate moisture for good leaf production. A rainfall of 1000 mm is suitable. A high relative humidity (80-90%) is best. It produces seeds when day lengths are short. It grows in most African and Asian countries.

Use: The young leaves and stem tops are eaten cooked. They are slimy unless fried. They are also used to make a thick soup. Leaves can be sun dried, pounded to flour, then stored for a long time.

Cultivation: Plants grow from seed, and they can be transplanted. Seeds are often broadcast into fine seed beds at the beginning of the wet season. Mixing the small seeds with sand makes it easier to sow them evenly. Often seeds are slow to start growing. This can be overcome by soaking them in hot water. A spacing of 20-30 cm between plants is suitable. For vigorous varieties this could be increases to 45-50 cm. Seeds are saved from pods for re-sowing.

Production: First leaves can be harvested after 5-6 weeks. Tips about 20-30 cm long are picked. Production of edible green tips, is not large. 7-8 kg of leaf tips can be harvested from 3-8 pickings over 3-4 months. Seeds can be collected after 13-15 weeks. If seeds of a particular variety are desired, it is necessary to grow these plants 16 m away from other plants, to avoid cross pollination. Seeds can be stored for 8-12 months in well-sealed jars.

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 (raw)	80.4	244	4.5	574	80	7.2	-
leaf (cooked)	87.2	155	3.4	156	33.0	3.1	0.8

Vegetables

English: Pencil yam
Local:

Scientific name: *Vigna vexillata*
Plant family: FABACEAE

Description: A variable climbing herb that keeps growing from year to year. It has a narrow woody rootstock that is dull white and wrinkled. The hairy vines are 30 cm to 3 m long. The leaves have 3 leaflets and these are oval or long. They can be 3-16 cm long by 0.4-8 cm wide. They taper towards the tip and are rounded at the base. The leaf stalk is 2-11 cm long. The flowering stalks are in the axils of leaves and have 2-6 flowers. The flowering stalk is 5-36 cm long. The pea like flower has a standard which is 2-3 cm long and not the same on both sides. Flowers are pink or purple. The keel is paler with a beak curved back at the end and twisted to one side. The fruit are pods which are held erect. They are 4-14 cm long by 3-4 mm wide and covered with short brown hairs. There are 10-18 seeds. The seeds are light brown to black. They are kidney shaped and 3-4 mm long by 2 mm wide.

Distribution: It is a tropical plant that mostly grows naturally in open woodland on sandstone soils. It will grow in dry, acid and high aluminium soils that are infertile. It can grow in arid places.

Use: The tuberous roots are eaten raw or cooked. They can be boiled or roasted. The seeds are cooked and eaten.

Cultivation: Plants can be grown from seed or tubers.

Food Value: Per 100 g edible portion

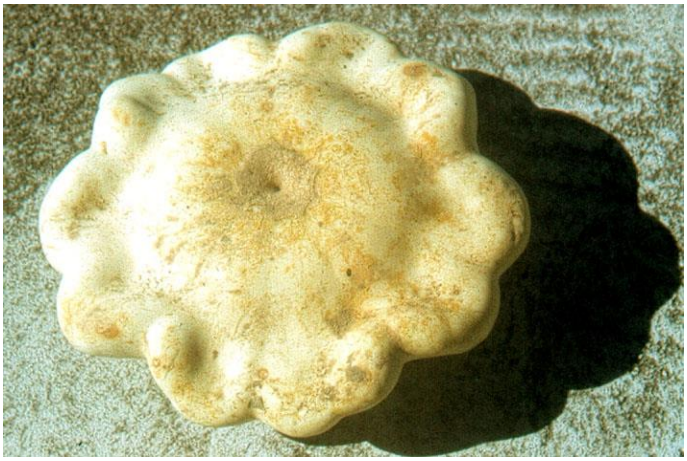
Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
tuber	79.6	302	2.1	-	11.6	0.8	0.5
root	68.9	287	2.3	-	-	10.0	1.7

Image accessed from: http://farm3.static.flickr.com/2347/1651731806_c282f57a3c.jpg%3Fv%3D0

Vegetables

English: Marrow
Local:

Scientific name: *Cucurbita pepo*
Plant family: CUCURBITACEAE



Description: A bristly hairy annual vine in the pumpkin family. It has branched tendrils. The stems are angular and prickly. The leaves are roughly triangular. The leaves have 5 lobes which are pointed at the end and are toothed around the edge. Male and female plants are separate on the same plant. Male flowers are carried on long grooved flower stalks. Female flowers are borne on shorter more angular stalks. The fruit stalks have furrows along them but are not fattened near the stalk. The fruit vary in shape, size and colour. Often they are oval and yellow and 20 cm long by 15 cm wide. The seeds are smaller than pumpkin and easy to separate from the tissue. The scar at their tip is rounded or horizontal, not oblique. There are a large number of cultivated varieties.

Distribution: A subtropical plant. They are more suited to drier areas. They are frost sensitive, and grow best with day temperatures between 24-29°C and night temperatures of 16-24°C. It suits tropical highland regions. It suits hardiness zones 8-11.

Use: The young fruit are cooked and eaten. They can be steamed, boiled or fried. They are used in pies, soups, stews and cakes. The young leaves and the ripe seeds can also be eaten cooked. The seeds are dried, salted and toasted and eaten as a snack food. The seeds can also be pressed to produce oil. The sprouted seeds are used in salads. Flowers and flower buds can be eaten boiled. They can be dried for later use.

Cultivation: They are grown from seeds. The seeds germinate after one week. They can be grown from cuttings. They are best planted on mounds. A spacing of 2-3 m between plants is needed. Hand pollination assists fruit setting. Plants can also be grown from cuttings as plants root at the nodes.

Production: The first usable immature fruit are ready 7-8 weeks after planting.

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)	3.7	2266	29.4	-	-	7.3	-
leaf	89.0	113	4.0	180	80	0.8	-
fruit (mature)	92.0	105	1.6	17	16	2.4	-
fruit	91.3	102	1.1	-	12	0.8	0.2
yellow fruit	92.0	97	1.0	180	8	1.4	-
immature fruit (raw)	92.0	92	1.5	-	9	0.4	0.1

Nuts, seeds, herbs and other foods

English: Horse-mint, Biblical mint
Local:

Scientific name: *Mentha longifolia*
Plant family: LAMIACEAE

Description: A herb which keeps growing from year to year. It has rhizomes or underground stems. The above ground stems are erect, or creeping and 1 m high. There are many branches. The branches are white with lines along them. The leaf blade is oval to oblong and 6 cm long by 1.5 cm wide. The leaves have teeth along the edge. The flowers are purplish and in spikes 3-8 cm long.

Distribution: It grows in damp locations. It can grow in light shade and in arid places. It suits hardiness zones 6-9.

Use: The leaves are eaten in chutneys. They are also used for seasonings. The leaves and flowers yield an oil used for flavouring. The leaves are candied or used as a tea. The leaves are dried and used for flavouring.

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	8.2	1056	8.4	-	-	12.2	5.1

Nuts, seeds, herbs and other foods

English: Garlic
Local:

Scientific name: *Allium sativum*
Plant family: AMARYLLIDACEAE

Description: An onion family plant. It is an erect herb with a number of tightly packed bulbs (cloves) wrapped in papery scale leaves. It grows one year, then flowers the next. It grows about 40 cm tall. he true leaves of the plant are long, flat and solid and 2.5 cm wide. The roots are side roots. The number of cloves per bulb varies from 16-50 depending on variety. Flowers are borne on a long stalk in a head where the flowers are on equal length stalks from one point forming a rounded head.

Distribution: A temperate plant. It grows in the tropical highlands mostly between 1600 m and 2200 m, but will grow satisfactorily down to 500 m. There are varieties that will grow in hot coastal tropical places. Best bulb development occurs with temperatures up to 30°C. It is frost resistant. High humidity or high rainfall is not suitable. It is best grown in low rainfall areas with irrigation. Bulb development is favoured with long day lengths. It does best with a soil pH of 6-7. It suits hardiness zones 8-10.

Use: The cloves are used in small amounts to flavour food. The leaves can also be used. Leaves should be cut before they are mature.

Cultivation: Plants are grown by planting individual cloves. The individual segments of the clove are separated out then planted. A spacing of 20 cm is suitable. They should be planted into a deeply dug but firm seedbed and almost covered with fine soil. Cloves or "rounds" are best planted at the end of the wet season. Plants rarely produce fertile flowers or seed. They can be grown from seed.

Production: Bulbs should be ready about 90-120 days from planting. Bulbs can be stored at 25-30°C for 90 days with low humidity and good air circulation.

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	87.0	50	2.1	684	38	0.4	1.0

Nuts, seeds, herbs and other foods

English: Tallow tree
Local:

Scientific name: *Detarium senegalense*
Plant family: FABACEAE

Description: A small tree that grows 5-7 m tall in savannah areas. It can be 36 m high. It has a short trunk and a spreading crown. The bark is grey and rough and flakes off in angular sections. The bark is hard to cut. The leaves are made up of 5-12 leaflets along a stalk. The leaves are 6-10 cm long and 2.5-5 cm wide. They are rounded at the base. The leaves are pale green and leathery. The leaflet stalk is stout and 3-5 mm long. The flowers are creamy white and occur in clusters. Individual flowers are 10 mm across. The fruit are round or oval and 4 cm across. They contain one seed. The flesh is edible. The flesh is green and a fibrous network attaches to the hard shell of the seed. The kernel of the seed is a deep purple brown.

Distribution: A tropical plant. It grows in savannah woodlands of tropical Africa. It grows where the rainfall is 900-1600 mm per year. It also grows near beaches and coastal sand dunes.

Use: The sweet pulp of the fruit is eaten fresh. It is also dried. **Caution:** The seeds are said to be poisonous. There are toxic and non-toxic varieties. Sweet pulp from the roots is used as a substitute for sugar.

Cultivation: Plants are grown by seed.

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)	14.0	1250	3.4	-	-	1.4	-
fruit	66.9	485	1.9	-	-	2.8	-

Image sourced from: http://tropical.theferns.info/plantimages/D/e/DetariumSenegalenseRipFruit.jpg

Nuts, seeds, herbs and other foods

English: Carob
Local:

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 300-4030 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	-	-	-	-

Nuts, seeds, herbs and other foods

English: Sesame
Local:

Scientific name: *Sesamum indicum*
Plant family: PEDALIACEAE

Description: A small, erect annual plant. It is very branched and grows 1-2 m tall. The stem is stout, 4 sided and furrowed along its length. It is densely covered with fine, downy, glandular hairs that vary in shape. The lower leaves have long stalks and are spear shaped, often with lobes or a toothed edge. The leaf stalks are 3-11 cm long. The leaf blade is 4-20 cm long by 2-10 cm wide. Upper leaves are narrow and oblong. They are 0.5-2.5 cm wide. The flowers occur in the axils of upper leaves, either on their own, or in groups of 2 or 3. They can be white, pink, purplish and with yellow spots and stripes. The fruit can be smooth or rough and there are 2 chambers in the capsule. The fruit are brown or purple. They are oblong and deeply grooved. The seeds are small and oval. They are 3 mm by 1.5 mm and vary in colour from white, yellow, grey, red, brown or black. The fully ripe pods burst open.

Distribution: A tropical plant that suits the hot, dry, semi-arid tropics and sub-tropics. It can tolerate short periods of drought once established. It needs a temperature of 20-24°C in early growth, then 27°C for ripening. It grows from sea level to about 1200 m in areas with an annual rainfall of 400-1000 mm. Soils need to be well drained. It is very intolerant of water-logging. It cannot stand high humidity and needs frost free conditions. It needs a dry period for seed drying. It does not like acid soils. It grows in open sunny places. It can grow in arid places.

Use: The seeds are eaten. They are used in soups or fried or boiled. They are used in tahini and hummus. Seeds are eaten in the form of sweetmeats. Roasted seeds are used in pickles. They are also put on bread. Oil from the seeds is used in cooking and on salads. The refuse from the seed after the oil has been extracted is boiled in water and made into soup.

Cultivation: Plants are grown from seed. Seed will not germinate below 21°C. Seeds are broadcast on well prepared land and then harrowed in using a light harrow, or sown 2-15 cm apart in rows 20-45 cm apart. Plants can be thinned or weeded during early growth to produce a better crop. Seeding rates of 9-11 kg/ha are used. Some varieties shatter easily.

Production: Yields of 340-500 kg/ha are average. Plants reach maturity in 80-180 days. Crops are harvested as the leaves begin to drop. Plants are cut and stooked or dried in racks. The hull is removed by soaking in water overnight, then partly dried and rubbed against a rough surface.

Food Value: Per 100 g edible portion

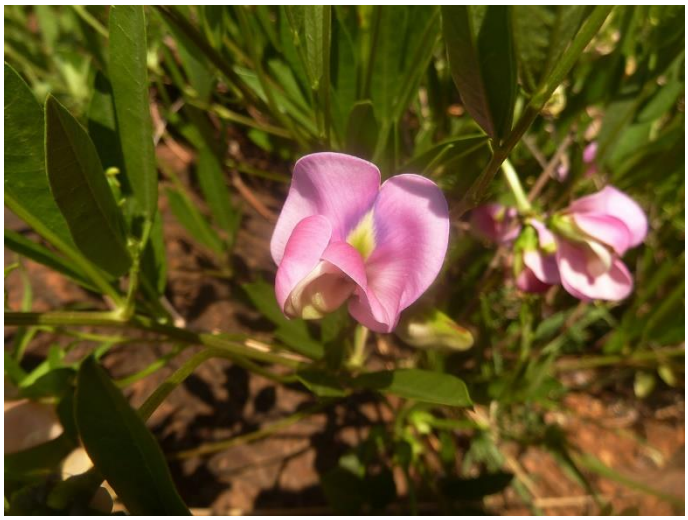
Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed (dry)	4.7	2397	17.7	1	-	14.6	7.8
leaf (raw)	85.5	188	3.4	-	-	-	-
oil	-	3683	0.2	-	-	-	-

Nuts, seeds, herbs and other foods

Common name: African yam bean
Local:

Scientific name: *Sphenostylis stenocarpa*
Plant family: FABACEAE

Description: A vigorous climbing vine. It grows 1.5-2 m high. The leaves have 3 leaflets. They are 14 cm long and 5 cm wide. The flowers are pink, purple or greenish-white. They are 2.5 cm long. They occur on stout stalks in the axils of leaves. The seed pods are smooth and 25-30 cm long by 1-1.5 cm wide. They are flat but have both edges raised. The seeds vary in shape, size and colour. They can be 1 cm long by 0.7 cm wide. They can be cream or brown. Small narrow tubers grow under the ground. They can be 5-7.5 cm long and weigh 50-150 g. The flesh is white and watery.



Distribution: It is a tropical plant that grows from sea level up to 1800 m altitude. It grows in grassland and woodland and sometimes in marshy sites. It can grow in arid places.

Use: The pods, leaves, seeds and tubers are cooked and eaten. They are used in soups or with maize or rice. The hard seeds need to be soaked in water for 12 hours before cooking and being ground. The tubers are cooked and eaten.

Cultivation: It can be grown from seed or tubers.

Production: Tubers are ready for harvest about 8 months after planting.

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	9.0	1470	19.2	-	-	-	-
seed (boiled)	67.9	485	7	-	-	1.3	1.1
tuber	64.0	542	3.8	-	-	-	-

Image accessed from:
https://upload.wikimedia.org/wikipedia/commons/thumb/4/48/Sphenostylis_angustifolia%2C_veldblomstappie%2C_Faerie_Glen_NR%2C_a.jpg/1200px-Sphenostylis_angustifolia%2C_veldblomstappie%2C_Faerie_Glen_NR%2C_a.jpg

Nuts, seeds, herbs and other foods

English: Yellow ipomoea
Local:

Scientific name: *Ipomoea obscura*
Plant family: CONVOLVULACEAE

Description: A slender trailing herb that lies along the ground. It can be a climber or twining. It has a taproot and can keep growing from year to year. The leaf stalks are 1.5 cm long. The leaf blades vary but are long and tapering to the tip with a broadly heart shape base. They are 4 cm long. The flowers occur singly or as a few together in the axils of leaves. The flowers are funnel shaped and 4 cm long and 3 cm across. They are pale yellow or white.

Distribution: It is a tropical plant. It grows up to 1800 m above sea level. It grows in woodland, grassland, savannah and coastal sands. It can grow in arid places.

Use: The leaves are cooked and eaten as a relish. The leaves are added to soup.

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	56.6	569	8.8	-	-	28.8	1.1

Image sourced from: https://en.wikipedia.org/wiki/Ipomoea_obscura

Nuts, seeds, herbs and other foods

English: Boabab
Local:

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 100-1000 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 1500 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	-	-

Nutritional values of food plants by plant Family

Plant Family	Scientific name	Common name	Edible part	Moisture %	Energy kJ	Protein g	Vit A µg	Vit C mg	Iron mg	Zinc mg	Page
AMARANTHACEAE	*Amaranthus cruentus*	Purple amaranth	leaf	84.0	176	4.6	-	64	8.9	-	29
AMARANTHACEAE	*Celosia trigyna*	Silver spinach	leaf	89.0	139	2.7	94	10	5.0	-	31
AMARANTHACEAE	*Amaranthus graecizans*	Spreading pigweed	leaf (dry)	6.3	903	26.1	-	-	9.8	5.0	36
AMARYLLIDACEAE	*Allium sativum*	Garlic	leaf	87.0	50	2.1	684	38	0.4	1.0	56
ANACARDIACEAE	*Mangifera indica*	Mango	fruit	83.0	253	0.5	54	30	0.5	0.04	39
ANNONACEAE	*Annona senegalensis*	Wild custard apple	fruit	77.2	329	1.7		18.1	0.7	0.3	37
APIACEAE	*Daucus carota* subsp. *Sativus*	Carrot	root (raw)	89.9	180	1.0	835	6	0.6	0.4	49
APOCYNACEAE	*Leptadenia lancifolia*		leaf (raw)	81.0	226	4.9	4915	78	5.4	-	32
ARACEAE	*Colocasia esculenta*	Taro	root	66.8	1231	1.96	3	5	0.68	3.2	11
BOMBACACEAE	*Adansonia digitata*	Boabab	fruit	16.0	1212	2.2	-	360	7.4	6.7	62
CANNABACEAE	*Trema orientalis*	African elm	fruit	74.1	452	4.5	-	51.5	-	0.6	43
CHENOPODIACEAE	*Beta vulgaris* subsp. *cicla*	Silver beet	leaf (boiled)	92.7	84	1.9	314	18	2.3	0.3	35
CONVOLVULACEAE	*Ipomoea batatas*	Sweet potato	tuber (baked)	72.9	431	1.7	961	24.6	0.5	0.3	19
CONVOLVULACEAE	*Ipomoea obscura*	Yellow ipomoea	leaf	56.6	569	8.8	-	-	28.8	1.1	61
CUCURBITACEAE	*Cucumis melo*	Canteloupe	fruit	93.0	109	0.5	169	30	0.4	0.2	47
CUCURBITACEAE	*Cucumis prophetarum*	Wild cucumber	fruit	81.8	583	12.7	-	-	-	-	50
CUCURBITACEAE	*Cucurbita pepo*	Marrow	yellow fruit	92.0	97	1.0	180	8	1.4	-	54
CYPERACEAE	*Cyperus esculentus*	Yellow nutsedge	bulb	77.4	342	0.9	-	21	4.2	0.6	13
FABACEAE	*Arachis hypogea*	Peanut	seed (dry)	4.5	2364	24.3	-	-	2.0	3.0	21
FABACEAE	*Lablab purpureus*	Lablab bean	seed (young)	86.9	209	3.0	14	5.1	0.8	0.4	22
FABACEAE	*Mucuna pruriens*	Velvet bean	seed	7.3	-	29.3	-	4.8	-	-	23
FABACEAE	*Parkia filicoidea*	African locust bean	seed (dry)	7.0	1780	32.3	-	6	33.2	-	24
FABACEAE	*Cajanus cajan*	Pigeon pea	seed (young, boiled)	71.8	464	6.0	2	28.1	1.6	0.8	25
FABACEAE	*Prosopis Africana*	Mesquite	seed(dry)	4.2	1450	15.4	-	-	-	-	26
FABACEAE	*Acacia tortilis*	Umbrella thorn	seed	8.3	-	13.2	-	-	-	-	27
FABACEAE	*Cyamopsis tetragonolobus*	Guar bean	pod (fresh)	82.0	-	3.7	198	49	5.8	-	28
FABACEAE	*Crotalaria brevidens*	Slenderleaf rattlepod	leaf	74.5		8.8	-	-	38	-	34
FABACEAE	*Phaseolus vulgaris*	Common bean	pod	88.0	151	2.5	750	27	1.4	0.2	48
FABACEAE	*Vicia faba*	Broad bean	seed (fresh, boiled)	83.7	259	4.8	27	20	1.5	0.5	51
FABACEAE	*Vigna vexillata*	Pencil yam	tuber	79.6	302	2.1	-	11.6	0.8	0.5	53
FABACEAE	*Detarium senegalense*	Tallow tree	fruit	66.9	485	1.9	-	-	2.8	-	57
FABACEAE	*Ceratonia siliqua*	Carob	pod	11.2	753	6.5	-	-	20.3	1.7	58
FABACEAE	*Sphenostylis stenocarpa*	African yam bean	seed	9.0	1470	19.2	-	-	-	-	60
LAMIACEAE	*Plectranthus esculentus*	Kaffir potato	tuber	78.0	351	1.9	-	-	6.4	-	14
LAMIACEAE	*Mentha longifolia*	Horse-mint	leaf	8.2	1056	8.4	-	-	12.2	5.1	55
LAURACEAE	*Persea americana*	Avocado	fruit	74.4	805	1.8	480	11	0.7	0.4	41
MALVACEAE	*Sida cordifolia*	Goat's horns	leaf	6.6	1296	24.2	-	-	79.8	-	33
MALVACEAE	*Grewia tenax*	Small-leaved white raisin	fruit	59.1	-	4.5	-	161	125	-	38
MALVACEAE	*Corchorus olitorius*	Jute	leaf (cooked)	87.2	155	3.4	156	33.0	3.1	0.8	52
MORINGACEAE	*Moringa oleifera*	Horseradish tree	leaf (boiled)	87	189	4.7	40	31.0	2.0	0.2	30

Plant Family	Scientific name	Common name	Edible part	Moisture %	Energy kJ	Protein g	Vit A µg	Vit C mg	Iron mg	Zinc mg	Page
PEDALIACEAE	*Sesamum indicum*	Sesame	seed (dry)	4.7	2397	17.7	1	-	14.6	7.8	59
POACEAE	*Pennisetum glaucum*	Bullrush millet	seed	11.6	1442	10.5	-	-	6.5	1.7	15
POACEAE	*Sorghum bicolor*	Sorghum	seed	-	1459	11.1	-	-	-	-	16
POACEAE	*Digitaria exilis*	Hungry rice	seed (cooked)	63.0	613	2.9	0	-	3.5	0.61	17
POACEAE	*Oryza glaberrima*	Floating rice	seed	11.3	1538	7.4	-	-	3.4	-	18
RHAMNACEAE	*Ziziphus mauritiana*	Indian jujube	fruit	77.0	360	0.8	21	71	0.4	0.4	44
SAPINDACEAE	*Paullinia pinnata*	Cheese and bread	aril	83.0	1203	0.7	-	-	110	-	46

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