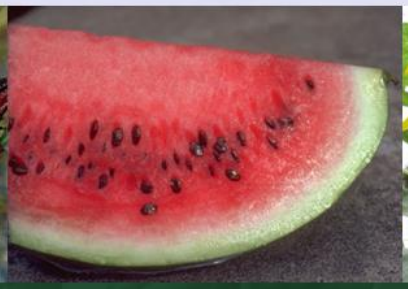
# Food Plants of East Sudan






Rotary

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

german cooperation
DEUTSCHE ZUSAMMENARBEIT

WELT HUNGER HILFE
WHH

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

*www.foodplantsolutions.org*

REGISTERED CHARITY



Welthungerhilfe (WHH) is implementing a four-year (2021-2025) project, Strengthening the resilience and peaceful co-existence of refugees and host communities in Sudan's two states of Kassala (Wad Elhilew locality), and Gedaref state (Al-Fashaga locality). The project's objective is to improve livelihoods and nutrition for targeted refugees and vulnerable host communities. To achieve better nutritional outcomes, Food Plant Solutions has identified and developed a field guide for highly nutritious food plants suitable for the target areas of Kassala and Gedaref. Through this field guide, WHH is promoting (re-) introduction of edible underutilized food plants in the target areas to help improve nutrition and reduce malnutrition. The project is funded by the German Federal Ministry for Economic Cooperation and Development (BMZ).

# Food Plants of East Sudan

**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.

Bruce French (AO), agricultural scientist, founder of Food Plants International and developer of the "Edible Plants of the World" database.

Food Plant Solutions Field Guide – East Sudan, Version 1, Feb 2025

**Preface**

This guide is based on information from the Food Plants International (FPI) database, "Edible Plants of the World", 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 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 an indicative guide 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 Sudan. This guide has been developed with the best intention to create interest and improve understanding of the important local food plants of Sudan, and on the understanding that it will be further edited and augmented by local specialists with appropriate knowledge and understanding of local food plants.

Food Plant Solutions was initiated by the Rotary Club of Devonport North to assist in creating awareness of the edible plant database developed by Food Plants International, and its potential in addressing malnutrition and food security in any country of the world. In June 2007, Food Plant Solutions was established as a project of Rotary District 9830, the Rotary Club of Devonport North and Food Plants International. The primary objective of the project is to increase awareness and understanding of the vast food resource that exists in the form of local plants, well adapted to the prevailing conditions in which they are to be grown, 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.



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*

Bruce French, AO – founder of Food Plants International (FPI) and developer of the FPI database
Edited by Food Plant Solutions

Potentially Important Food Plants of Sudan has been produced to provide information on approximately 40 edible plants that are known to grow in Sudan. 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. The selection and use of plants adapted to a range of growing conditions is becoming even more important as climate change impacts production in a variety of ways in different regions.

**Getting to know plants**

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

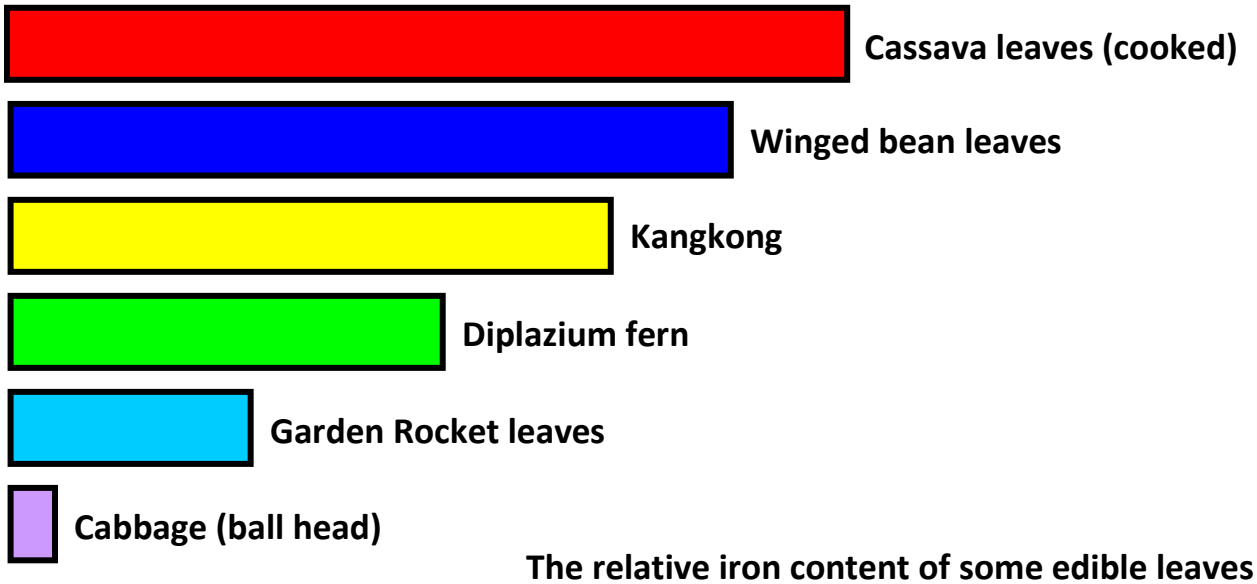
**Naming of plants**

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

**Local food plants are often very good**

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

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




**The relative iron content of some edible leaves**

**A healthy balanced diet**

Good nutrition, or eating a healthy balanced diet, is possible even with limited resources, space or means. 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 contain many vitamins and minerals, as well as protein. There are many spices or flavouring plants that can improve the taste of foods, which helps save money on artificial taste enhancers. 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 consumed with a little 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 will not 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. Maize 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 familiar with natural environments will know this very well. The reason people all over the world want to save natural environments is because they have 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 may not 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. 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 will not 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 maize, 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 will not 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.

Maize 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 do not 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.

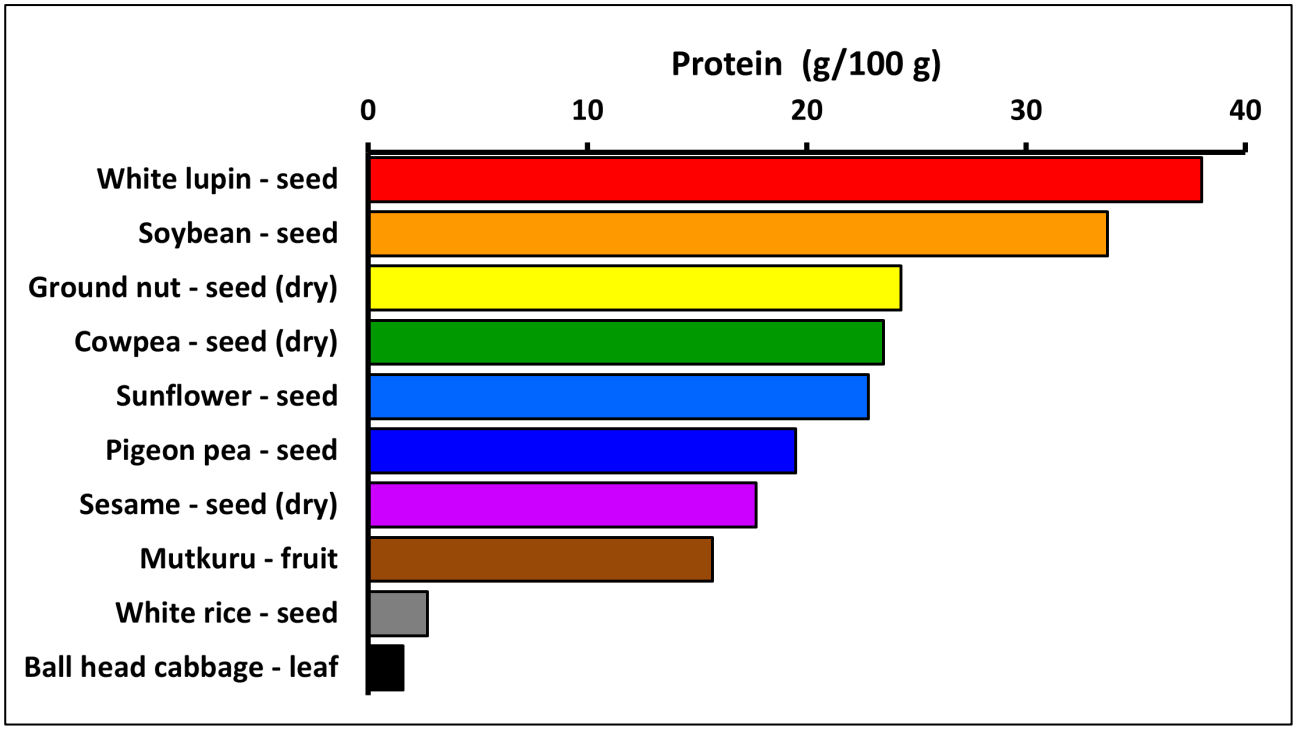
**Pests**
There are a large number of insects that enjoy sharing our food with us! We should not try to kill all these insects as they have an important role to play in keeping everything in nature in balance. What

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.

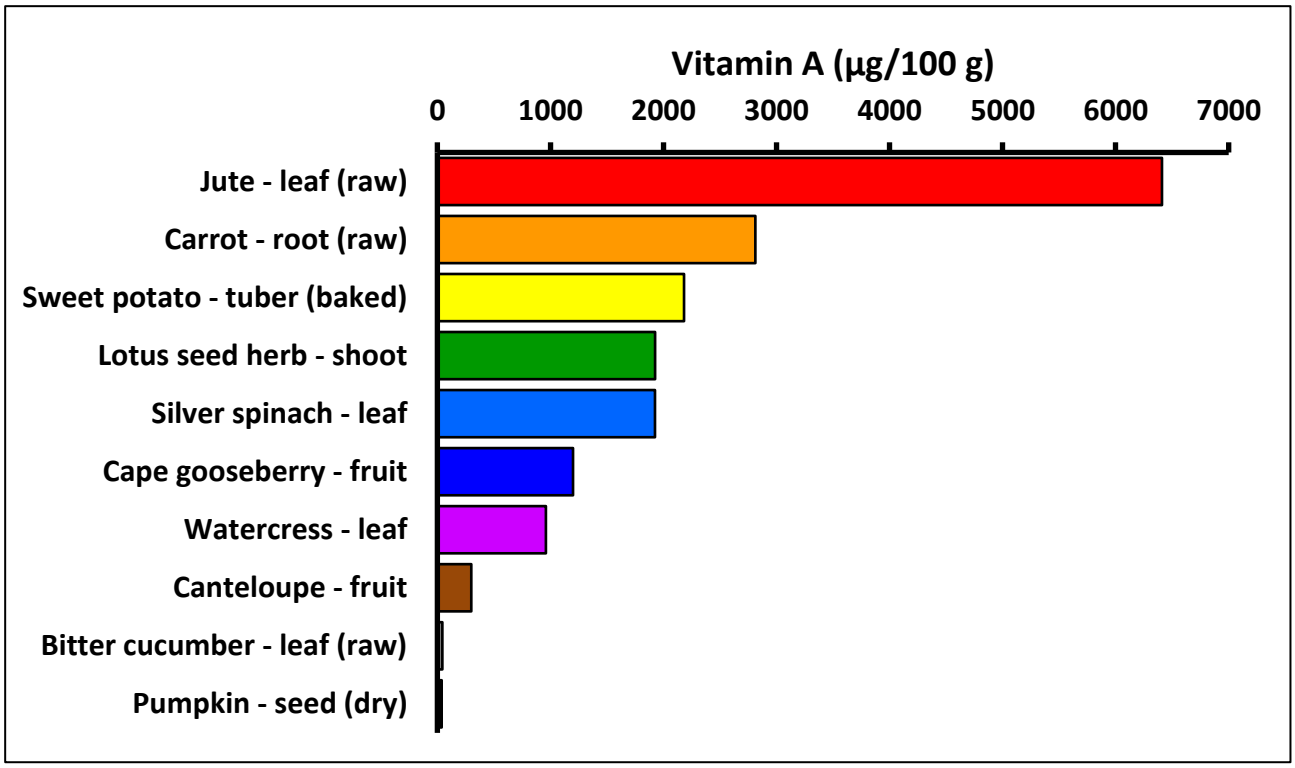
**Diseases**

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 does not 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.

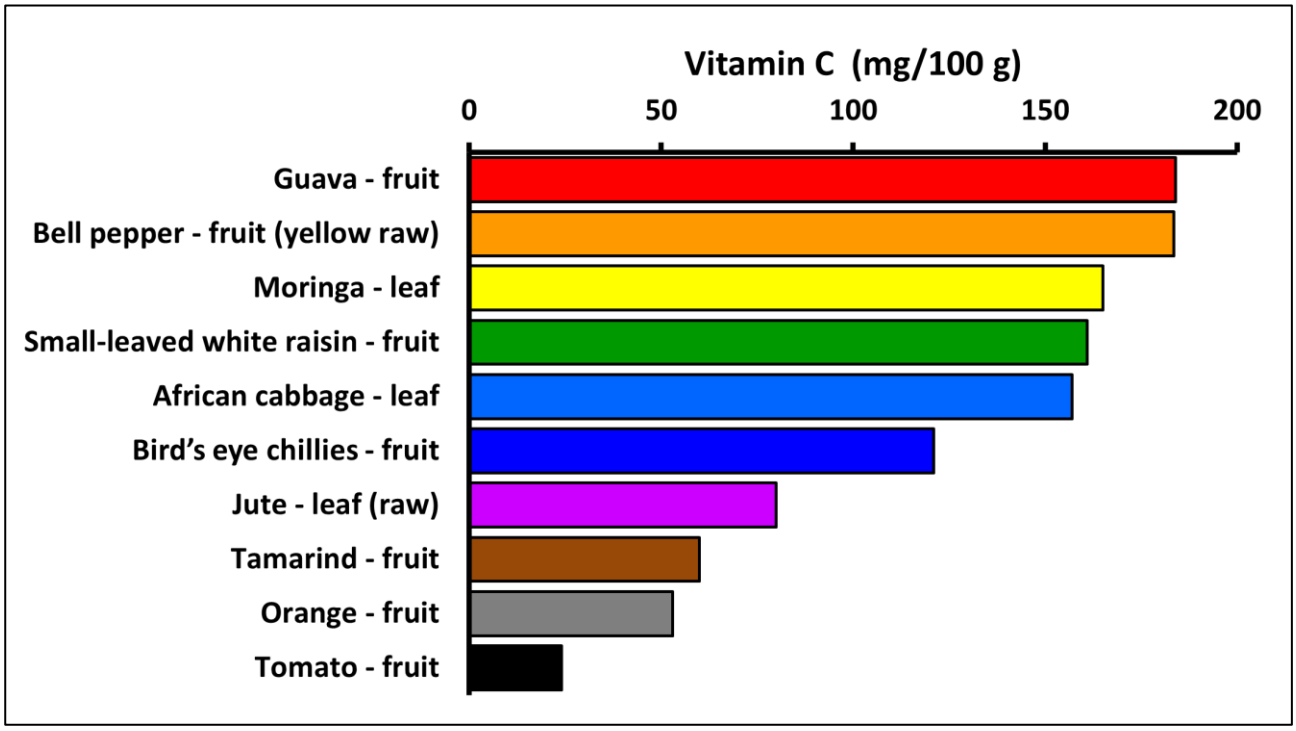
## Food value charts for a selection of plants from Sudan



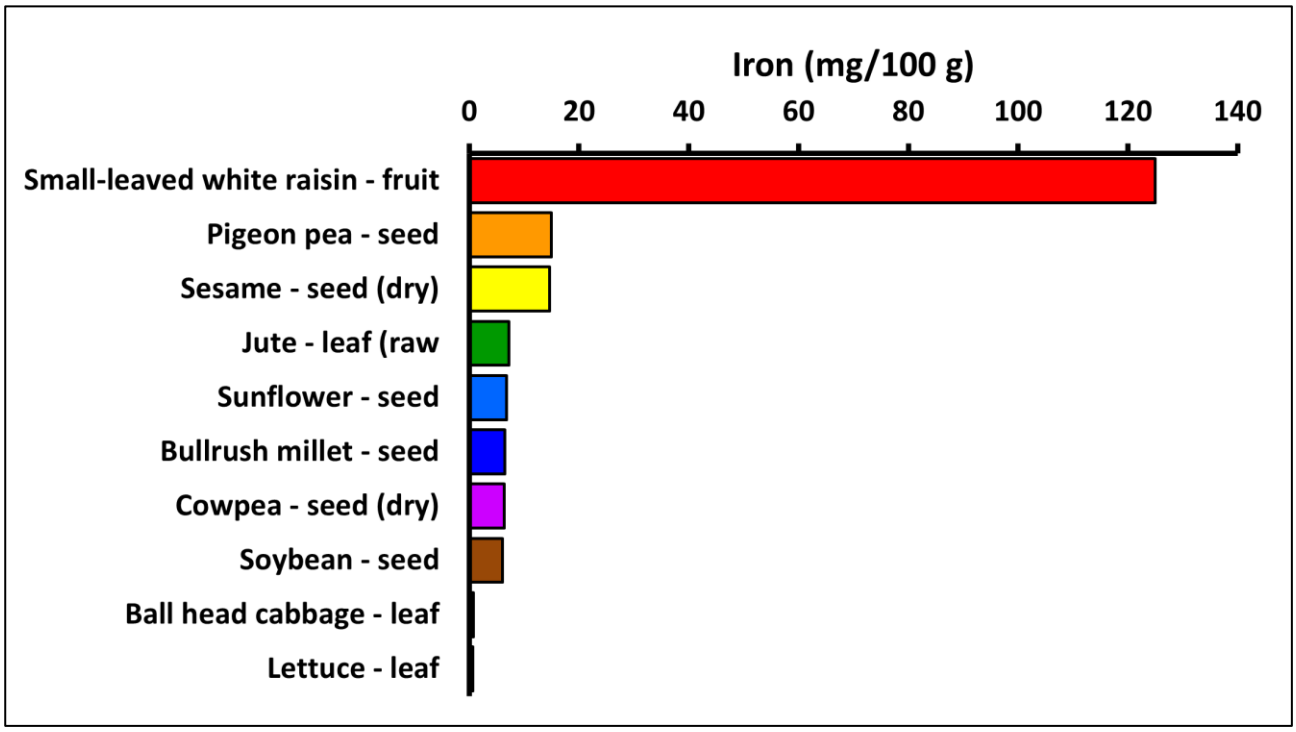

Protein helps the body repair cells and make new ones. Protein is also important for growth and development in children, teens, and pregnant women. Symptoms of protein deficiency include wasting and shrinkage of muscle tissue, and slow growth (in children).



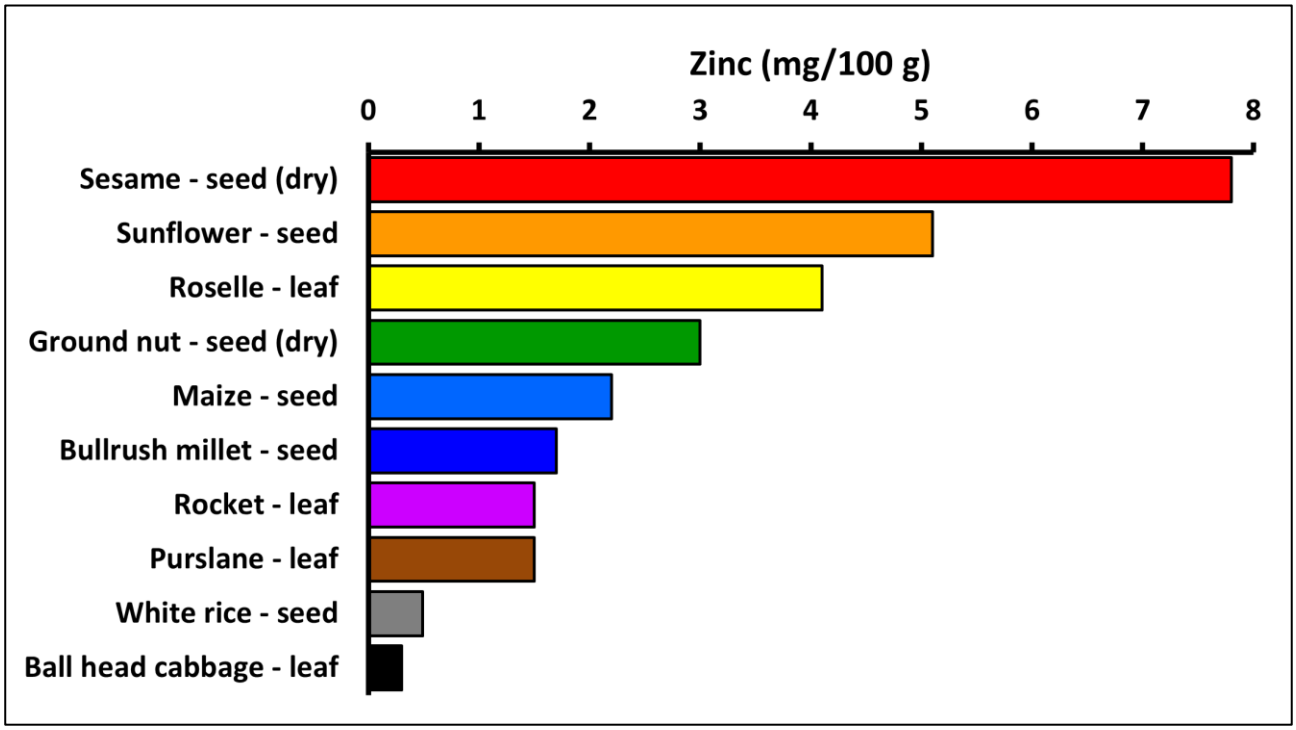

Vitamin A is very important for eyesight and fighting disease, particularly in infants, young children and pregnant women. People who are short of vitamin A have trouble seeing at night.




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.

## *Starchy staples*

**Common name**: 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 ground nut. 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 | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 11.6 | 1442 | 10.5 | - | - | 6.5 | 1.7 |

## Starchy staples

**Common name**: 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 | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | - | 1459 | 11.1 | - | - | - | - |

## Starchy staples

**Common name**: Maize
**Local:**

**Scientific name:** *Zea mays*
**Plant family: POACEAE**

**Description**: A single stemmed annual plant that grows 2-3 m tall. The stem is solid and 2-3 cm across. It is a large grass family plant with prop roots near the base. Some forms produce tillers near the base. Seed roots feed the plant initially then casual side roots develop from the lowest node on the plant and continue supplying nutrients. Roots can go sideways for 1 m or downwards for 2-3 m. Leaves are produced one after another along opposite sides of the stem and there are 8-21 leaves. The leaf sheath wraps around the stem but opens towards the top of the sheath. The leaf blade is 30-150 cm long and 5-15 cm wide. The leaf blade has a pronounced midrib and is often wavy along the edge. The male flower or tassel is at the top. The female flower is called the ear. It is on a short stalk in the axils of one of the largest leaves about half-way down the stem. It produces a large cob wrapped in leaves. Cobs commonly have 300-1000 grains. Normally only one or two cobs develop per plant.

**Distribution**: A warm temperate plant. Seeds need a soil temperature of more than 10°C to germinate. It grows best at less than 1800 m altitude in the equatorial tropics. It is grown in most areas of Asia and has been grown from sea level to 3300 m in the Americas. It tends to be grown in areas too dry for rice but wetter than for millets. Maize must have over 120 days frost free.

**Use**: The cobs are eaten cooked. The dried grains can be crushed and the meal can be used for breads, cake, soups, stews etc. Pancake like tortillas from maize have been a staple food in Central America. Maize is cooked and prepared in many different ways-boiled, roasted, dried, steamed and other ways. Maize oil is used in salads and cooking. Young tassels are cooked and eaten. The pollen is used in soups. The fresh silks are used in tortillas. The pith of the stem can be chewed or made into syrup. Sprouted seeds can be eaten.

**Cultivation**: It is grown from seeds. It is normal to plant one seed per hole at 1-2 cm depth. A spacing of about 30 cm between plants is suitable. Seed should be saved from gardens of over 200 plants and the seed from several cobs mixed to avoid inbreeding depression.

**Production**: In warm, moist soil, seeds germinate in 2-3 days after planting. Cobs are harvested when the grains are full and the tassel is just starting to turn brown. This is normally about 50 days after fertilization. It is sweetest eaten soon after harvesting. Drought and unfavorable weather can result in the silks of the female flowers emerging after the pollen has been shed. This results in poorly pollinated cobs.

**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed (mature) | 10.4 | 1528 | 10.0 | 100 | 4 | 4.9 | 2.2 |

## *Legumes*

**Common name**: Ground nut
**Local:**

**Scientific name:** *Arachis hypogaea*
**Plant family: FABACEAE**

**Description**: Ground nuts 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 ground nuts occur. The runner kind (Virginia type) has a vegetative or leafy branch between each fruiting branch and therefore produces a spreading bush. The bunch type (Spanish-Valencia type) 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 underground 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**: Ground nuts grow in tropical and subtropical areas. They grow well from sea level up to about 1650 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. Ground nuts 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 ground nut 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**: Ground nuts require soil with good levels of calcium and boron or they produce empty pods. Ground nuts 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. Ground nuts 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-type ground nuts 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 | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed (dry) | 4.5 | 2364 | 24.3 | 0 | - | 2.0 | 3.0 |
| seed (fresh) | 45 | 1394 | 15 | - | 10 | 1.5 | - |
| leaf | 78.5 | 228 | 4.4 | - | - | 4.2 | - |

## Legumes

**Common name**: 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 | Vitamin 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 | 13 | 28.1 | 1.6 | 0.8 |

## Legumes

**Common name**: Soybean
**Local:**

**Scientific name:** *Glycine max*
**Plant family: FABACEAE**

**Description**: A small erect bean growing up to 60 cm tall. It grows each year from seed. Straggling kinds can occur. Stems, leaves and pods are softly hairy. The leaves have 3 leaflets. The leaflets have stalks. Flowers are small and white or blue. They occur in groups in the axils of leaves. The pods are broad, flat and hairy. Pods have 2-4 seeds. The seeds can be yellow to black.

**Distribution**: It is a temperate plant that suits lowland areas. It can be grown from sea level to 2000 m altitude. Many varieties will not flower in the tropics (short days). It needs fertile soil. The best soil acidity is pH 5.5-7.0. It is damaged by frost.

**Use**: The young pods and ripe seeds are eaten. They are used for flour. The dried seeds are boiled or baked and used in soups, stews and casseroles. The seeds are used for oil. Toasted seeds are eaten like a snack. Strongly roasted seeds are used for coffee. Soy flour is used for noodles, and confectionary. The beans are fermented and used in a range of foods. Sometimes the young leaves are eaten. The seeds are also used for sprouts and for making cooking oil and soya sauce etc. Because soybean contains a trypsin inhibitor they should be cooked and even the sprouts should be lightly cooked.

**Cultivation**: It is grown from seed. Seeds need to be inoculated with bacteria before planting. Plants need to be about 20 cm apart.

**Production**: Plants flower about 8 weeks after sowing and pods mature about 16 weeks after sowing. Often plants are pulled up and hung up before threshing out the seed.

**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 9.0 | 1701 | 33.7 | 55 | - | 6.1 | - |
| seed (immature) | 68.0 | 584 | 13.0 | 16 | 27 | 3.8 | 0.9 |
| sprout | 79.5 | 339 | 8.5 | 1.0 | 8.3 | 1.3 | 1.0 |

## Legumes

**Common name**: White lupin
**Local:**

**Scientific name:** *Lupinus albus*
**Plant family: FABACEAE**

**Description**: An erect annual herb. It grows 1.2 m tall. The leaves have leaflets spread out like fingers on a hand. The flowers are white and in clusters. The pods are 60-100 mm long. The pods are hairy and turn yellow when ripe. The seeds are usually white.

**Distribution**: It grows in temperate places. It is grown at higher altitudes in the tropics. It grows where temperatures are 15-25°C. It will tolerate cold but not high temperatures. It can tolerate frost. It grows in areas with an annual rainfall of 360-500 mm and 1800-3000 m above sea level in tropical zones. It can grow in acid, neutral or alkaline soils. It can grow in salty soils. It is a long day plant. It can grow in arid places.

**Use**: The seeds are used as food. They are soaked for about 3 days in salted water then cooked and eaten or used in soups. The toasted seeds are eaten as a snack. The flower stalks are pickled and eaten. The ground seeds are mixed with bread flour. The roasted seeds are used as a coffee substitute. **Caution:** The seeds contain a toxic element which is removed by soaking or boiling. There are sweet lupin varieties that can be eaten without treatment due to their low alkaloid content.

**Cultivation**:

**Production**:

**Food Value:** Per 100 g edible portion

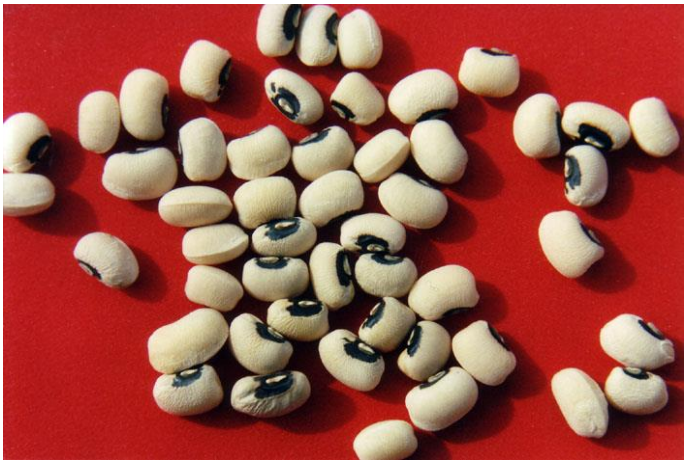
| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 8.9 | 1555 | 38.0 | - | - | - | - |

Image accessed from: http://www.summagallicana.it/lessico/l/lupino.htm

## Legumes

**Common name**: Cowpea
**Local:**

**Scientific name:** *Vigna unguiculata*
**Plant family: FABACEAE**



**Description**: A creeping bean type plant with straight firm pods. There is a deep tap root and many branches occur from it in the surface of the soil. The root nodules are large and round. The leaves have 3 leaflets. The end leaflet can be 12-16 cm long. The side leaflets are asymmetrical. The stipules at the base of the leaf are large and with spurs at their base. Flowers occur often in pairs on the end of long flowering shoots. Only 2-4 flowers in each stalk produce pods. Flowers are white, yellow or blue. They are large and showy. The pods are about 15 cm long. The seeds are white except for a dark scar.

**Distribution**: It grows in tropical and subtropical climates. It grows from sea level to 1800 m altitude in the tropics. Plants can stand high temperatures. Some kinds can tolerate drought. They are sensitive to cold and killed by frost. Plants germinate with a temperature between 11.5-15.5°C. The best growth occurs between 20-35°C. They can grow on a range of soils providing they are well drained. They are a short day plant. They do well in the semiarid tropics. It will not tolerate acid or alkaline soils. It grows in areas with an annual rainfall between 280-410 mm. It can grow in arid places.

**Use**: The young leaves, young pods and ripe seeds are all eaten. They can be steamed, boiled, stir-fried etc. The leaves can be dried and stored. The dried seeds are used in soups and stews. They are ground into flour or fermented. The seeds are also used for bean sprouts. Roasted seeds are used as a coffee substitute.

**Cultivation**: It is grown from seeds. Seeds remain viable for several years if carefully stored. A seeding rate of about 20 kg per ha is suitable and seed are sometimes broadcast then thinned.

**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed (dry) | 11.2 | 1189 | 23.5 | - | 1.5 | 6.4 | - |
| seed (young, boiled) | 75.5 | 406 | 3.2 | 79 | 2.2 | 1.1 | 1.0 |
| leaf | 88.4 | 143 | 4.2 | 36 | 35 | 4.7 | 0.3 |
| young pod + seed (boiled) | 89.5 | 142 | 2.6 | 45 | 17.0 | 0.7 | 0.2 |
| leaf (boiled) | 91.3 | 92 | 4.7 | 29 | 18 | 1.1 | 0.2 |

## *Leafy greens*

**Common name**: Okra
**Local:**

**Scientific name:** *Abelmoschus esculentus*
**Plant family: MALVACEAE**

**Description**: A tropical annual herb that grows erect, often with hairy stems. It mostly grows about 1 m tall but can be 3.5 m tall. It becomes woody at the base. The leaves have long stalks up to 30 cm long. Leaves vary in shape but are roughly heart shaped with lobes and teeth along the edge. Upper leaves are more deeply divided than lower ones. The flowers are yellow with red hearts. The fruits are green, long and ribbed. The seeds are 4-5 mm across. They are round and dark green.

**Distribution**: A tropical plant that suits the hot humid tropical lowlands but is unsuited to the highlands. It is very sensitive to frost. It can grow in salty soils. It grows best where temperatures are 20-36°C. It can grow well in dry climates with irrigation. It suits hot humid environments. It does best on well drained well manured soils but will grow on many soils. A soil pH of 5.5-7.0 is best.

**Use**: Pods are eaten cooked. They are slimy, but less so if fried. Dried powdered seeds can be used in soups as a thickener. They can also be pickled. Young leaves can be eaten cooked. They can be dried and stored. Flowers can also be eaten. Okra is frozen and canned. The seeds are roasted and used as a coffee substitute.

**Cultivation**: They are grown from seeds, which are easy to collect. They need high temperatures for germination (over 20°C) and a sunny position. Often seeds are soaked for 24 hours before sowing to give quick germination. Seeds are sown 1.5-2.5 cm deep with 2-3 seeds per hole. Later these are thinned out to one plant. Seeds can be sown in nurseries and plants transplanted. Pinching out the tops of plants when 30 cm high encourages branching. A spacing of about 90 x 45 cm is suitable. About 8-10 kg of seed are required for one hectare. Most kinds respond to fertiliser. Seeds do not breed true and can cross with other kinds of okra growing nearby. This is not normally a problem but simply means plants and fruit are not all the same.

**Production**: Plants maintain production if the fruits are harvested regularly. Plants are ready to harvest 8-10 weeks after sowing. Seed yields of 500-800 kg per hectare are recorded. Pod yields of 4-6 tonnes per hectare occur. It takes 2-4 months from sowing to harvest of young pods. Pods develop 5-10 days after flowering. Pod harvests can continue for 1-2 months. Leaving pods on the plants stops new pods developing.

**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 9.2 | 1721 | 23.7 | - | - | - | - |
| leaf | 81.0 | 235 | 4.4 | 116 | 59 | 0.7 | - |
| pod (fresh) | 88.0 | 151 | 2.1 | 185 | 47 | 1.2 | - |
| fruit (cooked) | 90.0 | 134 | 1.9 | 58 | 16.3 | 0.5 | 0.6 |
| fruit (raw) | 90.0 | 71 | 2.0 | 90 | 25 | 1.0 | - |

## Leafy greens

**Common name**: African cabbage
**Local:**

**Scientific name:** *Brassica carinata*
**Plant family: BRASSICACEAE**

**Description**: A cabbage family herb. The leafy form grows for 3-4 years. It is 2 m tall. The stem is 2 cm across. The stem is usually without hairs but is waxy. It is grey green but with purple blotches. It has many branches which hang down. They are above 30 cm on the stalk. The leaves are light green and stalked. They vary a lot in shape. The leaves become smaller and with fewer lobes nearer the flower. The flower is yellow and occurs in branched flower stalks. The fruit are pods which are up to 65 mm long and 8 mm wide. They hang downwards. The seeds are 1-2.5 mm across and vary in shape and colour. They are reddish brown.

**Distribution**: A tropical plant that occurs in the highlands of Ethiopia and Kenya. It has been introduced to other countries. It will grow on most agricultural soils. It needs a cool climate (15-20°C) and requires a sunny position. It is mostly grown between 1500-2500 m altitude in tropical regions. It can grow with a rainfall of 200-500 mm but is usually sown at the beginning of the rains.

**Use**: The seeds are cooked whole. They are used to make a mustard. The young leaves are cooked. They are also used in salads. The flower buds and young shoots are eaten raw. The seed produces a good quality cooking oil which has a mustard taste unless refined.

**Cultivation**: It is grown from seed. Seed germinate and come up in about 3 days. Leafy kinds do best on fertile well drained soils. For leafy kinds, seed is sown into a fine well prepared seed bed and transplanted after 6 weeks. For leafy kinds a spacing of 50 x 50 cm is suitable. Oil seed kinds are sown more closely with about 500,000 plant per hectare. Plants can be established from cuttings.

**Production**: Leaf yields can be up to 4800 kg per hectare. Much higher yields are possible with intensive production. Leaf harvest can occur after 47 days under best growing conditions.

**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| leaf | 88.0 | 86.1 | 3.5 | - | 157 | 1.3 | 0.9 |

Image sourced from:
https://www.farmseeds.co.uk/media/cache/item_large/item_images/194a6ea28a3d8b3e058956698fb4_tVD1.png

## Leafy greens

**Common name**: 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 capsule 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.

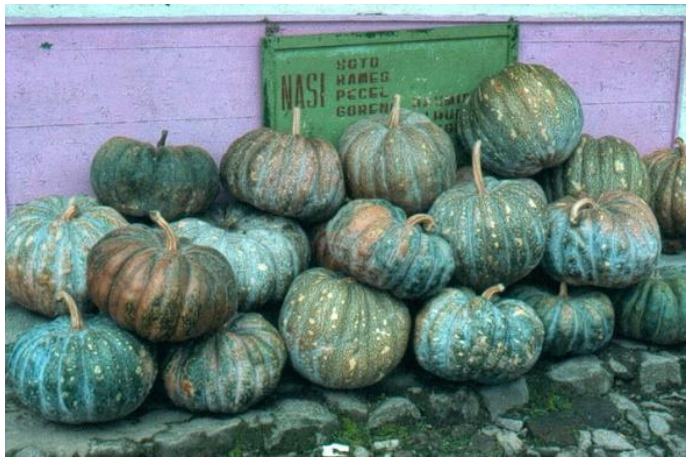
**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| leaf (raw) | 80.4 | 244 | 4.5 | 1923 | 80 | 7.2 | - |
| leaf (cooked) | 87.2 | 155 | 3.4 | 156 | 33.0 | 3.1 | 0.8 |

## Leafy greens

**Common name**: Pumpkin
**Local:**

**Scientific name:** *Cucurbita maxima*
**Plant family: CUCURBITACEAE**




**Description**: A pumpkin family plant. It is a creeping vine with tendrils. It is an annual plant. The stems are soft and round in cross section. The leaves are large and hang loose. They are dark green and kidney shaped. The edges of the leaves are entire. There are large nodes at the base of the leaf. The tendrils are fairly stout and are divided half way along their length into many branches. Male flowers are carried on long upright stalks. The 5 petals are united into a long yellow tube. The female flowers are larger than the male and are fewer in number and carried on shorter stalks. The fruit varies in size, colour and patterns on the skin. They can be round, oval or flattened, with yellow, orange or green skin. The surface can be smooth or rough and warty. The flesh is yellow and edible. The seeds are in the centre. The seeds are white or brown. They are flattened but plump and have a slanting scar at the top. The seeds are edible. (*C. moschata* does not have hairy stems but has fruit with a thickened stalk near where it joins the fruit.) There are a large number of cultivated varieties.

**Distribution**: A subtropical plant that grows from sea level to 2400 m altitude. They need a fertile soil. *C. moschata* is better suited to coastal areas. They are frost sensitive but better suited to cooler areas than *C. moschata.* It can grow in arid places. It suits hardiness zones 8-11.

**Use**: The young leaf tips are eaten cooked. They can also be dried and stored. The fruit can be eaten cooked. They are baked, boiled, fried, steamed or mashed. They are used in pies and cakes. The seeds are edible, raw or roasted. They are also ground into a meal. The male flowers are eaten after removing the stamen and calyx.

**Cultivation**: They are grown from seed. Usually 2 or 3 seeds are planted together in a mound. The distance apart depends on the cultivar. Some kinds are better for leaf tips. It is good to save seed of adapted varieties.

**Production**: Fruit are ready for harvest after about 3-4 months. Seed can be saved from fruit for re-sowing, but as pumpkins cross-pollinate, different types become mixed.

**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed (dry) | 6.9 | 2264 | 24.5 | 38 | 1.9 | 14.9 | 7.5 |
| fruit | 69.6 | 439 | 1.4 | - | - | - | - |
| leaf | 88.0 | 160 | 4.9 | 260 | 28 | 2.5 | 0.9 |
| flower | 88.7 | 107 | 1.4 | 173 | 14 | 0.8 | 0.1 |

## Leafy greens

**Common name**: Rocket
**Local:**

**Scientific name:** *Eruca vesicaria* subsp. *sativa*
**Plant family: BRASSICACEAE**

**Description**: A cabbage family herb. It is an annual plant. It grows to a height of 1 m and spreads to 0.5 m across. It has a taproot. The stem is erect and slender with few branches. The leaves are bright green and occur opposite each other. The leaves have deep lobes. The flowers are white or pale yellow with purple veins. There are 4 petals. The fruit are 1-4.5 cm long. They are beaked and erect. There are many seeds which are round and 1-2 mm across.

**Distribution**: It is native to Mediterranean regions. It will grow on most well-drained soils. It prefers an open, sunny position. It is drought and frost resistant. It can grow on poor soils and with low rainfall. It suits hardiness zones 7-10. In the tropics it grows up to 2100 m altitude. It can grow in arid places.

**Use**: The young leaves are used as a salad vegetable. They are tender, bitter and slightly mustard flavoured. Older leaves can be pureed and used in soups and sauces. The seeds are eaten or used in pickle and Persian mustard. The seeds can be used for edible oil. The flowers are used as a garnish.

**Cultivation**: Plants are grown from seed. Seeds germinate in about 1 day at 25°C.

**Production**: It should be grown using high nitrogen levels to assist rapid growth and reduce bitterness. Leaves are picked before flowering to give a milder taste. Leaves can be harvested after about 3-4 weeks.

**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 6.3 | 2023 | 17.8 | - | - | - | - |
| leaf | 91.7 | 105 | 2.6 | 35 | 15.0 | 1.5 | 1.5 |

Image sourced from: https://www.biolib.cz/IMG/GAL/423774.jpg

## Leafy greens

**Common name**: Roselle
**Local:**

**Scientific name:** *Hibiscus sabdariffa*
**Plant family: MALVACEAE**

**Description**: A branched shrub up to 2 m tall. It has reddish stems, leaves and fruit. Different types vary in their height, shape and leafiness. The leaves are 7-10 cm across and lobed. The upper leaves often have more lobes than the lower leaves. The flowers are large and yellow and in the axils of the leaves. They are carried singly. The bracts at the base of the flower are enlarged and form a fleshy red fruit. This capsule is 3 cm long and contains 22-34 seeds. The seeds are dark brown and 4-6 mm long. 1000 seeds weigh about 25 g.

**Distribution**: A tropical plant that grows from sea level up to about 1000 m altitude. It will tolerate a range of soils and requires short days for flowering. It will grow in semi-arid locations. It grows best where average temperatures are in the range 25-30°C. It needs a temperature above 10°C. Plants will tolerate high temperatures. They grow up to 800 m altitude in Africa. A rainfall of 450-550 mm distributed over a 90-120 day growing period is required. It cannot tolerate waterlogged soils. It can grow in arid places. It suits hardiness zones 10-12.

**Use**: The swollen bases of the flowers are used for jams or drinks. The young leaves can be cooked and eaten. They can also be dried and used. The flowers can be used to flavour drinks. The seeds can be eaten. They can be dried and ground. They can be pressed for oil.

**Cultivation**: Seeds are sown and the seedlings can be transplanted. They are transplanted when 15-20 cm high. Seed should be planted 1-2.5 cm deep. A spacing of 50 cm x 50 cm is suitable although a wider spacing is used for fruit and a closer one for leaves. Plants can be propagated by cuttings.

**Production**: Fruit are ready 12-15 weeks after sowing. The bracts are picked 15-20 days after flowering. They can produce about 1 kg per plant. The yield of leaves can be 10 tons per hectare.

**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 8.2 | 1718 | 19.6 | - | - | 4.2 | - |
| leaf | 86.4 | 185 | 10.9 | 58 | 35 | 1.5 | 4.1 |
| calyces | 86.0 | 185 | 1.6 | 29 | 14 | 3.8 | - |

## Leafy greens

**Common name**: Moringa
**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 m 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 | Vitamin 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 | 883 | 31.0 | 2.0 | 0.2 |
| pod (raw) | 88.2 | 155 | 2.1 | 7 | 141 | 0.4 | 0.5 |
| seed | 6.5 | - | 46.6 | - | - | - | - |

## *Fruit*

**English**: Desert date
**Local:**

**Scientific name:** *Balanites aegyptiaca*
**Plant family: ZYGOPHYLLACEAE**

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

**Distribution**: A tropical plant that is found all over Africa. It grows in the lowlands and Miombo woodland in Africa. It occurs from arid to sub-humid areas. It suits hot, dry areas, such as the Sahel. It grows from sea level to 2000 m altitude. It prefers valley soils but will grow on a range of soils. It suits a rainfall of 200-800 mm. It needs an average temperature of 20-30°C.

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

**Cultivation**: It is grown from seed, either in a nursery in pots, or direct. Root suckers can also be used. There are 600-1200 seeds per kg. Seed removed from the fruit can be stored for a year. Seed should be sown vertically with the stem end down for best results. Seeds germinate in 1-4 weeks. Soaking the seed helps them germinate. They can be soaked in cold water for 2 days with the water being changed after 24 hours. Seedlings are slow growing but root suckers are faster.

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

**Food Value:** Per 100 g edible portion

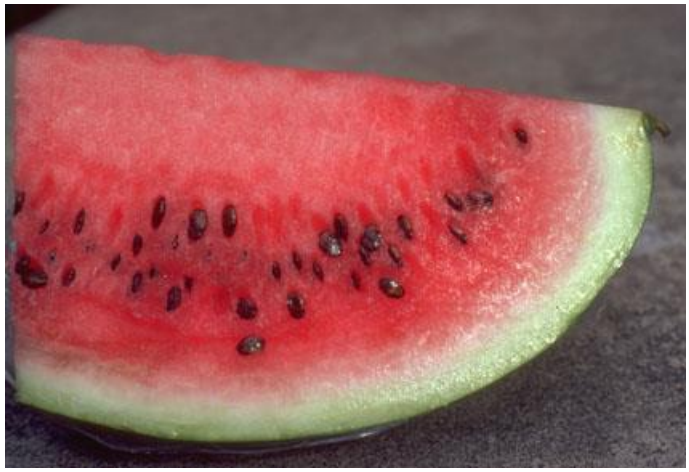
| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| leaf | 63.5 | 249 | 10.5 | - | - | 4.9 | 0.4 |
| nut (dry) | 5.0 | 2286 | 23.0 | - | - | 7.0 | - |
| fruit (dry) | 19.0 | 1150 | 5.0 | - | - | 3.1 | - |
| fruit |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

Image accessed from: https://static.teline.fr/cache/1920/zygophyllaceae/balanites-aegyptiaca/241206095324/balanites-aegyptiaca-photo10.jpg.webp

## Fruit

**Common name**: Watermelon
**Local:**

**Scientific name:** *Citrullus lanatus*
**Plant family: CUCURBITACEAE**



**Description**: An annual climber, with deeply divided leaves and tendrils along the vine. It trails over the ground and has hairy, angular stems. The leaves are on long leaf stalks. The leaves are deeply divided along their length. These leaf lobes are rounded and can themselves be divided. The leaves are 5-20 cm long by 2-12 cm across. The tendrils are divided. The plant has separate male and female flowers on the same plant. The flowers are pale yellow and smaller than pumpkin flowers. The flowers occur in the axils of leaves. The male flowers appear first. Fruit are large and round or oval. They can be 60 cm long. Fruit have a hard smooth skin. Several fruit colours and shapes occur. They often have a dark green mottle, or blotches. The fruit has reddish, juicy flesh and black or red seeds. The seeds are oval-shaped and smooth.

**Distribution**: It grows in most tropical and subtropical countries. It grows best on the coast in the tropics, but will grow up to about 1000 m altitude. It will not stand water-logging and does well on sandy soils. Plants are frost-sensitive. Seed will not germinate below 21°C. Temperatures between 24-30°C are suitable. Fruit are sweeter in arid warm areas. It suits hardiness zones 10-12.

**Use**: The fruit is eaten raw when ripe. Small, unripe fruit can be cooked as a vegetable. The skin is sometimes candied in vinegar and eaten with fish. Seeds are also eaten. They are dried, soaked in salt water, then roasted. Oil is extracted from the seeds. Very young leaves are occasionally eaten. It is a popular fruit.

**Cultivation**: They are suitable mainly for the dry season. A spacing of 1.5-2 m is suitable. They grow easily from seed. They do best when fully exposed to the sun. Seed can be dried and stored. If too much vegetative growth occurs, picking out the tip to produce side branches will produce more fruit.

**Production**: Harvesting commences after 4-5 months. The ripeness can be determined by tapping the fruit to get a dull sound The part of the fruit on the ground changes from green to light yellow and the tendril near the base of the fruit becomes dry when ripe. Fruit yield can be 45-60 t/ha.

**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| fruit | 90 | 148 | 0.6 | - | - | 0.2 | - |
| seed | 10 | 2107 | 40 | - | - | 5.6 | - |

## Fruit

**Common name**: 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 | Vitamin 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

**Common name**: Round-leaf grewia
**Local:**

**Scientific name:** *Grewia villosa*
**Plant family: MALVACEAE**

**Description**: A shrub that grows 2-4 m tall. It usually has many branches. It loses its leaves during the year. The leaves are oval or round and are large. They are 2.5-14 cm across. They have teeth along the edges. They are copper coloured. There are downy hairs on both surfaces. The leaves are more pale underneath. The fruit is red and hairy. They have 4 shallow lobes. They are 12 mm across. The fruit are edible.

**Distribution**: A tropical plant that grows on rocky soils rich in iron. It grows in arid places like the Sahel. It occurs in low altitude mixed woodland. It Ethiopia it grows well from 800-1800 m altitude.

**Use**: The ripe orange fruit are usually eaten raw. The skin is rubbed off and the seeds discarded.

**Cultivation**: Plants are grown from seed. They are best planted directly.

**Production**:

**Food Value:** Per 100 g edible portion

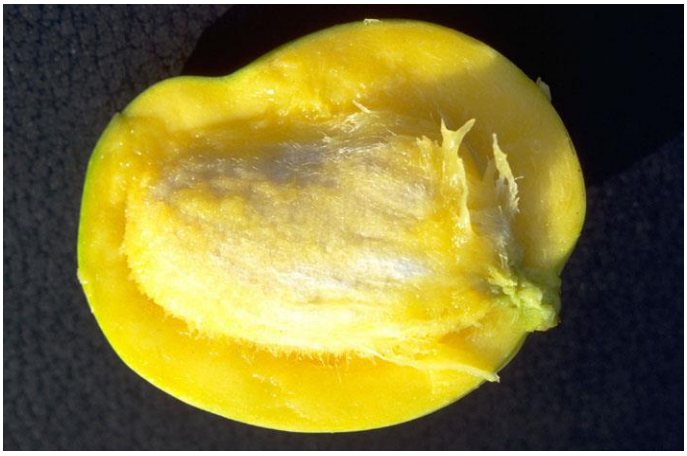
| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

Image sourced from: https://d2seqvvyy3b8p2.cloudfront.net/6badb39fb33e5c58d172e8dcf86393ce.jpg

## Fruit

**Common name**: 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 | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| fruit | 83.0 | 253 | 0.5 | 180 | 30 | 0.5 | 0.04 |
| leaf | 82.1 | 226 | 3.9 | - | 60 | 2.8 | - |

## Fruit

**Common name**: Guava
**Local:**

**Scientific name:** *Psidium guajava*
**Plant family: MYRTACEAE**

**Description**: A small evergreen tree 8-10 m tall with smooth, mottled bark which peels off in flakes. It is shallow rooted and branches close to the ground. The branches are four-angled. The leaves are opposite, dull green, and somewhat hairy. They are oval and somewhat pointed at both ends, 15 cm long by 2-5 cm wide with short leaf stalks. The showy flowers are white and borne in loose, irregular arrangements of 1-3 flowers that grow in the axils of leaves on new growth. The petals are 1.5-2 cm long. Both self and cross-pollination occurs. The fruit are rounded and 4-5 cm long. They are green, turning yellow when ripe. The skin is firm and encloses a pink, or nearly white, sweet-smelling, edible pulp with many seeds. In better selected varieties, the skin and the seeds are fully edible. Fruit vary from very acid to very sweet.

**Distribution**: A native to Central and South America, it grows in most tropical countries. Guava thrives in humid and dry tropical climates and does best in sunny positions. It is killed by frost and fruits better where there is a cooler season. Temperatures near 30°C are best. It grows in open areas and secondary forests and can become weedy in some conditions. It prefers a well-drained soil with good organic matter but can stand brief water-logging. A soil pH of 5-7 is best but can tolerate a pH from 4.6-8.9. Trees cannot tolerate salty conditions. It suits hardiness zones 9-12.

**Use**: The fruit are eaten raw and can be used for jams and jellies. Half-ripe fruit are added to help the jelly set. The young leaves are eaten raw or cooked. It is an attractive and nutritious fruit.

**Cultivation**: They are mostly grown from seed but seedling trees vary in quality. Seeds remain viable for a year or longer, and usually germinate in 2-3 weeks, but can take 8 weeks. Trees can be propagated by budding or grafting, and by layering, root cuttings or stem cuttings if hormones are used. Tips are used for stem cuttings and grown under mist at 28-30°C with bottom heat. Suckers can be used. Vegetative propagation preserves better fruit types. Trees self-sow in the lowland tropics. As fruit are produced on new season's growth, pruning does not greatly affect fruiting. Trees should be managed to give the maximum number of vigorous, new shoots and can be pruned for shape. Trees can be grown at 2.5 m within rows and 6 m apart between rows.

**Production**: Seedling trees begin to bear 2-3 years after transplanting. Pruning back the tips slightly increases fruit production. Tree-ripened fruit taste best. Ripening after picking can be hastened by placing them in a brown paper bag with a banana or apple. Mature fruit which have not changed colour can be stored 2-5 weeks at temperatures of 8-10°C and relative humidity of 85-95%. Mature fruit ripen in 2-3 days at normal temperatures and will keep for 7 days.

**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| fruit | 77.1 | 238 | 1.1 | 60 | 184 | 1.4 | 0.2 |

## Fruit

**Common name**: Tomato
**Local:**

**Scientific name:** *Solanum lycopersicum*
**Plant family: SOLONACEAE**

**Description**: A short lived perennial plant. It is upright but with weak stems. It can grow to 2 m tall with support for the stems. The stems have long hairs. It is bad smelling. The leaves are deeply lobed with an odd number of leaflets. They have irregular teeth around the edge. There are up to 12 star shaped flowers on each raceme. Flowers are yellow. The fruit are round and red when ripe. Yellow coloured fruit also occur. There are many varieties.

**Distribution**: A warm temperate plant. It grows from sea level to 2400 m altitude in the tropics. It needs to be grown in fertile soil. For best production it requires much water, plenty of sunshine and low night temperatures. For germination it does best between 20-30°C. It is frost susceptible. A pH of 6.0-7.9 is best. In Nepal it grows to 1400 m altitude. It suits hardiness zones 9-12.

**Use**: The fruit are eaten raw or added to salads. They can be cooked, stewed, pureed, stuffed, made into sauces, juice, and used in soups and stews. Unripe fruit are pickled, roasted, fried and dried. **Caution:** Leaves and green fruit are poisonous.

**Cultivation**: Plants are sown from seeds. These are normally sown in a nursery and transplanted. They are transplanted when 40-45 days old or 15 cm high. They are spaced about 60-90 cm apart. Seeds can also be sown directly in the field. They can also be grown from cuttings. To give fewer and larger fruit the side branches of upright types are removed. Upright plant types need to be tied to stakes. Plants are often grafted into stronger rootstocks.

**Production**: Harvesting commences after about 14 weeks. Yields can be 3-4 kg of fruit per plant.

**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| fruit | 93 | 88 | 1.2 | 45 | 26 | 0.6 | 0.1 |

## Fruit

**Common name**: Tamarind
**Local:**

**Scientific name:** *Tamarindus indica*
**Plant family: FABACEAE**

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

**Distribution**: A tropical legume. The tree is cultivated in a number of coastal towns in the tropics as a street tree. It is probably best grown below 800 m altitude in the tropics. It is drought resistant and cannot stand water-logging. It does well on coastal dunes above high water level. It suits semi-arid areas. It grows in the Sahel and must be in frost free locations. In Kenya it grows from sea level to 1600 m altitude. It suits hardiness zones 11-12.

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

**Cultivation**: It can be grown by seeds or cuttings. It is best to sow seedlings in pots then transplant them, but seed can be sown direct. There are about 1400 seeds per kg. Seed should be soaked in hot water or the seed coat nicked before sowing. Seed can be stored for 2 years if kept dry, cool and away from insects. Trees can be topped or cut back and allowed to re-grow. Nothing grows under the trees due to the acidity of the leaves. Trees can be grown by air layering or cuttings.

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

**Food Value:** Per 100 g edible portion

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

## Fruit

**Common name**: Crown of Thorns
**Local:**

**Scientific name:** *Ziziphus spina-christi*
**Plant family: RHAMNACEAE**

**Description**: A shrub or tree. It grows 2 m high in desert places. It can grow to 15-20 m high. The trunk is 50 cm across. It is prickly or thorny. The leaves are oval and alternate. There are three almost parallel veins easily seen underneath the leaf. The flower stalks are hairy. The flowers are 2-4 mm across. They are in clusters in the axils of leaves near the ends of branches. The fruit is small and orange or red. They are oblong and 13-18 mm across. The fruit are edible.

**Distribution**: A tropical plant. It grows in very dry plains and hill slopes. It grows in the Sahel in watercourses that occasionally get flooded. It grows in areas that have a rainfall of 50-300 mm per year. It can grow in arid places. It is highly salt tolerant. In Ethiopia it grows up to 2400 m above sea level.

**Use**: The pulp of the fruit is dried and milled into flour. It is then cooked with steam. The fruit are also eaten raw. The kernel of the seeds is eaten raw. The leaves are cooked and eaten as a snack.

**Cultivation**: Plants can be grown by seeds. It can be cut back and will re-grow.

**Production**:

**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| fruit | 47.6 | - | 2.1 | - | - | - | - |

## *Vegetables*

**Common name:** Bell pepper
**Local:**

**Scientific name:** *Capsicum annuum*
**Plant family: SOLANACEAE**

**Description:** An annual plant that grows up to 1.5 m tall. The leaves can be long and sword shaped or oval to rounded. The leaves can be 12 cm long. The flowers are produced singly and are yellow or white. They are bell shaped. The flowers are 1.5 cm across and in the axils of leaves. Fruit are hollow and about 10 cm long and 6 cm wide and red when fully ripe. They contain many seeds. Kinds with different shaped fruit also occur.

**Distribution:** A tropical or subtropical plant. Plants grow from sea level up to about 2400 m altitude. They are killed by frost. Soils need to be well drained and fertile. The fruit and plants can rot in the middle of the wettest seasons. They need a temperature above 4°C. A night temperature of 16-18°C and a day temperature of 26-28°C is best. A soil pH of 5.4-6.9 is suitable. They suit plant hardiness zones 8-12.

**Use:** The fruit are edible raw or cooked. They are stuffed, roasted, fried, preserved and used as flavouring. The leaves are edible when cooked.

**Cultivation:** Plants are grown from seed. Both self and cross pollination occur. It is possible to save seed. Seed will keep for 2-3 years. Seeds germinate in 6-10 days. Plants can be transplanted and need to be about 50 cm apart. About 50% of flowers set fruit.

**Production:** The first fruit can be harvested after 3-4 months.

**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| fruit (yellow raw) | 92 | 113 | 1.0 | 24 | 183.5 | 0.5 | 0.2 |
| fruit (green raw) | 93.5 | 65 | 0.9 | 59 | 100 | 0.4 | 0.2 |
| fruit (green boiled) | 93.7 | 59 | 0.9 | 59 | 60 | 0.4 | 0.2 |
| leaf | 82.1 | 222 | 5.8 | - | 68 | 1.4 | - |

## Vegetables

**Common name**: Mutkuru
**Local:**

**Scientific name:** *Coccinia adoensis*
**Plant family: CURCURBITACEAE**

**Description**: A pumpkin family herb. It is a slender climber. It has annual climbing stems. It grows up to 6 m long. The stems are furrowed and hairy when young. The leaves are deeply lobed and look like fingers on a hand. The edges of the leaves have shallow teeth. The leaf shape can vary on the one plant. The flowers are separately male and female on separate plants. Male flowers are yellow and in clusters. The female flowers are small, yellow and occur singly. The fruit is oblong and about 2.5-5 cm long. It is bright red when ripe.

**Distribution**: A tropical plant. It occurs in medium to low rainfall areas. It grows with rainfalls of 450-800 mm. It grows from sea level to 2,140 m above sea level. It can grow in arid places. It often grows on termite mounds.

**Use**: The leaves are cooked and eaten. The fruit are eaten raw when ripe or cooked as a vegetable. The roots are eaten after processing. They need to be well cooked. **Caution**: The roots are poisonous unless carefully cooked.

**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| fruit | 92.9 | 445 | 15.7 | - | 19 | 0.6 | - |
| root | 81 | 289 | 1 | - | 81 | 0.4 | - |

Image sourced from: http://www.westafricanplants.senckenberg.de/root/index.php?page_id=14&id=2780

## Vegetables

**Common name**: 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.

**Cultivation**:

**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 | Vitamin 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

**Common name**: 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 roots are produced under the ground. There are a large number of varieties which vary in leaf shape and colour, root 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 cannot 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**: Roots 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 roots 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. Enlarged roots won't form if the ground is waterlogged when the plant roots 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 root yield. Dry matter percentage increases with increasing age of the crop. Higher dry matter roots are normally preferred.

Sweet potatoes 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 roots 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 roots undergo active 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. Initiation of root enlargement is subject to aeration

in the soil. Either heavy clay soils, waterlogged conditions or other factors reducing aeration can result in poor root 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 roots well covered with soil. Cracking soils can allow the weevil access to roots.

**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 | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| root (baked) | 72.9 | 431 | 1.7 | 2182 | 24.6 | 0.5 | 0.3 |
| root (raw) | 70.0 | 387 | 1.2 | 4000 | 25 | 0.7 | 0.4 |
| root (boiled) | 72.0 | 363 | 1.1 | 1705 | 15 | 0.6 | 0.3 |
| leaf | 86.3 | 168 | 3.9 | 105 | 58 | 2.9 | - |

## Vegetables

**Common name**: Purslane
**Local:**

**Scientific name:** *Portulaca oleracea*
**Plant family: PORTULACACEAE**

**Description**: A spreading branched herb. It lies flat on the ground. It grows each year from seed. The plants spread 10 to 50 cm wide. The stems are purplish. The leaves are fleshy, flat and shaped like a wedge at the base. They are 1.5-2.5 cm long and 0.3-1 cm wide. The flowers are yellow and occur in a few rounded heads. They are 0.8-1.5 cm across. They bloom about the middle of the day. The capsules are 0.5 cm long and oval. The seeds are black and shiny.

**Distribution**: It grows in tropical and temperate regions. They are common in waste places throughout the Philippines. It is a common self-sown plant in lowland areas and up to 1700 m altitude. It prefers sandy well drained places. It can grow on salty soils. It can grow in arid places. It suits hardiness zones 7-12.

**Use**: The stems and leaves are cooked and eaten. Usually the skin is scraped off then the plant is boiled and mashed. It thickens stews and other dishes in which it is cooked. It is used as a pot herb. The fleshy stems are pickled. Sprouted seeds are eaten in salads. The seeds are ground for use in cakes and bread. **Caution:** In areas where a lot of nitrogen fertiliser is used plants can cause nitrate poisoning. Plants can also have oxalates.

**Cultivation**: It roots easily from broken pieces. It can be grown from stem cuttings. It can be grown from seed.

**Production**: The first harvest of leaves can be a month after planting. In the tropics it can complete its lifecycle in 2-4 months. Often it is harvested in the dry season when other vegetables are in short supply.

**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 9.1 | 1405 | 19.5 | - | - | - | - |
| plant | 87.0 | 181 | 4.0 | - | 11 | 2.5 | - |
| root | 79 | 210 | 3.5 | - | - | - | - |
| leaf | 82.2 | 108 | 3.1 | 54 | 20 | 0.8 | 1.5 |

## Vegetables

**Common name**: Eggplant
**Local:**

**Scientific name:** *Solanum melongena*
**Plant family: SOLANACEAE**

**Description**: A perennial shrubby herb up to 1 m tall. It is often grown as an annual. It has a deep taproot and branched side roots. The stem is thick and covered with many woolly hairs. The plant has many branches. Often the plant is spiny. Leaves can be 20 cm long and wavy along the edge. Leaves are covered with hairs. Flowers are bluish red and 5 cm across. They are either solitary or in small groups opposite the leaves. They have 5 large woolly lobes which continue to surround the base of the fruit. Fruit are white, blue, green or purple. The fruit colour and shape vary. Sometimes the fruit is spiny. Often the fruit are 10-20 cm long and 5-8 cm wide. Numerous kidney shaped seeds are in the flesh of the berry. There are many cultivated varieties.

**Distribution**: A tropical plant. Plants grow from sea level up to 2200 m altitude in the tropics. It suits wet climates but does well in dry climates with irrigation. It needs a long warm growing period. A daily mean temperature of 20-30°C is most suitable. They are frost tender. They need a rich, friable, well tilled soil. In the sub-tropics they can be grown as a summer crop.

**Use**: Fruit are mostly fried then eaten. They can also be grilled, baked, stuffed and stewed. They are used in curries. The fruit are also dried and stored. The leaves, although edible, are hairy and not good flavor.

**Cultivation**: Plants are grown from seeds. Seeds germinate slowly. At the best temperature, they germinate in 8-12 days. Seed are sown in nursery beds. Seedlings can be transplanted when about 8 cm tall or 4-6 weeks old. Plants need to be about 60-100 cm apart. Because some cross pollination can occur, seed crops need to have varieties planted 400 m apart.

**Production**: Fruit are ready for harvest after 3 months. They continue to yield for 3-4 months.

**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| fruit | 91.8 | 117 | 0.8 | 6 | 1.3 | 0.4 | 0.2 |
| fruit (fresh) | 93.4 | 62 | 0.7 | 50 | 5 | 0.4 | 0.3 |
| leaf | 86.4 | 198 | 4.6 | 280 | - | 3.4 | 0.6 |

## *Nuts, seeds, herbs and other foods*

**Common name**: Bird's eye chillies
**Local:**

**Scientific name:** *Capsicum frutescens*
**Plant family: SOLANACEAE**

**Description**: It is a shrubby, perennial plant growing about 1 m tall. The leaves are smaller than round capsicums or bell peppers. Two or more flowers occur together in the axils of leaves. They have small pointed fruit about 1-2 cm long and they are red when ripe. They have a very hot taste when eaten or touched on the lips.

**Distribution**: It is grown in most tropical countries. It grows from sea level up to about 1800 m altitude in the equatorial tropics. It can't tolerate water-logging or frost. It tolerates high temperatures and a wide range of rainfall. Very high rainfall leads to poor fruit set and rotting of fruit. Soil needs to be well-drained and, preferably, fertile with adequate organic material. Light, loamy soils rich in lime are best. It suits hardiness zones 10-12.

**Use**: The leaves are eaten for their mild, spicy taste. The leaves are eaten cooked. The fruit can be used in very small quantities to spice food. The small, red fruit are very hot to eat due to a chemical called capsaicin. They are used to add spice and flavour to other foods. It would not be appropriate to eat sufficient of Bird's eye chilli fruit to significantly affect nutrition.

**Cultivation**: The seeds are dried in the sun. They are small. For large-scale plantings, 1.8-2.3 kg/ha of seed is needed. Seed is best sown in nurseries and the seedlings transplanted when they have 4-5 leaves (after 3-4 weeks). They can be transplanted at about 0.8 m spacing. Pruning out the tops can increase branching. This is often done 10 days before transplanting. Excessive nitrogen can reduce fruit setting.

**Production**: The first picking of fruit can occur 3 months after planting and continue about every two weeks. Plants continue to be harvested for about 4-5 years before replanting. For dried chillies, the fruit are dried in the sun for 3-15 days. The fresh weight is reduced by about two thirds during drying. Yields of dry chillies can be from 300-2500 kg/ha depending on growing conditions, irrigation, etc.

**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| fruit | 74.0 | 395 | 4.1 | 7140 | 121 | 2.9 | - |

## Nuts, seeds, herbs and other foods

**Common name**: Sunflower
**Local:**

**Scientific name:** *Helianthus annuus*
**Plant family: ASTERACEAE**

**Description**: An upright annual plant that ranges in height from 1-4 m. It has a strong tap root. Plants are mostly unbranched, but may have some branches. The stems are hairy. The leaves are large and oval to heart shaped with teeth around the edges. They are roughly hairy and mid to dark green. Leaves can be 10-40 cm long by 5-20 cm wide. The leaf stalk is long. The flowers are yellow and daisy like, and 9-20 cm across. Sometimes they are tinged red or purple.

**Distribution**: A temperate plant that suits the highlands of the tropics and can stand a light frost. It needs a well drained, rich soil. It is drought and frost resistant. Sunflower grow from the equator to 55°N latitude. It does not suit the wet tropics. It cannot tolerate very acid soils. It can grow in arid places. It suits hardiness zones 4-11. It is widely distributed in many environments.

**Use**: An edible oil is extracted from the seeds and used for cooking. Sometimes seeds are eaten raw or roasted. The seeds can be ground into a meal for use in bread and cakes. They are also dried, roasted and ground and used as a coffee substitute. The seeds are boiled with water and honey to make a drink. The germinated seeds are fermented into a yogurt or cheese.

**Cultivation**: Plants are grown from seed. Only well-filled seed should be planted. It is easy to save your own seed as dry seed stores well. A plant spacing of 1 m by 0.5 m is suitable. Seeds are sown at a depth of 2-4 cm. Mature heads are collected by hand, dried and then threshed.

**Production**: Time to maturity is usually 4-5 months. Seeds are ready to eat when the flower starts to wither.

**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 5.4 | 2385 | 22.8 | 5 | 1.4 | 6.8 | 5.1 |

## Nuts, seeds, herbs and other foods

**Common name**: Peppermint
**Local:**

**Scientific name:** *Mentha piperita*
**Plant family: LAMIACEAE**

**Description**: A herb that keeps growing from year to year. It can grow to 1.2 m high. The stems are slightly hairy. They are 4 sided and purple. The leaves are almost oval and 2-4 cm long. They are opposite. There are teeth towards the tip. The stalks are 3-12 mm long. The flowers are in clusters at the top of the stems. They are light purple. They are in spikes. The fruit contains 4 small nutlets

**Distribution**: A cool temperate plant. It suits hardiness zones 4-9.

**Use**: It is strongly flavoured and is mostly used as an extract in flavouring sweets and drinks. The dried leaves can be used for tea. The oil obtained by distillation is used in flavouring.

**Cultivation**: It is most commonly grown by division of the roots. It can be grown from seeds, although it often does not set viable seeds.

**Production**:

**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | Vitamin C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

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## Nuts, seeds, herbs and other foods

**Common name**: 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 | Vitamin 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 | 0.1 | 3683 | 0.2 | - | - | - | - |

# *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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **ANACARDIACEAE** | *Mangifera indica* | Mango | fruit | 83.0 | 253 | 0.5 | 180 | 30 | 0.5 | 0.04 | 30 |
| **ASTERACEAE** | *Helianthus annuus* | Sunflower | seed | 5.4 | 2385 | 22.8 | 5 | 1.4 | 6.8 | 5.1 | 44 |
| **BRASSICACEAE** | *Brassica carinata* | African cabbage | leaf | 88.0 | 86.1 | 3.5 | - | 157 | 1.3 | 0.9 | 19 |
| **BRASSICACEAE** | *Eruca vesicaria* | Rocket | leaf | 91.7 | 105 | 2.6 | 35 | 15.0 | 1.5 | 1.5 | 22 |
| **CONVOLVULACEAE** | *Ipomoea batatas* | Sweet potato | root (baked) | 72.9 | 431 | 1.7 | 2182 | 24.6 | 0.5 | 0.3 | 39 |
| **CUCURBITACEAE** | *Cucurbita maxima* | Pumpkin | leaf | 88.0 | 160 | 4.9 | 260 | 28 | 2.5 | 0.9 | 21 |
| **CUCURBITACEAE** | *Citrullus lanatus* | Watermelon | fruit | 90 | 148 | 0.6 | - | - | 0.2 | - | 27 |
| **CUCURBITACEAE** | *Cucumis prophetarum* | Wild cucumber | fruit | 81.8 | 583 | 12.7 | - | - | - | - | 38 |
| **CURCURBITACEAE** | *Coccinia adoensis* | Mutkuru | fruit | 92.9 | 445 | 15.7 | - | 19 | 0.6 | - | 37 |
| **FABACEAE** | *Vigna unguiculata* | Cowpea | seed (dry) | 11.2 | 1189 | 23.5 | - | 1.5 | 6.4 | - | 17 |
| **FABACEAE** | *Arachis hypogaea* | Ground nut | seed (dry) | 4.5 | 2364 | 24.3 | 0 | - | 2.0 | 3.0 | 13 |
| **FABACEAE** | *Cajanus cajan* | Pigeon pea | seed | 10.0 | 1449 | 19.5 | 55 | - | 15.0 | - | 14 |
| **FABACEAE** | *Glycine max* | Soybean | seed | 9.0 | 1701 | 33.7 | 55 | - | 6.1 | - | 15 |
| **FABACEAE** | *Tamarindus indica* | Tamarind | fruit | 38.7 | 995 | 2.3 | 20 | 60 | 1.1 | 0.7 | 34 |
| **FABACEAE** | *Lupinus albus* | White lupin | seed | 8.9 | 1555 | 38.0 | - | - | - | - | 16 |
| **LAMIACEAE** | *Mentha piperita* | Peppermint | leaf | - | - | - | - | - | - | - | 45 |
| **MALVACEAE** | *Corchorus olitorius* | Jute | leaf (raw) | 80.4 | 244 | 4.5 | 1923 | 80 | 7.2 | - | 20 |
| **MALVACEAE** | *Abelmoschus esculentus* | Okra | leaf | 81.0 | 235 | 4.4 | 116 | 59 | 0.7 | - | 18 |
| **MALVACEAE** | *Hibiscus sabdariffa* | Roselle | leaf | 86.4 | 185 | 10.9 | 58 | 35 | 1.5 | 4.1 | 23 |
| **MALVACEAE** | *Grewia villosa* | Round-leaf grewia | fruit | - | - | - | - | - | - | - | 29 |
| **MALVACEAE** | *Grewia tenax* | Small-leaved white raisin | fruit | 59.1 | - | 4.5 | - | 161 | 125 | - | 28 |
| **MORINGACEAE** | *Moringa olifera* | Moringa | leaf | 76.4 | 302 | 5.0 | 197 | 165 | 3.6 | - | 24 |
| **MYRTACEAE** | *Psidium guajava* | Guava | fruit | 77.1 | 238 | 1.1 | 60 | 184 | 1.4 | 0.2 | 32 |
| **PEDALIACEAE** | *Sesamum indicum* | Sesame | seed (dry) | 4.7 | 2397 | 17.7 | 1 | - | 14.6 | 7.8 | 46 |
| **POACEAE** | *Pennisetum glaucum* | Bullrush millet | seed | 11.6 | 1442 | 10.5 | - | - | 6.5 | 1.7 | 10 |
| **POACEAE** | *Zea mays* | Maize | seed | 10.4 | 1528 | 10.0 | 100 | 4 | 4.9 | 2.2 | 12 |
| **POACEAE** | *Sorghum bicolor* | Sorghum | seed | - | 1459 | 11.1 | - | - | - | - | 11 |
| **PORTULACACEAE** | *Portulaca oleracea* | Purslane | leaf | 82.2 | 108 | 3.1 | 54 | 20 | 0.8 | 1.5 | 41 |
| **RHAMNACEAE** | *Ziziphus spina-christi* | Crown of thorns | fruit | 47.6 | - | 2.1 | - | - | - | - | 35 |
| **SOLANACEAE** | *Capsicum frutescens* | Bird's eye chillies | fruit | 74.0 | 395 | 4.1 | 7140 | 121 | 2.9 | - | 43 |
| **SOLANACEAE** | *Capsicum annuum* | Bell pepper | fruit (yellow raw) | 92 | 113 | 1.0 | 24 | 183.5 | 0.5 | 0.2 | 36 |
| **SOLANACEAE** | *Solanum melongena* | Eggplant | fruit | 91.8 | 117 | 0.8 | 6 | 1.3 | 0.4 | 0.2 | 42 |
| **SOLONACEAE** | *Solanum lycopersicum* | Tomato | fruit | 93 | 88 | 1.2 | 45 | 26 | 0.6 | 0.1 | 33 |
| **ZYGOPHYLLACEAE** | *Balanites aegyptiaca* | Desert date | fruit (dry) | 19.0 | 1150 | 5.0 | - | - | 3.1 | - | 25 |

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