# Potentially Important Food Plants of Guinea-Conakry




Rotary

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

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

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**Dedication**

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

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 – Guinea-Conakry, Version 3, January, 2021

**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 by Michael Goddard and John McPhee working in a voluntary capacity using the selection criteria developed by Food Plant Solutions. These selection criteria focus on the local plants from each of the main food groups with the highest levels of nutrients important to human nutrition and alleviation of malnutrition. It is intended as a **Draft Guide only** to indicate some important food plants that serve as examples for this purpose. Other important nutritious plants may be equally useful, and it is recommended that the FPI database be used to source information on the full range of plants known to occur in Guinea-Conakry. This guide has been developed with the best intention to create interest and improve understanding of the important local food plants of Guinea-Conakry, 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.

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

- makes any expressed or implied representation as to the accuracy of the information contained in the database or the Field Guide, and cannot be held legally responsible or accept liability for any errors or omissions
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Always be sure you have the correct plant, and undertake proper preparation methods, by consulting with specialist scientists or local users of the plant. The Food Plants International database, from which the information in this Field Guide is drawn, is a work in progress and is regularly being amended and updated.

# Contents

## *Introduction*

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

**Growing food**

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

**A country with very special plants**

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

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

**Getting to know plants**

People who spend time in gardens and with their food plants get to know them very well. It is a good idea to learn from someone who grows plants well. Each plant grows best in certain conditions and there are often special techniques in getting it to grow well. For example, sweet potato will not form tubers if the soil is too wet, but it may still grow lots of green leaves. Taro will grow in light shade, but sweet potato will not. Ginger can grow in fairly heavy shade. Pruning the tips of betel leaf or pepper vines will cause more side branches to grow and therefore, produce more fruit. Stored yam tubers need special treatment if you want them to put out shoots early. There are lots of unique things about every plant and learning about these helps a good gardener produce more food.

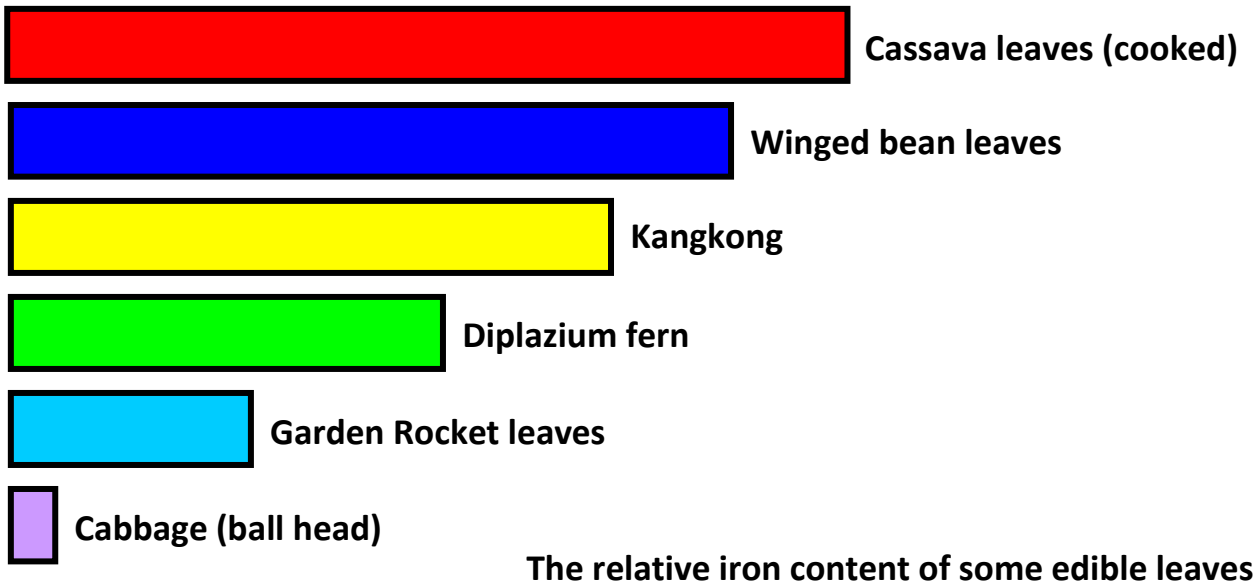
**Naming of plants**

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

**Local food plants are often very good**

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

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




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

**A healthy balanced diet**

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

**Learning to cook well**

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

**Learning to grow "wild" food plants**

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

**Saving better types of plants**

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

**Growing from cuttings and suckers**

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

**Saving seed**

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

**Growing a garden of mixed plants**

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

**Different types of plants for food security**

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

**Looking after the soil**

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

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

**Building up the soil**

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

**Poor soils where crops won't grow**

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

**Soil nutrients**

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

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

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

**Making compost**

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

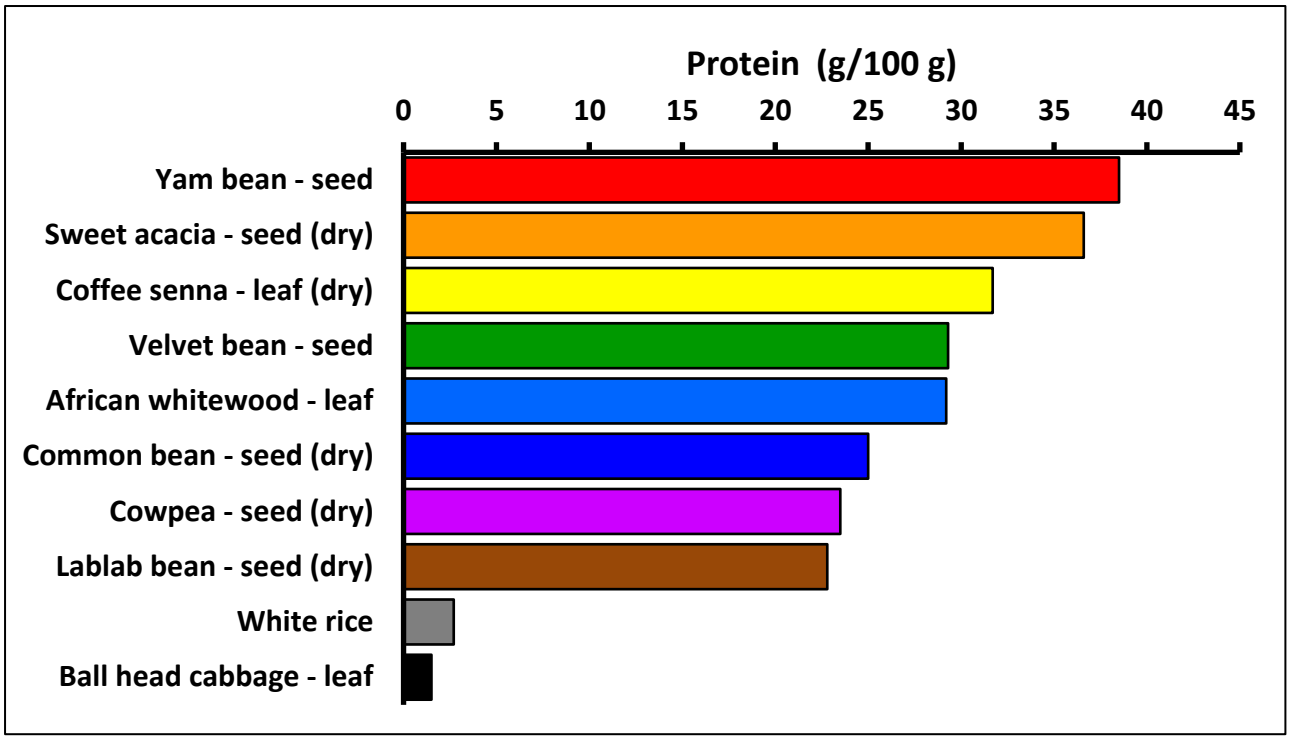
**Pests**

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

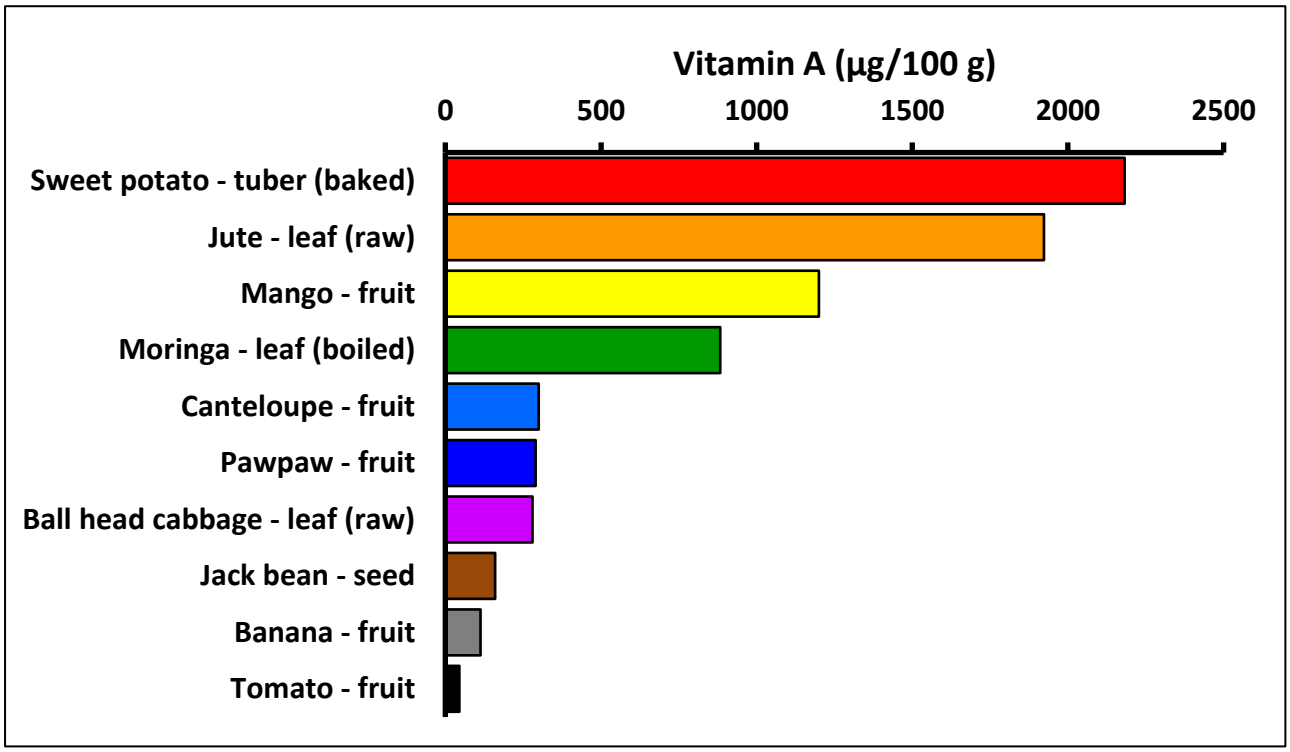
**Diseases**

The living organisms that cause disease are much smaller than insects. These disease organisms can often only be seen with a microscope. There are three main kinds of disease organisms - fungi, bacteria and viruses. Fungi are like the mushrooms we eat, only very much smaller. They usually make distinct dry spots on leaves and other plant parts. Fungi have spores that often blow in the wind. Bacteria are often smaller and live in damp places. They usually make plants go soft and squashy, and they may cause a smell. Bacteria are mostly spread with rain and in water. Viruses are very, very small and usually make irregular stripes and patterns on leaves and other plant parts. Viruses usually spread in planting material or in the mouths of small sucking insects. One common fungus disease on sweet potato causes the leaves to become wrinkled and twisted. It usually gets worse in old gardens and where soils are running out of nutrients. It doesn't affect all kinds of sweet potato to the same extent. The answer is not to stop the disease, but to improve the soil. The general rule is that healthy plants that are growing well will suffer less damage from disease.

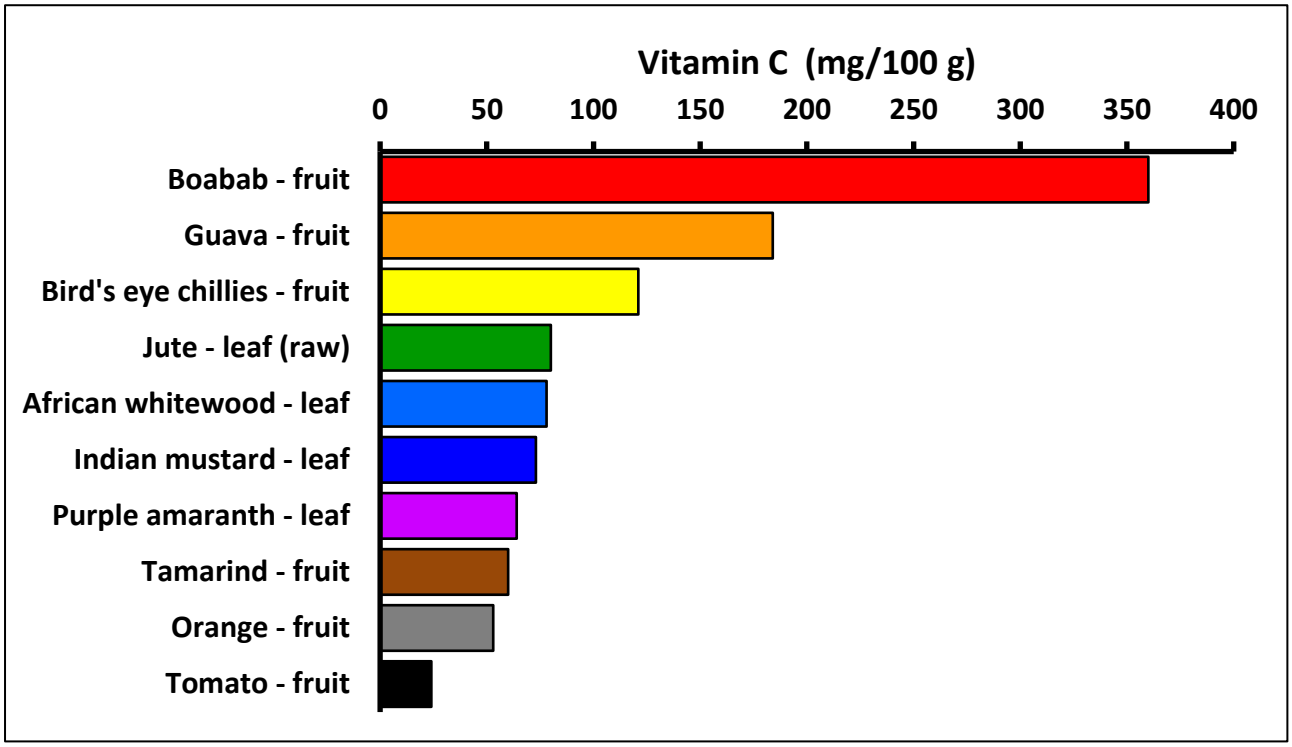
## Food value charts for a selection of plants from Guinea-Conakry



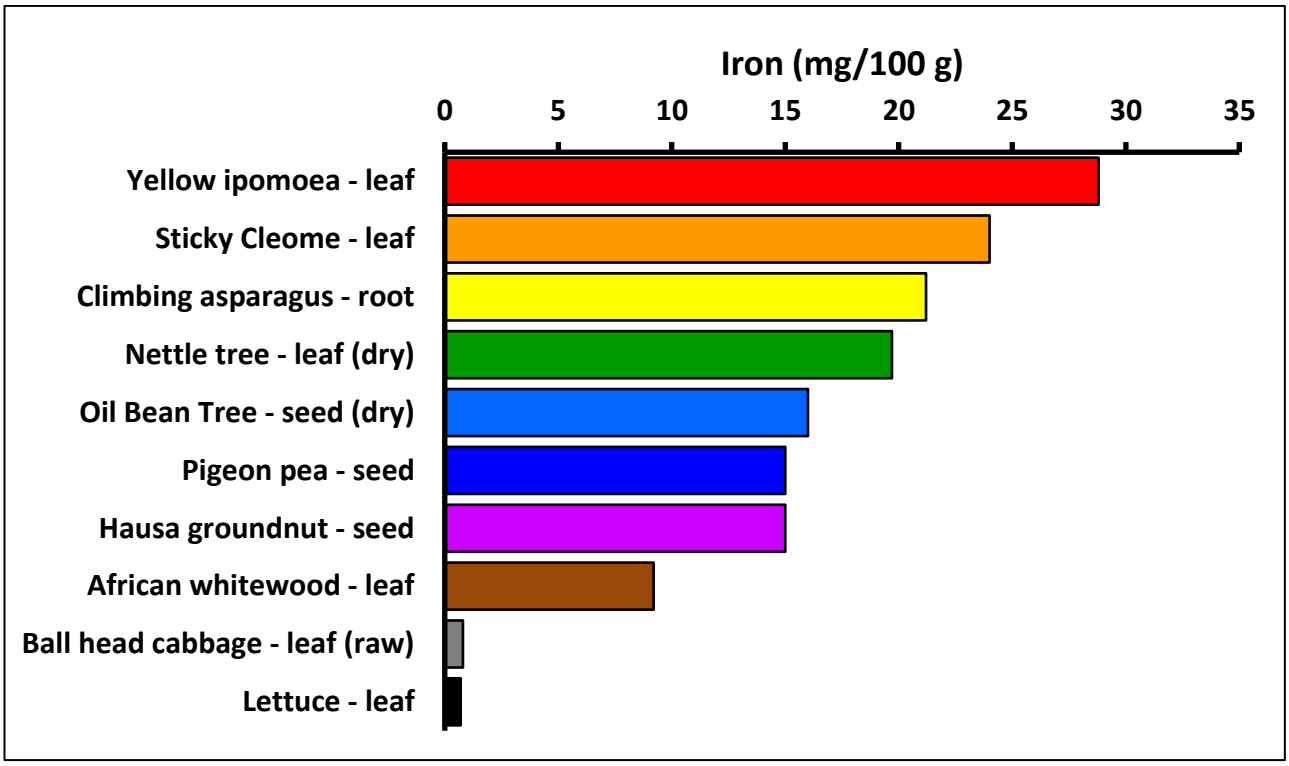

Protein helps the body repair cells and make new ones. Protein is also important for growth and development in children, teens, and pregnant women. Symptoms of protein deficiency include wasting and shrinkage of muscle tissue, and slow growth (in children).



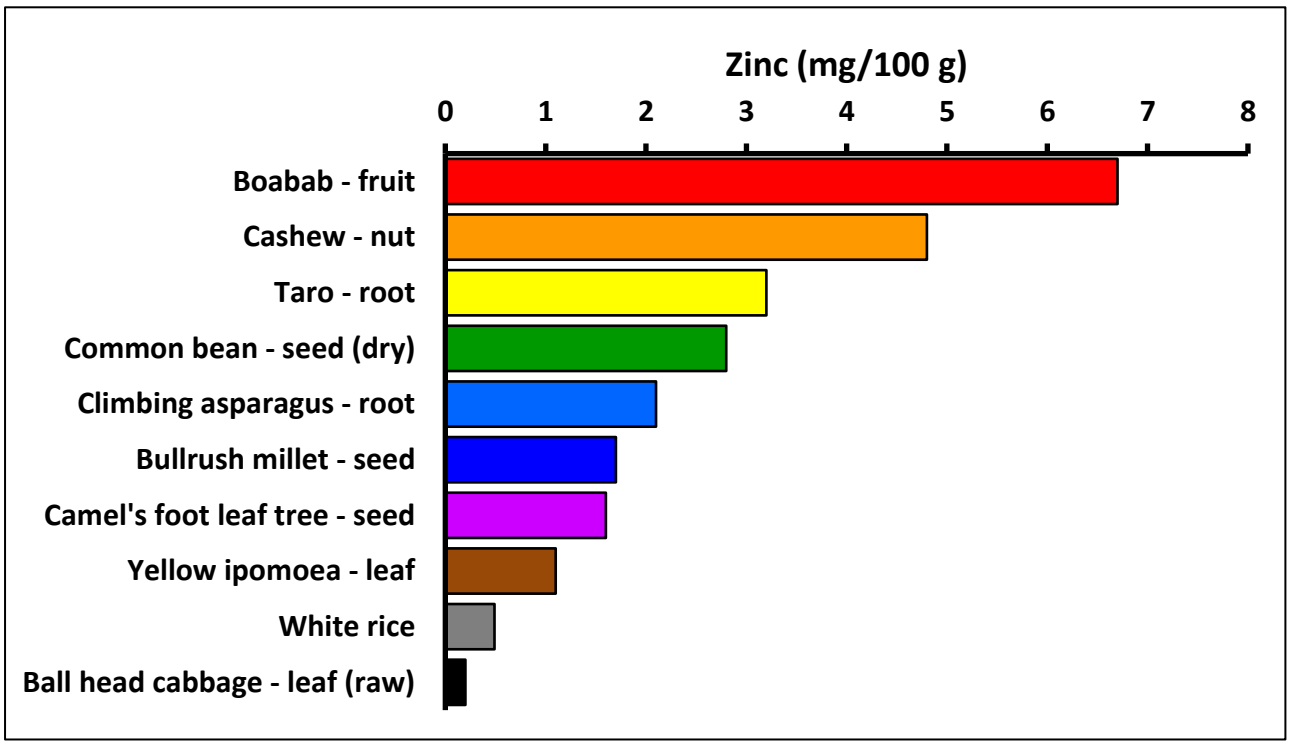

Vitamin A is very important for eyesight and fighting disease, particularly in infants, young children and pregnant women. People who are short of Vitamin A have trouble seeing at night.




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




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




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

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

## *Starchy staples*

**Common name**: Taro
**Local:**

**Scientific name:** *Colocasia esculenta*
**Plant family: ARACEAE**

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

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

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

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

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

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

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

Evapotranspiration for flooded taro averages about 4 mm per day, ranging from 1.5-7.2 mm, with a total of about 1,200 mm for the crop. Intermittent moisture can result in irregular shaped corms. Flooding has been found to be more effective than sprinkler irrigation, or furrow irrigation. Increased suckering, giving greater leaf area, seems to be the reason for this.

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

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

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

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

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

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

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

## Starchy staples

**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 | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | - | 1459 | 11.1 | - | - | - | - |

## Starchy staples

**Common name**: Cassava
**Local:**

**Scientific name:** *Manihot esculenta*
**Plant family: EUPHORBIACEAE**

**Description**: A plant which can re-grow year after year from the thickened roots. It has several stems. The stems are woody and have some branches. Plants grow up to 3 metres tall. Stalks have distinct scars where leaves have fallen. The leaves tend to be near the ends of branches. The leaves are divided like the fingers on a hand. The leaves have long leaf stalks. The leaves have 3-7 long lobes which can be 20 cm long. These are widest about 1/3 of the distance from the tip and taper towards the base. The colour varies. It produces several long tubers. These can be 50 cm long by 10 cm across. The flowers are on short stalks around a central stalk. They are produced near the ends of branches. The female flowers are near the base of the flower stalk and the male flowers higher up.

**Distribution**: A tropical plant. Plants grow from sea level up to about 1650 m. In Fiji they grow to 900 m. They can grow in poor soil and can survive drought. It is native to tropical America. It grows between 25°N and 25°S and needs a rainfall above 750 mm. It suits hardiness zones 10-12.

**Use**: The tubers are eaten after thorough cooking. They are boiled, roasted or made into flour. The starch is used in puddings, soups and dumplings. Young leaves are edible after cooking. They are also sometimes dried and stored. Seeds are also eaten. **Caution:** Bitter kinds of cassava contain poison but this is destroyed on heating. This kind of cassava should be cooked, sun dried, soaked and cooked again.

**Cultivation**: Cassava is planted from sections of the stalk. Sections about 15-20 cm long of the more mature woody stem are cut and stuck into the ground. They can be completely buried or put at almost any angle and it affects the growth little. Soon roots form and leaves start to sprout from the stalk. Cassava seeds need a soil temperature of 30°C for their germination. Flower and fruit production is more common under lower temperatures such as in highland or less equatorial conditions.

It is not necessary to dig a hole to plant cassava and on many soils where the soil is loose it can be planted without digging the soil first. Cassava does not suit waterlogged soils and preferably they should not be too shallow or stony.

Cassava can be planted at any time of the year but to get started it needs moisture so is often planted near the beginning of the wet season. The crop once established can survive for several months without rain. The ability to tolerate drought varies significantly with cultivar. During drought less and smaller leaves are produced and leaves die off more quickly but storage roots can be increased in the short term.

Because cassava can still grow satisfactorily in poorer soils it is often put last in a rotation after others crops have already been grown on the piece of land. Cassava is more responsive to nitrogen and potassium than phosphorus under many field situations. Nitrogen can increase cyanide levels. Under very acid conditions with high soluble aluminium levels, cassava has been able to achieve and maintain top growth but with significantly reduce root yields. When drainage is good and soil moisture is adequate, cassava stalks can be planted at any orientation from horizontal to vertical, but in very sandy soils horizontal planting is best and in heavy clay soils vertical planting is best.

Because of the slow growth in early establishment stages, soil loss from erosion with heavy rains can be significant. To avoid this planting should be timed so that the maximum vegetative growth is occurring during the heaviest rains. A leaf area index between 2.5-3.5 is optimal for cassava yield. The critical period for weed control is the time from 2-8 weeks after planting. Cassava tuber bulking is delayed under shaded conditions. Yields are also reduced. In mixed cropping situations using crops which mature early, allowing the cassava time to recover, is one possible strategy. For optimum production shading should be avoided.

Cassava takes about 10-12 months to produce mature tubers in the lowlands tropics although some varieties produce a smaller yield earlier. Yields in the range of 20-45 t/ha have been recorded for 12-14 month crops. The plants can be left growing and the tubers stored in the soil for considerable time. Crops of 24 months duration occur. Once the tubers have been dug they do not keep for more than a few days. Pre-harvest pruning of plants increases the storage time of tubers after harvest.

Spacing and plant density varies with soil climatic conditions and variety. Plant densities from 10000 to 30000 plants per hectare are used. Plants from the higher density crops have been shown to have quick post-harvest deterioration. Mulching has given significant yield increases in some conditions. It also reduces the incidence and damage of some root boring insects.

**Production**: Plants can be harvested after 10 months in the lowlands. There are some faster growing varieties. Yields in the range of 20-45 t/ha have been recorded for 12-14 month crops.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| tuber | 62.8 | 625 | 1.4 | 30 | 15 | 0.23 | 0.48 |
| leaf | 82.0 | 382 | 7.1 | 57 | 275 | 7.6 | - |

## Starchy staples

**Common name**: Sandbur grass
**Local:**

**Scientific name:** *Cenchrus biflorus*
**Plant family: POACEAE**

**Description**: An annual grass that grows 10-60 cm tall. It forms tufts and has runners. The leaves are alternate and simple. They are 2-25 cm long and 2-7 cm wide. The flowers are green and occur in a spike-like panicle, 2-15 cm long with 1-3 spikelets.

**Distribution**: A tropical plant, found in many African countries. It grows on sand dunes and sandy plains. It is collected in the Sahel. It can grow in arid places and suits areas with 260-650 mm annual rainfall. It cannot tolerate frost. It can grow in salty or alkaline soils. It grows from sea level to 1300 m above sea level.

**Use**: Seeds are eaten raw, used in bread or for making porridge. It is also used to make a drink as a milk substitute.

**Cultivation**: It can be grown from seed. Seed germinate best at 35°C.

**Production**: The seeds fall from the plant and are swept up. They are pounded in a mortar then winnowed in the wind.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 9.8 | 1547 | 17.8 | - | - | - | - |

## Starchy staples

**Common name**: Floating rice
**Local:**

**Scientific name:** *Oryza glaberrima*
**Plant family: POACEAE**

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

**Distribution**: It is a tropical plant that grows in swamps and on flood plains of savanna regions. It does best with temperatures of 30-35°C. It grows from sea level to 1700 m altitude and can tolerate low soil fertility.

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

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

**Production**:

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 11.3 | 1538 | 7.4 | - | - | 3.4 | - |

## 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 peanut. Crops are normally weeded 2 or 3 times.

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

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 11.6 | 1442 | 10.5 | - | - | 6.5 | 1.7 |

## Starchy staples

**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 corn have been a staple food in Central America. Maize is cooked and prepared in many different ways-boiled, roasted, dried, steamed and other ways. Corn 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 | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed (mature) | 10.4 | 1528 | 10.0 | 100 | 4 | 4.9 | 2.2 |

## Starchy staples

**Common name**: Climbing asparagus
**Local:**

**Scientific name:** *Asparagus racemosus*
**Plant family: ASPARAGACEAE**

**Description**: A creeping or climbing shrub. It has woody stems. It grows 2 m high and spreads 2 m wide. The stems are slender and trailing. The leaves are light green and narrow. They are 5 cm long. The flowers are very small. The fruit are small round red berries.

**Distribution**: It is a tropical plant that grows best in rich moist soils and filtered sunlight. It is damaged by frost and drought. It can grow in arid places.

**Use**: The tubers (rhizome) are cooked and eaten. The outer skin is removed and cut into small pieces then pounded. The young leaves are used as a green vegetable. They are eaten cooked or raw. They are also used for pickles. The fruit are eaten as a dessert fruit. The harvested shoots can be stored for 10 days.

**Cultivation**: It can be grown by seed or by division.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| root | 78.4 | 1682 | 6.7 | - | - | 21.2 | 2.1 |

## *Legumes*

**English**: Camel's foot leaf tree
**Local:**

**Scientific name:** *Bauhinia thonningii*
**Plant family: FABACEAE**

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

**Distribution**: A tropical plant. It grows in open woodland and often near streams. It grows in the Sahel. In Ethiopia it grows at low and medium altitudes especially between 900-1700 m. It cannot stand cold temperatures or frost and is tolerant of drought. It grows in areas with an annual rainfall between 400-1200 mm. It can grow in arid places. It also grows on termite mounds. It grows in the lowlands. It grows in Miombo woodland in Africa.

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

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

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

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

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

## Legumes

**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 | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 10.0 | 1449 | 19.5 | 55 | - | 15.0 | - |
| pod (young) | 64.4 | 477 | 8.7 | - | - | 2.0 | - |
| seed (young, boiled) | 71.8 | 464 | 6.0 | 2 | 28.1 | 1.6 | 0.8 |

## Legumes

**Common name**: Jack bean
**Local:**

**Scientific name:** *Canavalia ensiformis*
**Plant family: FABACEAE**

**Description**: A perennial climber, although short kinds do occur. Often it is a more bushy plant than the sword bean. Plants grow up to 1.5 m long. Stems can be hairy. Leaves have 3 leaflets. The leaflets are oval and 5.7-20 cm long by 3.2-11.5 cm wide. The leaf tends to be wedge shaped at the base. The leaf stalks are 2.5-11 cm long. Flowers are red/purple. They occur on flower clusters 5-12 cm long and with flower cluster stalks which are 10-34 cm long. The individual flower stalks are 2-5 mm long. Pods are long and sword shaped. Pods can be 15-35 cm long. Seeds are white with a light brown hilum half as long as the seed. Seeds are 2 cm long, by 1 cm across.

**Distribution**: It grows in tropical and subtropical places. It requires a fairly high temperature (15°-30°C). It will possibly grow up to 900 m altitude. It is fairly drought resistant and also has some resistance to water-logging and salt in the soil. It can tolerate shade. It can tolerate pH from 4.5-8.0 but does best at about 6.1. The optimum mean annual temperature is 14.4-27.8°C. Seed germinate between 24-27.5°C. It is a short day plant growing well with a day length of 10-12 hours of sunlight. It can grow in arid places.

**Use**: The leaves and top shoots are eaten. The very young pods are boiled and eaten. The flowers can be eaten. The young seeds are eaten boiled, roasted, or peeled and cooked. The seeds are also fermented. The ripe seeds are roasted and used as a coffee substitute. **Caution:** The ripe seeds can contain poison and need to be well cooked and the water changed before eating. They are also often left under running water or fermented.

**Cultivation**: It is grown from seeds. Seeds need to be 2 cm deep. A spacing of about 60 cm is suitable. Plants preferably need a support to climb over. It benefits from a fertile soil but adding nitrogen depresses yield.

**Production**: Green pods are produced in 3-4 months, but ripe seeds need 6-9 months. Yield of seeds can range from 700-5400 kg/ha.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 10.0 | 1423 | 20.4 | 160 | 0 | 4.9 | - |
| pod (fresh) | 88.0 | 155 | 2.4 | - | - | - | - |

## Legumes

**Common name**: Lablab bean
**Local:**

**Scientific name:** *Lablab purpureus*
**Plant family: FABACEAE**

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

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

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

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

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

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed (dry) | 10.0 | 1428 | 22.8 | - | - | 9.0 | - |
| seed (young) | 86.9 | 209 | 3.0 | 14 | 5.1 | 0.8 | 0.4 |
| pod (fresh) | 86.7 | 203 | 3.9 | - | 1.0 | 2.4 | - |

## Legumes

**Common name**: Hausa groundnut
**Local:**

**Scientific name:** *Macrotyloma geocarpum*
**Plant family: FABACEAE**

**Description**: An annual herb. The 10 cm long stems lie along the ground and form roots. The leaves are alternate and have 3 leaflets. The leaf stalk is erect and 25 cm long. The leaflets are 3-8 cm long by 2-2.5 cm wide. The flowers can be single or in pairs in the axils of leaves. The flowers are greenish white. The fruit are pods 0.5-2.5 cm long by 0.5-1 cm wide. These are forced into the ground as they develop. The pods contain 1 to 3 kidney shaped beans. The seeds are 5-10 mm long by 4-7 mm wide.

**Distribution**: A tropical plant that can grow in arid places. It grows in the drier regions of West Africa.

**Use**: The seeds are cooked and eaten. They are boiled with salt and eaten with palm oil. They are also boiled in soup. Dried seeds are ground into flour and made into cakes and other dishes. The leaves are also cooked and eaten.

**Cultivation**: Plants are grown from seeds. Plants are often intercropped.

**Production**: Pods are harvested and then dried in the sun. The seeds are then thrashed from the pods. Yields of dry seeds can be 500 kg per hectare.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 9.0 | 1461 | 19.4 | - | - | 15.0 | - |

## Legumes

**Common bame**: Oil bean tree
**Local:**

**Scientific name:** *Pentaclethra macrophylla*
**Plant family: FABACEAE**

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

**Distribution**: A tropical plant that grows in tropical Africa from sea level to 500 m altitude. It needs temperatures above 18°C. An average temperature of 25°C and an annual rainfall of 1500-2000 mm per year is best. It grows best on a well-drained soil but can tolerate waterlogging. It can grow in acid soils and arid places.

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

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

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

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

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

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

## Legumes

**Common name**: Common bean
**Local:**

**Scientific name:** *Phaseolus vulgaris*
**Plant family: FABACEAE**

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

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

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

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

**Production**:

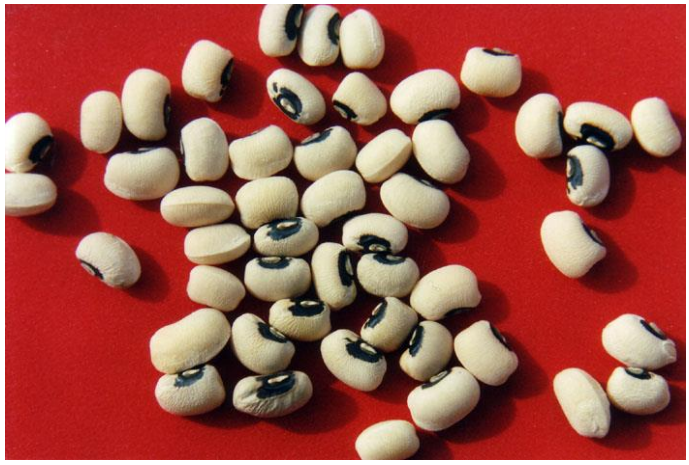
**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed (dry) | 10.0 | 1386 | 25.0 | 10 | 1 | 8.0 | 2.8 |
| seed (young) | 92.0 | 142 | 3.0 | - | 20 | 0.8 | 0.2 |
| pod | 88.0 | 151 | 2.5 | 750 | 27 | 1.4 | 0.2 |
| sprout | 90.7 | 121 | 4.2 | - | 38.7 | 0.8 | 0.4 |

## 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 | proVit 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 |

## Legumes

**Common name**: Velvet bean
**Local:**

**Scientific name:** *Mucuna pruriens*
**Plant family: FABACEAE**

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

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

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

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

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 7.3 | - | 29.3 | - | 4.8 | - | - |

## Legumes

**Common name**: Yam bean
**Local:**

**Scientific name*:*** *Pachyrhizus erosus*
**Plant family: FABACEAE**

**Description**: A climbing bean that can grow up to 6 m tall. The hairy stems are woody at the base. It has a white-fleshed tuber with a rough, sandy-coloured skin. The leaves are alternate and made up of 3 leaflets. These leaflets have large teeth. The flowers are violet or white. The pod is 8-15 cm long, curved and hairy, and contains 8-11 flattened seeds. The seeds are almost black.

**Distribution**: It grows in warm places, like coastal areas in Papua New Guinea and up to about 70 m altitude in the tropics. A well-drained soil is needed. A light rich sandy soil is suitable. It cannot tolerate frost. Plants need 11-13 hours of daylight for tubers to form. It suits hardiness zones 10-11.

**Use**: The young tuber is eaten either raw or cooked. It can also be pickled. The young pods can be eaten, provided they are well cooked. **Caution:** Old pods and mature seeds can be poisonous.

**Cultivation**: It is grown from seeds and also grows wild. Seed should be pre-soaked for 12 hours in warm water to encourage rapid germination. Seeds germinate (shoot) within 2 weeks. Plants can be grown by dividing the root clump and then growing plants from the thickened roots. Cuttings will grow. A spacing of 50 cm between plants is suitable. Topping the plant by picking out the growing point and removing the flowers is said to help tubers form.

**Production**: Tubers are ready about 6 months after sowing. Individual tubers can be up to 20 kg in weight.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| tuber | 89.0 | 160 | 1.0 | 2.0 | 20 | 0.6 | 0.2 |
| seed | 8.1 | - | 38.5 | - | - | 1.3 | - |
| pod | 86.0 | 189 | 2.6 | 345 | | 1.3 | |

## Legumes

**Common name**: Sweet acacia
**Local:**

**Scientific name:** *Acacia farnesiana*
**Plant family: FABACEAE**

**Description**: An evergreen shrub. It grows 5-7 m tall and 3 m across. The stem is slender and erect. The crown is open. It is a spreading, densely branched shrub. The bark is smooth and brown. The leaves are branched and green. There are 4-6 pairs of larger leaves and 10-20 pairs of small leaflets. They have tiny leaflets and thorns up to 2 cm long, occur in pairs. The leaf stalk has a gland at or above the middle. The flowers are large orange balls. They are strongly perfumed. (The oil is used as a perfume in France.) The pods are long and dark brown to black. They are 5-8 cm long by 0.5-1 cm wide. They are inflated and sausage like. Often they are curved. They are marked with narrow lines. The pods have hard grey seeds imbedded in a pithy substance. The pods do not split open at maturity. The seeds are chestnut brown and 7-8 mm long by 5.5 mm wide.

**Distribution**: It is a tropical plant. This tree occurs naturally in Australia, Asia and Africa. It will grow on most soils. It is drought and frost resistant. It most commonly grows naturally on clay soils. In Papua New Guinea the plants are coastal below 60 m altitude. It grows in areas with an annual rainfall between 400-4000 mm. It can grow in acid or alkaline soils. It can grow in arid places. It suits hardiness zones 11-12.

**Use**: The pods have been recorded as eaten after cooking. The gum is eaten. The ground up seeds are eaten. The germinated seeds are claimed to be eaten. The gum is used to prepare sweets. The young leaves are used in India as a substitute for tamarind in chutneys.

**Cultivation**: It is grown from seed.

**Production**: It is fast growing. Flowering can occur almost continuously if watering is regular. In northern Australia, flowering is normally May to July, with pods available from September to November.

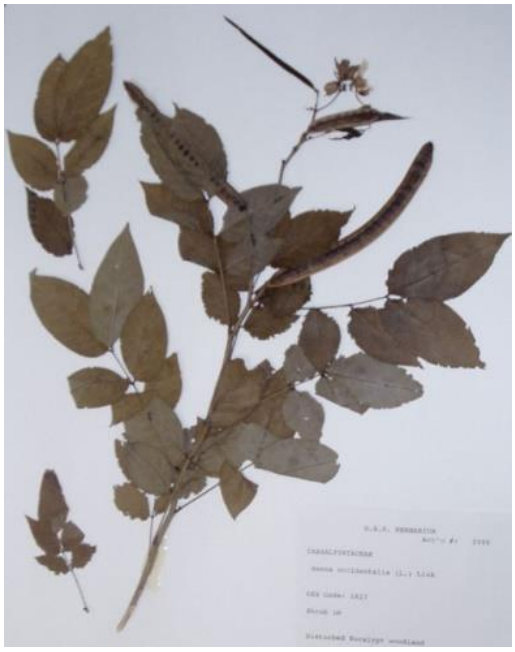
**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed (dry) | 8.1 | 1522 | 36.6 | - | - | 6.0 | 0.6 |

## Legumes

**Common name**: Coffee senna
**Local:**

**Scientific name:** *Senna occidentalis*
**Plant family: FABACEAE**



**Description**: An annual herb or small shrub. It can continue growing for a few years. It grows 1-2.5 m high. The stems have few hairs. The leaf stalk has a gland at the base but there is no gland along the leaf axis. The leaves are compound. There are 4-6 pairs of leaflets. The leaf stalk is 2-3 cm long. The leaflets are oval and 4-12 cm long by 1.5-4 cm wide. They taper to the top and are rounded at the base. The flower stalks are very short. The flower cluster is in the axils of leaves. The petals are yellow and 0.9-1.5 cm long. The fruit is a narrow, slightly curved pod. It is 5-10 cm long by 0.5-1 cm wide. It has pale edges. They are flattened. They usually dry with a brown area along the pod. The seeds are compressed. There are 28-32 seeds inside. They are green or brown and 5 mm long. There are small pits on each side.

**Distribution**: A tropical plant. It grows in monsoon forest as well as arid areas. In Africa it grows up to 2400 m altitude. It can grow in acid, neutral or alkaline soils. It can grow in arid places. Temperatures which average 12.5-28°C are suitable. It grows in areas with rainfalls between 500 and 4000 mm per year. A rainfall of 500 to 1000 mm is enough.

**Use**: The seeds are roasted and used for coffee. (They contain no caffeine). **Caution:** The seeds are poisonous unless roasted. Young leaves and young seeds are eaten cooked. The leaves are added to soups. The unripe pods are cooked and eaten with rice. The ashes of the pods are used as food salt.

**Cultivation**:

**Production**:

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| leaf (dry) | 10.0 | - | 31.7 | - | - | 3.1 | - |
| leaf | 84.9 | 205 | 5 | - | 17.9 | 12.7 | - |

## *Leafy greens*

**Common name:** Purple amaranth
**Local:**

**Scientific name:** *Amaranthus cruentus*
**Plant family: AMARANTHACEAE**

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

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

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

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

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

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 87.7 | 2006 | 14.7 | - | 0 | 3.8 | - |
| leaf | 84.0 | 176 | 4.6 | - | 64 | 8.9 | - |

## Leafy greens

**Common name**: Indian mustard
**Local:**

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

**Description**: It is an erect leafy annual cabbage plant. It grows to about 1 m high. The plant can vary a lot. The dark green leaves are elliptical and deeply divided. The end segment of the leaves is oval. The leaves taper towards the stem and have a strong mustard flavour. The flowers are pale yellow. They have 4 petals. It produces a flower and seed pods at the top. The seed pod is 3-5 cm long and narrow. The seeds are reddish-brown.

**Distribution**: A warm temperate plant. It is grown in some highland areas in the tropics. It is often grown as a cool season crop. Most varieties are not frost tolerant. It needs a fertile, well drained soil. A pH of 5.5-6.8 is suitable. It can tolerate poor soils. It can grow in arid places. It suits hardiness zones 9-11.

**Use**: The leaves are cooked and eaten. They have a bitter taste, so the cooking water needs changing. They can be stir-fried, or added to soups and stews. They can be eaten crystallised in vinegar or salt. They can be used in salads. The seeds can be fried then used as a spice. They also yield an edible oil. They can be sprouted. The leaves are also pickled.

**Cultivation**: The seed is broadcast. They can be put in a nursery and transplanted. A spacing of 25 cm x 25 cm is suitable. Seed germinate in 5 days at 20-25°C.

**Production**: Plants grow rapidly. Leaves can be harvested one month after planting. Leaves can be harvested several times. Whole plants can be harvested in about 45 days from transplanting.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 6.9 | 1964 | 24.9 | - | 3 | 10.0 | - |
| leaf | 92.0 | 108 | 2.4 | 31 | 73 | 2.7 | - |

## Leafy greens

**Common name**: Cat's-whiskers
**Local:**

**Scientific name:** *Cleome gynandra*
**Plant family: CLEOMACEAE**

**Description**: An annual herb with a long tap root that grows 60-90 cm tall. It is erect and somewhat hairy. It usually has purple stems. The leaves occur one after another along a long stalk. There are 5-7 leaflets which are unequal and spread out at the end. They are oblong and about 2.5-6 cm long by 1.4-3.2 cm wide. The leaflets are pointed at the base with a rounder point at the tip. There are fine teeth along the edges of the leaves. The flowers are white or purple and occur in long flower clusters at the end of branches. These are 30 cm long. The flower clusters are showy with a spidery like appearance. The fruit are a slender capsule with 2 valves and many small seeds. They are 5-10 cm long and very narrow. The seeds are kidney shaped and rough. They are brown and have fine lines along them. They are 1-1.5 mm across.

**Distribution**: A widespread tropical plant. It commonly occurs as a self sown weed on cultivated land. It grows in warm or tropical regions at a range of elevations but especially above 600 m altitude. It will grow from semi arid to wet humid climates. It will grow on many soil types, but needs fertile soil for good leaf production. A temperature of 18-25°C seems best. Plants need plenty of sunlight. They are not drought resistant but can produce a crop with short periods of rain. Plants cannot withstand flooding. It is often abundant near the sea. It can grow in arid places.

**Use**: The leaves are eaten. If they are cooked, the bitter taste is reduced. They are also used in flavouring sauces. The leaves are also blanched, dried and stored. The flowers can be eaten. Young pods are also eaten. The oil from the seeds is edible without needing to be refined. The leaves can be candied in vinegar or in salt water, then eaten with fish. The seeds are used as a spice in curries. **Caution:** Fresh plants can contain hydrocyanic acid and should be cooked.

**Cultivation**: The plant is grown from seed that are broadcast. Fertile soil is needed to get plants with good leaf coverage. The seed germinate erratically, because the seed have a rest period after harvest. Seed germinate best 6 months after harvest. Once they are ready to grow, they germinate in 4-5 days. Leaves or whole plants can be harvested when 15 cm high. Picking out the tops encourages side growth and longer leaf production. Removing flowers extends the harvest period.

**Production**: Leaves can be harvested 4-5 weeks after planting. Seeds reach maturity about 5 months after sowing.

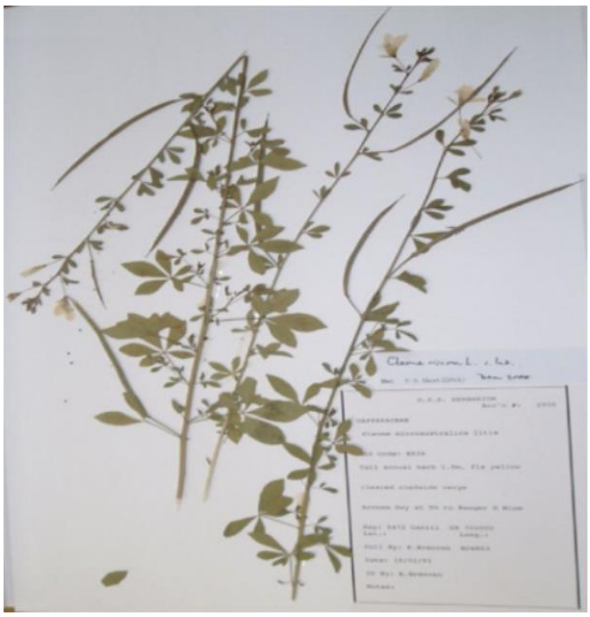
**Food Value:** Per 100 g edible portion

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| leaf | 86.6 | 142 | 4.8 | - | 26 | 6.0 | - |

## Leafy greens

**Common name**: Sticky cleome
**Local:**

**Scientific name:** *Cleome viscosa*
**Plant family: CLEOMACEAE**



**Description**: An erect annual herb about 0.3 to 1 m tall. It is sticky and has a rank smell. The leaves are made up of 3-5 leaflets each 1-3 cm long. The flowers are in leafy groups at the end of branches. The flower stalks are less than 1 cm long. The petals are yellow and 7-8 mm long. The fruit is a narrow capsule and gradually tapers near the tip. The stems and seed pods are hairy. The seeds are round, black and 1 mm across.

**Distribution**: It is a tropical plant found in waste places at low and medium altitudes. It is damaged by drought and frost. It can grow in arid places. It restricts the germination and growth of Pearl millet.

**Use**: The leaves are edible when cooked. The young fruit are eaten candied. Roasted seeds are used in curries and pickles. Seed oil is used for cooking. The leaves are soaked, fermented and used as a spice.

**Cultivation**: Plants are grown from seed.

**Production**:

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| leaf | 80.4 | - | 5.6 | - | - | 24 | - |

## 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 capsules contains 180-230 seeds. The seeds are dull grey and with four faces and one long point. Each seed has one pale line along it.

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

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

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

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

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

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

## Leafy greens

**Common name**: Horseradish tree
**Local:**

**Scientific name:** *Moringa oleifera*
**Plant family: MORINGACEAE**

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

**Distribution**: A tropical and subtropical plant. They suit the dry lowland areas and grow up to 1350 m altitude in the tropics. They are not hardy to frost. They cannot tolerate water-logging. A pH of 6-7.5 is suitable. It can grow in arid places. It suits hardiness zones 9-12.

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

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

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

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| leaf | 76.4 | 302 | 5.0 | 197 | 165 | 3.6 | - |
| flower | 84.2 | 205 | 3.3 | - | - | 5.2 | - |
| leaf (boiled) | 87 | 189 | 4.7 | 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 | - | - | - | - |

## Leafy greens

**Common name**: Yellow ipomoea **Scientific name:** *Ipomoea obscura*
**Local:** **Plant family: CONVOLVULACEAE**

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

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

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

**Cultivation**:

**Production**:

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

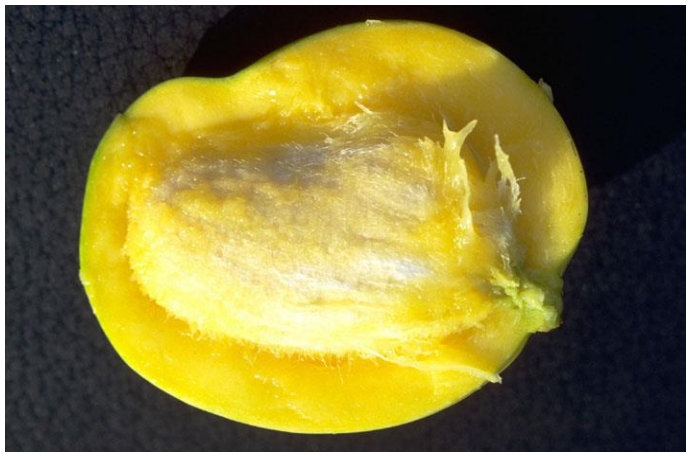
| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| leaf | 56.6 | 569 | 8.8 | - | - | 28.8 | 1.1 |

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

## *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 200-1,000 g. Trees can produce one million flowers but only 500 fruit. Trees last for many years.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| fruit | 83.0 | 253 | 0.5 | 1200 | 30 | 0.5 | 0.04 |
| leaf | 82.1 | 226 | 3.9 | - | 60 | 2.8 | - |

## Fruit

**Common name**: Mombin
**Local:**

**Scientific name:** *Spondias mombin*
**Plant family: ANACARDIACEAE**

**Description**: A medium sized tree growing 20-30 m high. The trunk can be 0.5-2 m across. Branches start after 10-15 m. They are widespread and sparse. The leaves are compound. They have leaflets along the stalk. The leaflets are in pairs with a leaflet at the end. There are 5-9 pairs. The flowers occur on stalks near the ends of the branches. The fruit are small and yellow. They are 2.5-4 cm long. They have one large seed. The flesh is sub-acid.

**Distribution**: It grows in the tropical lowlands in wet or dry zones. In Bolivia it grows where rainfall is 1000-1500 mm per year. It cannot tolerate frost. It can tolerate a range of soils.

**Use**: The fruit are used fresh or cooked. They are acidic. They are also used for jams and jellies. Because it is sour it is often sweetened and used for drinks. The unripe fruit are pickled and eaten like olives. The young leaves are cooked and eaten.

**Cultivation**: Plants can be grown from seed or cuttings. The fresh fruit can be planted whole. The flesh can be removed and the seeds dried. Seeds only store well for about 3 months. Seeds germinate in 20-40 days. It is often used as a living fence or hedge.

**Production**: It is fast growing. Plants can be 3.5 m tall in 2 years.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| fruit | 82.7 | 193 | 1.3 | 70 | 28 | 2.8 | - |

## Fruit

**Common name**: Boabab
**Local:**

**Scientific name:** *Adansonia digitata*
**Plant family: BOMBACACEAE**

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

**Distribution**: It is a tropical plant that grows in the lowlands. It grows in the hot dry regions of tropical Africa, such as the Sahel. It survives well in dry climates. It grows where rainfall is 100-1000 mm a year. It can tolerate fire. It grows where the annual temperatures are 20-30°C. In most places it grows below 900 m altitude but occasionally grows to 1500 m altitude. It requires good drainage. It can grow in arid places and suits hardiness zones 11-12.

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

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

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

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

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

## Fruit

**Common name**: Pawpaw
**Local:**

**Scientific name:** *Carica papaya*
**Plant family: CARICACEAE**

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

**Distribution**: It is a tropical plant that grows from sea level up to about 1700 m altitude in the equatorial tropics. In cooler regions they have to be planted but in humid tropical regions are commonly self-sown. Sunlight allows germination when forest is cleared. It cannot stand frost. It needs a night temperature above 12°C and won't tolerate water-logging. Plants die after 48 hours in standing water. It needs a pH between 5-8 and suits hardiness zones 11-12.

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

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

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

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

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

## Fruit

**Common name**: Canteloupe
**Local:**

**Scientific name:** *Cucumis melo*
**Plant family: CUCURBITACEAE**

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

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

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

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

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

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 7.0 | 2319 | 15.8 | - | - | - | - |
| leaf | 85.0 | 172 | 4.2 | 72 | - | - | - |
| fruit | 93.0 | 109 | 0.5 | 300 | 30 | 0.4 | 0.2 |

## Fruit

**Common name**: Banana
**Local:**

**Scientific name:** *Musa sp (A &/or B genome) cv.*
**Plant family: MUSACEAE**

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

**Distribution**: A tropical and subtropical plant. They grow from sea level up to about 2000 m altitude in the tropics. They are rarely an important food above about 1600 m. In Nepal they grow to about 1800 m altitude. They do best in warm and humid tropical climates. Temperatures need to be above 15°C. The best temperature is 27°C. The maximum temperature is 38°C. Bananas grow best in full sun. For best growth, a rainfall of 200-220 mm per month is needed. A deep friable soil is best. They can tolerate a pH between 4.5-7.5. It suits hardiness zones 10-12. It is widely grown in many countries.

**Use**: Fruit are eaten raw or cooked depending on variety. Male buds and flowers are eaten on some varieties. They are cooked as a vegetable. The central pith of the false stem and the underground rhizome are also sometimes eaten.

**Cultivation**: They are planted from sword suckers. Diploids need re-planting annually but many triploids can be re-suckered from the base on the same site. Spacing depends on variety. A spacing of 1000-3000 plants per hectare is used depending on variety. Suckers are usually put 30 cm deep.

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

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| fruit (cooking) | 65.3 | 510 | 2.0 | 113 | 18.4 | 0.6 | 0.1 |
| fruit (sweet) | 70.7 | 365 | 1.7 | - | 2 | 0.9 | 0.4 |
| flower buds | 91.3 | 109 | 1.6 | - | - | 1.0 | - |

## 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 | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| fruit | 77.1 | 238 | 1.1 | 60 | 184 | 1.4 | 0.2 |

## *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 tubers are produced under the ground. There are a large number of varieties which vary in leaf shape and colour, tuber shape, colour, texture and in several other ways.

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

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

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

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

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

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

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

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| tuber (baked) | 72.9 | 431 | 1.7 | 2182 | 24.6 | 0.5 | 0.3 |
| tuber (raw) | 70.0 | 387 | 1.2 | 4000 | 25 | 0.7 | 0.4 |
| tuber (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**: Pumpkin
**Local:**

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

**Description**: A pumpkin family plant. It is a creeping plant with long creeping stems and softly hairy but without prickly hairs. The stems are rounded or 5 angled and moderately hard. They can grow 15-20 m long. The leaves are large and shallowly lobed and divided like fingers on a hand. Occasionally the leaves have white blotches. They have rounded lobes. They are 20 cm by 30 cm. The leaf stalk is 12-30 cm long. The flowers have male and female flowers separately on the same plant. The fruit stalk is distinctly expanded where it joins the fruit. The fruit are not hard shelled and are dull in colour. The flesh is yellow and often has fibres through it. The seeds are plump and white to brown. They separate easily from the pulp of the fruit. The edge of the seed is scalloped and irregular in outline. There are a large number of cultivated varieties.

**Distribution**: A tropical plant that suits the wet tropics. It will thrive in humid as well as in very hot climates. A temperature of 18-30°C is best. It can tolerate some shade. It can grow in soils with a pH of 5.5-6.9. It suits hardiness zones 8-11.

**Use**: The fruit are eaten cooked. They are boiled, fried or baked. They can be mashed and used in pies, soups, bread and cakes. They can be dried, ground into flour and used for bread. The young leaves and flowers are edible. They can also be dried and stored. The seeds are eaten roasted. They can also be roasted in salt.

**Cultivation**: Plants are grown from seed. Seeds can be put in a nursery and transplanted.

**Production**: Fruit mature in 70-180 days after sowing depending on variety.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 5.5 | 2331 | 23.4 | - | - | 2.8 | - |
| leaf | 93.6 | 88 | 3.0 | 95 | 10 | 2.1 | - |
| fruit | 95.0 | 35 | 0.7 | - | 14 | 0.4 | - |

## Vegetables

**Common name**: Smooth loofah
**Local:**

**Scientific name:** *Luffa cylindrica*
**Plant family: CUCURBITACEAE**

**Description**: A pumpkin family plant. It is an annual climber up to 10 m long. The stem is five angled and slightly hairy. The tendrils have 2 or 3 branches. Leaves are 10-20 cm across with 5-7 lobes. Male and female flowers are separate and yellow. The male flowers occur as 4-20 flowers together while female flowers are solitary in the leaf axils. Flowers open in the early morning. The fruit is fairly smooth and cylindrical and can be 30-60 cm long. The seeds are black, flat and smooth and 10-15 mm long.

**Distribution**: A tropical plant that grows well in the tropical lowlands but will also grow in more temperate places. It does best with temperatures of 25-30°C. It is better suited to the drier season as too much rainfall during flowering and fruiting is harmful. Soils should be well drained and moderately rich. It grows in areas with an annual rainfall of 1000-1800 m. In Zimbabwe it grows up to 1500 m above sea level. It can grow in arid places. It suits hardiness zones 9-12.

**Use**: The young fruit are eaten as a vegetable. They are skinned and have the centre removed. They can also be sliced and dried for later use. They can be pickled or used in soups, stews and curries. The seeds yield an edible oil after extraction. The seeds are roasted with salt and eaten as a snack. The young leaves and flowers are edible. They are blanched by covering to make them white. **Caution:** Older fruit are bitter and fibrous and contain poisonous substances.

**Cultivation**: Plants are grown from seed which are collected from ripe fruit. Seed are sown 4-5 cm deep and plants are put 1 metre apart. They can be sown in seed boxes and transplanted when 15 cm high. It is best to have a trellis for the plant to climb on or be left to climb over trees. They are often pollinated by insects but can be hand pollinated in the early morning.

**Production**: Fruit are harvested for sponges when fully mature. Young fruit are ready 2-3 months after planting while fruit mature 4 -5 months after planting.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| fruit | 94.3 | 79 | 1.1 | - | - | 0.7 | - |
| leaf | 90 | 113 | 5.1 | - | 95 | 11.5 | - |

## Vegetables

**Common name**: Bitter cucumber
**Local:**

**Scientific name:** *Momordica charantia*
**Plant family: CUCURBITACEAE**

**Description**: A pumpkin family plant. It is a slender annual climber with flowers of both sexes on the one plant. It has simple tendrils and vines can be 4 m long. It has bright green lobed leaves 5-12 cm long on thin leaf stalks 3-10 cm long. The flowers have a sweet smell and 5 small, yellow petals. Fruit are green when young and orange when ripe. The fruit have a lumpy appearance, with ridges along its length and when fully ripe burst open. It has bright red covering on the seeds inside. The seeds are pale brown and 10-16 mm long and 7-10 mm wide. Considerable variation in the fruit occurs between varieties.

**Distribution**: A tropical plant that grows from sea level up to about 500 m and will probably grow to 1000 m altitude in tropical regions. They require a well-drained soil preferably rich in organic matter. Seeds do not germinate below 15°C. Plants grow best with temperatures of 18-35°C. A soil pH of 6.5 is best. It suits hardiness zones 9-12.

**Use**: The young bitter fruit are cooked and eaten. They are boiled, stuffed, fried or pickled. They are used in soups, stews and stir-fried dishes. The seed mass of the ripe fruit is used as a food flavouring. The leaves are also cooked and eaten as a flavouring. The tender shoots and leaves are sometimes eaten. **Caution:** The leaves are considered to cause diarrhoea and vomiting.

**Cultivation**: Plants are grown from seed. For large scale plantings, 6-7 kg of seed are required for planting one hectare. Seeds are planted at 50 cm spacing in the place where the plants are to grow and need a stick to climb up. Often plants are grown on raised beds 2 m apart with 0.5 m between plants. The seed has a hard seed coat and germinates slowly. Soaking seeds for 24 hours before sowing gives a quicker more even germination. Regular watering is required.

**Production**: Fruit are ready to harvest 45-55 days after planting. Fruit should be harvested when young and tender. Once fruit have begun to change colour to yellow they are past maturity for eating. Early removal of young fruit also ensures continuous fruit setting. This can allow 6-8 successive pickings of fruit. Fruit on the plant are sometimes wrapped in paper to prevent fruit fly damage. Seed well stored can remain viable for 4-5 years. The young bitter fruit are cooked and eaten. The fruit is blanched or soaked in salt water to reduce the bitter taste.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 8.6 | 2020 | 18.6 | - | - | - | - |
| leaf (raw) | 84.7 | 252 | 5.0 | 44 | 170 | 7.1 | 0.3 |
| leaf tip (boiled) | 88.7 | 146 | 3.6 | 173 | 57 | 1.0 | 0.3 |
| fruit | 93.6 | 105 | 1.2 | - | - | 0.2 | - |
| pod (boiled) | 94.0 | 79 | 0.8 | 11 | 33 | 0.4 | 0.8 |
| pod (raw) | 94.0 | 71 | 1.0 | 380 | 84 | 0.4 | 0.8 |

## Vegetables

**Common name**: False benniseed
**Local:**

**Scientific name:** *Ceratotheca sesamoides*
**Plant family: PEDALIACEAE**

**Description**: An erect, slender stemmed herb that grows 2-3 m tall. The leaves have stalks. The leaves at the top of the plant are arrowhead shaped and with teeth in their lower section. The lower leaves are wider and have teeth all around. The flowers are tube shaped. At the base of the flower stalk there is a pair of small purple glands on the stem. The fruit have 2 "horns" at the end.

**Distribution**: A lowland tropical plant that grows in tropical Africa. It grows on sandy soil and suits wet areas. In Malawi, it grows below 900 m altitude. In West Africa, it grows in open savannah woodland.

**Use**: The leaves are eaten as a vegetable. They can be added to soups. Leaves can be preserved by drying. The seeds are eaten like sesame seeds. They are also put into soups. The seeds yield an edible oil.

**Cultivation**: Plants are grown from seeds. Seeds are broadcast at the beginning of rains.

**Production**:

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed (dry) | 7.0 | 2299 | 14.2 | - | - | - | - |
| leaf | 81.0 | 226 | 4.2 | - | - | 3.2 | - |

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

**Common name**: Garlic
**Local:**

**Scientific name:** *Allium sativum*
**Plant family: AMARYLLIDACEAE**

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

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

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

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

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

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| leaf | 87 | 50 | 2.1 | 684 | 38 | 0.4 | 1.0 |
| bulb | 66 | 512 | 5.0 | - | 7 | 1.2 | - |

## Nuts, seeds, herbs and other foods

**Common name**: Cashew
**Local:**

**Scientific name:** *Anacardium occidentale*
**Plant family: ANACARDIACEAE**

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

**Distribution**: It is a tropical plant that suits the lowland tropics but will grow up to about 1200 m altitude. It only bears well in dry areas because of blight of the flowers. It grows best in temperatures of 22-26°C. A rainfall of 1750 mm per year is considered suitable but good yields have been obtained with rainfall of 750 mm. It can grow on poor soils but needs good drainage.

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

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

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

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

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

## Nuts, seeds, herbs and other foods

**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. Fruiting is seasonal from April to June. It takes 8-9 months from flowering to ripe fruit. If plants are grown for shoots, they are planted close together.

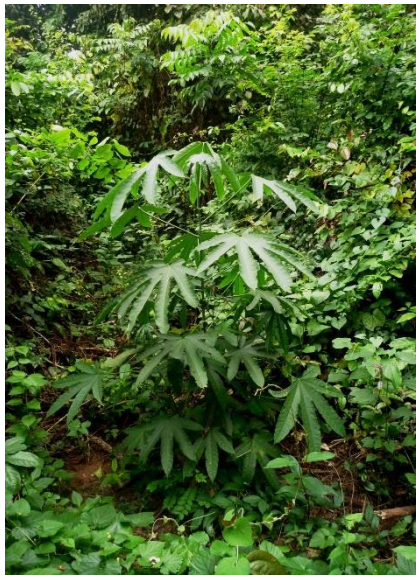
**Food Value:** Per 100 g edible portion

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

## Nuts, seeds, herbs and other foods

**Common name**: African whitewood
**Local:**

**Scientific name:** *Triplochiton scleroxylon*
**Plant family: HELICTERACEAE**



**Description**: A large tree growing to about 65 m tall. The trunk is 7 m around. It has large buttresses and grey, fairly smooth bark. It loses its leaves during the year. The leaves are 10-20 cm long with 5-7 lobes lobes arranged like fingers on a hand. The leaf stalk is 3.5-10 cm long. The saucer-shaped flowers are in short panicles. The hairy petals are white but reddish-purple at the base. The fruit are 6 cm long with 1-5 wings.

**Distribution**: It is a tropical plant that grows in lowland rainforests. It is common in drier disturbed forests.

**Use**: The leaves are cooked as a vegetable and are also used in sauces.

**Cultivation**: Plants are usually grown from seed. Seeds germinate in 1-2 weeks. Many seed do not germinate. Seeds can be stored for several years. Plants can be grown from cuttings under mist. Air layering is possible.

**Production**:

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| leaf | 74.7 | 668 | 29.2 | - | 78 | 9.2 | - |

Image sourced from: https://www.earth.com/earthpedia/plant/en/triplochiton-scleroxylon/

## Nuts, seeds, herbs and other foods

**Common name**: Nettle tree
**Local:**

**Scientific name:** *Celtis integrifolia*
**Plant family: ULMACEAE**

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

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

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

**Cultivation**:

**Production**:

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

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

## *Nutritional values of food plants by plant Family*

| Plant Family | Botanical name | Common name | Edible part | Moisture % | Energy kJ | Protein g | Vit A µg | Vit C mg | Iron mg | Zinc mg | Page |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ALLIACEAE | *Allium sativum* | Garlic | bulb | 66 | 512 | 5 | - | 7 | 1.2 | - | 55 |
| AMARANTHACEAE | *Amaranthus cruentus* | Purple amaranth | leaf | 84 | 176 | 4.6 | - | 64 | 8.9 | - | 32 |
| ANACARDIACEAE | *Mangifera indica* | Mango | fruit | 83 | 253 | 0.5 | 1200 | 30 | 0.5 | 0.04 | 39 |
| ANACARDIACEAE | *Spondias mombin* | Mombin | fruit | 82.7 | 193 | 1.3 | 70 | 28 | 2.8 | - | 41 |
| ANACARDIACEAE | *Anacardium occidentale* | Cashew | nut | 4.0 | 2478 | 17.5 | - | - | 2.8 | 4.8 | 56 |
| ARACEAE | *Colocasia esculenta* | Taro | root | 66.8 | 1231 | 1.96 | 3 | 5 | 0.68 | 3.2 | 10 |
| ASPARAGACEAE | *Asparagus racemosus* | Climbing asparagus | root | 78.4 | 1682 | 6.7 | - | - | 21.2 | 2.1 | 19 |
| BOMBACACEAE | *Adansonia digitata* | Boabab | fruit | 16 | 1212 | 2.2 | - | 360 | 7.4 | 6.7 | 42 |
| BRASSICACEAE | *Brassica juncea* | Indian mustard | leaf | 92.0 | 108 | 2.4 | 31 | 73 | 2.7 | - | 33 |
| CARICACEAE | *Carica papaya* | Pawpaw | fruit | 88.0 | 163 | 0.5 | 290 | 54 | 0.4 | 0.18 | 43 |
| CLEOMACEAE | *Cleome gynandra* | Cat's-whiskers | leaf | 86.6 | 142 | 4.8 | - | 26 | 6 | - | 34 |
| CLEOMACEAE | *Cleome viscosa* | Sticky Cleome | leaf | 80.4 | - | 5.6 | - | - | 24 | - | 35 |
| CONVOLVULACEAE | *Ipomoea obscura* | Yellow ipomoea | leaf | 56.6 | 569 | 8.8 | - | - | 28.8 | 1.1 | 38 |
| CONVOLVULACEAE | *Ipomoea batatas* | Sweet potato | tuber (baked) | 72.9 | 431 | 1.7 | 2182 | 24.6 | 0.5 | 0.3 | 48 |
| CUCURBITACEAE | *Cucumis melo* | Canteloupe | fruit | 93 | 109 | 0.5 | 300 | 30 | 0.4 | 0.2 | 45 |
| CUCURBITACEAE | *Cucurbita moschata* | Pumpkin | fruit | 95 | 35 | 0.7 | - | 14 | 0.4 | - | 50 |
| CUCURBITACEAE | *Luffa cylindrica* | Smooth loofah | fruit | 94.3 | 79 | 1.1 | - | - | 0.7 | - | 51 |
| CUCURBITACEAE | *Momordica charantia* | Bitter cucumber | pod (boiled) | 94.0 | 79 | 0.8 | 11 | 33 | 0.4 | 0.8 | 52 |
| EUPHORBIACEAE | *Manihot esculenta* | Cassava | tuber | 62.8 | 625 | 1.4 | 30 | 15 | 0.23 | 0.48 | 13 |
| FABACEAE | *Bauhinia thonningii* | Camel's foot leaf tree | seed | 9.9 | 1381 | 22.7 | - | - | 4.7 | 1.6 | 20 |
| FABACEAE | *Cajanus cajan* | Pigeon pea | seed | 10 | 1449 | 19.5 | 55 | - | 15 | - | 21 |
| FABACEAE | *Canavalia ensiformis* | Jack bean | seed | 10 | 1423 | 20.4 | 160 | 0 | 4.9 | - | 22 |
| FABACEAE | *Lablab purpureus* | Lablab bean | seed (dry) | 10 | 1428 | 22.8 | - | - | 9 | - | 23 |
| FABACEAE | *Macrotyloma geocarpum* | Hausa groundnut | seed | 9 | 1461 | 19.4 | - | - | 15 | - | 24 |
| FABACEAE | *Pentaclethra macrophylla* | Oil Bean Tree | seed (dry) | 6.2 | 2332 | 22.6 | - | - | 16 | - | 25 |
| FABACEAE | *Phaseolus vulgaris* | Common bean | seed (dry) | 10 | 1386 | 25 | 10 | 1 | 8 | 2.8 | 26 |
| FABACEAE | *Vigna unguiculata* | Cowpea | seed (dry) | 11.2 | 1189 | 23.5 | - | 1.5 | 6.4 | - | 27 |
| FABACEAE | *Mucuna pruriens* | Velvet bean | seed | 7.3 | - | 29.3 | - | 4.8 | - | - | 28 |
| FABACEAE | *Pachyrhizus erosus* | Yam bean | seed | 8.1 | - | 38.5 | - | - | 1.3 | - | 29 |
| FABACEAE | *Acacia farnesiana* | Sweet acacia | seed (dry) | 8.1 | 1522 | 36.6 | - | - | 6.0 | 0.6 | 30 |
| FABACEAE | *Senna occidentalis* | Coffee senna | leaf (dry) | 10.0 | - | 31.7 | - | - | 3.1 | - | 31 |
| FABACEAE | *Tamarindus indica* | Tamarind | fruit | 38.7 | 995 | 2.3 | 20 | 60 | 1.1 | 0.7 | 57 |
| HELICTERACEAE | *Triplochiton scleroxylon* | African whitewood | leaf | 74.7 | 668 | 29.2 | - | 78 | 9.2 | - | 58 |
| MALVACEAE | *Corchorus olitorius* | Jute | leaf (raw) | 80.4 | 244 | 4.5 | 1923 | 80 | 7.2 | - | 37 |

| Plant Family | Botanical name | Common name | Edible part | Moisture % | Energy kJ | Protein g | Vit A µg | Vit C mg | Iron mg | Zinc mg | Page |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MORINGACEAE | *Moringa oleifera* | Moringa | leaf (boiled) | 87 | 189 | 4.7 | 883 | 31 | 2 | 0.2 | 37 |
| MUSACEAE | *Musa x paradisiaca* | Banana | fruit | 65.3 | 510 | 2 | 113 | 18.4 | 0.6 | 0.1 | 46 |
| MYRTACEAE | *Psidium guajava* | Guava | fruit | 77.1 | 238 | 1.1 | 60 | 184 | 1.4 | 0.2 | 47 |
| PEDALIACEAE | *Ceratotheca sesamoides* | False benniseed | leaf | 81 | 226 | 4.2 | - | - | 3.2 | - | 54 |
| POACEAE | *Sorghum bicolor* | Sorghum | seed | - | 1459 | 11.1 | - | - | - | - | 12 |
| POACEAE | *Cenchrus biflorus* | Sandbur grass | seed | 9.8 | 1547 | 17.8 | - | - | - | - | 15 |
| POACEAE | *Oryza glaberrima* | Floating rice | seed | 11.3 | 1538 | 7.4 | - | - | 3.4 | - | 16 |
| POACEAE | *Pennisetum glaucum* | Bullrush millet | seed | 11.6 | 1442 | 10.5 | - | - | 6.5 | 1.7 | 17 |
| POACEAE | *Zea mays* | Corn | seed (mature) | 10.4 | 1528 | 10 | 100 | 4 | 4.9 | - | 18 |
| ULMACEAE | *Celtis integrifolia* | Nettle tree | leaf (dry) | 10.8 | 1058 | 8 | - | - | 19.7 | - | 59 |

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