Potentially Important Food Plants of Somalia




Rotary

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

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

www.foodplantsolutions.org

Potentially Important Food Plants of Somalia

Dedication

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

Food Plant Solutions Field Guide – Somalia, Version 3, January 2022

Preface

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

The selection of plants included in this guide has been developed by Lyndie Kite working in a voluntary capacity using the selection criteria developed by Food Plant Solutions. These selection criteria focus on the local plants from each of the main food groups with the highest levels of nutrients important to human nutrition and alleviation of malnutrition. It is intended as a **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 Somalia. This guide has been developed with the best intention to create interest and improve understanding of the important local food plants of Somalia, and on the understanding that it will be further edited and augmented by local specialists with appropriate knowledge and understanding of local food plants.

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

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

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

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

Contents

Introduction

Potentially Important Food Plants of Somalia has been produced to provide information on approximately 40 edible plants that are known to grow in Somalia. 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.

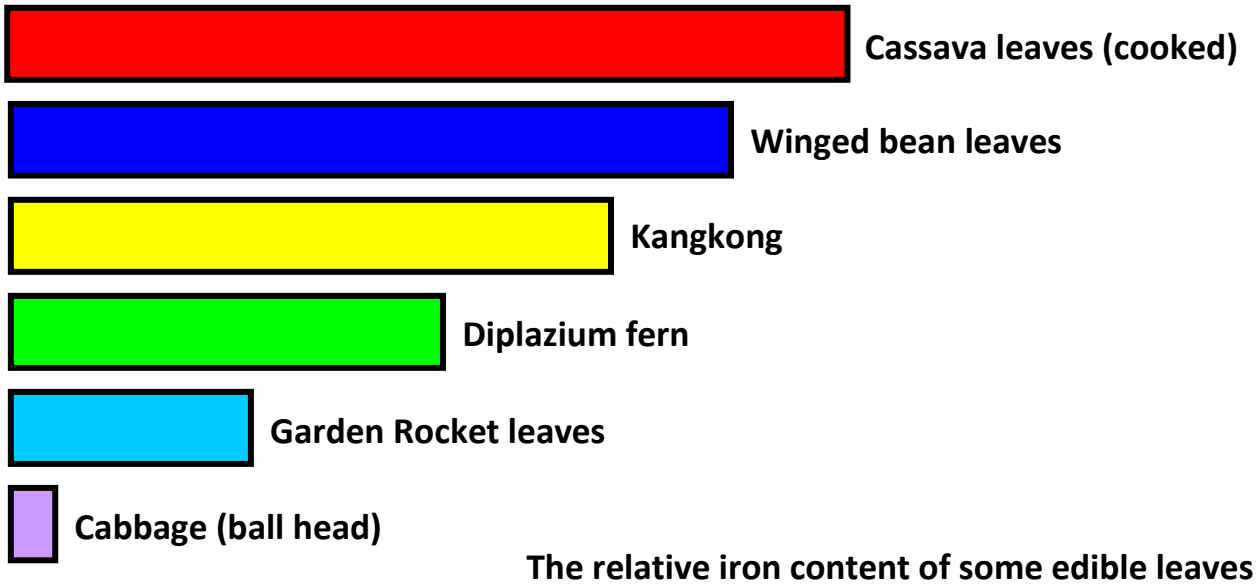
Naming of plants

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

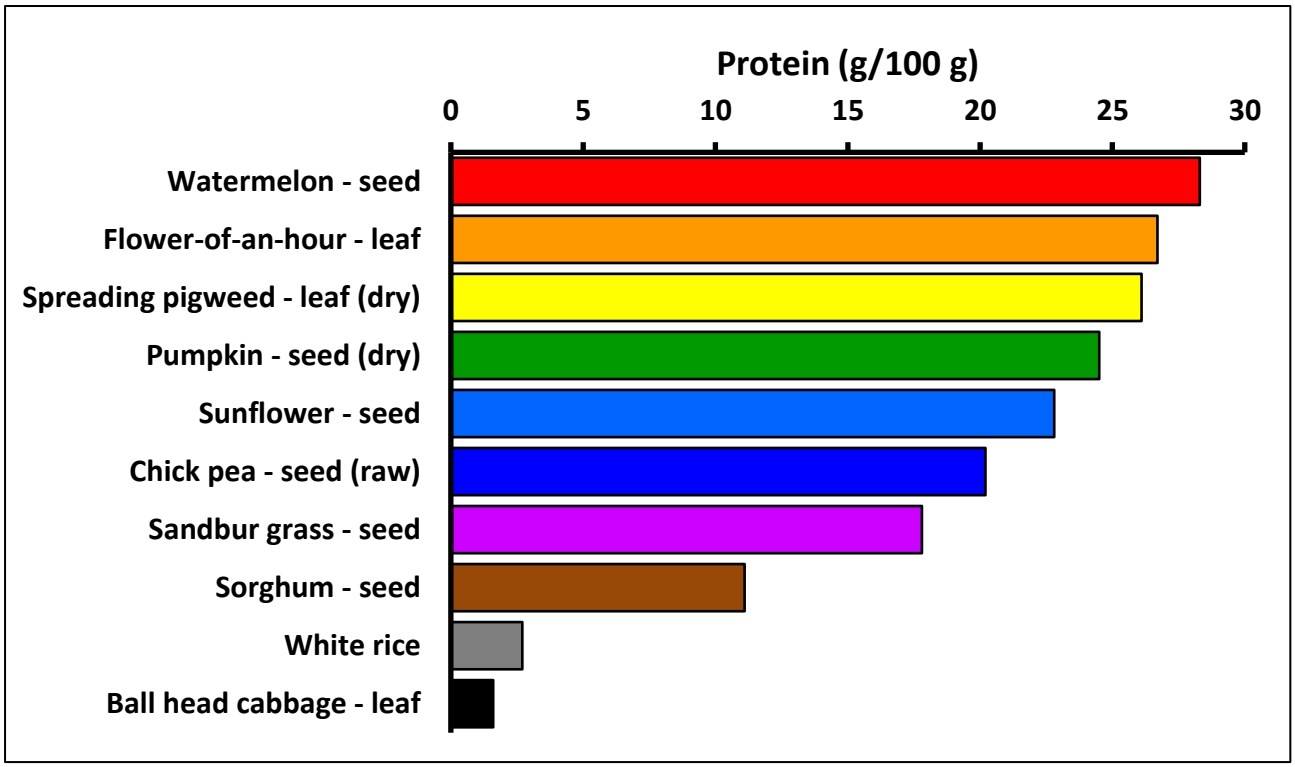
There are a large number of insects that enjoy sharing our food with us! We should not try to kill all these insects as they have an important role to play in keeping everything in nature in balance. What we need to do is to learn to manage these insects so we can all get some food to eat! Some insects 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.

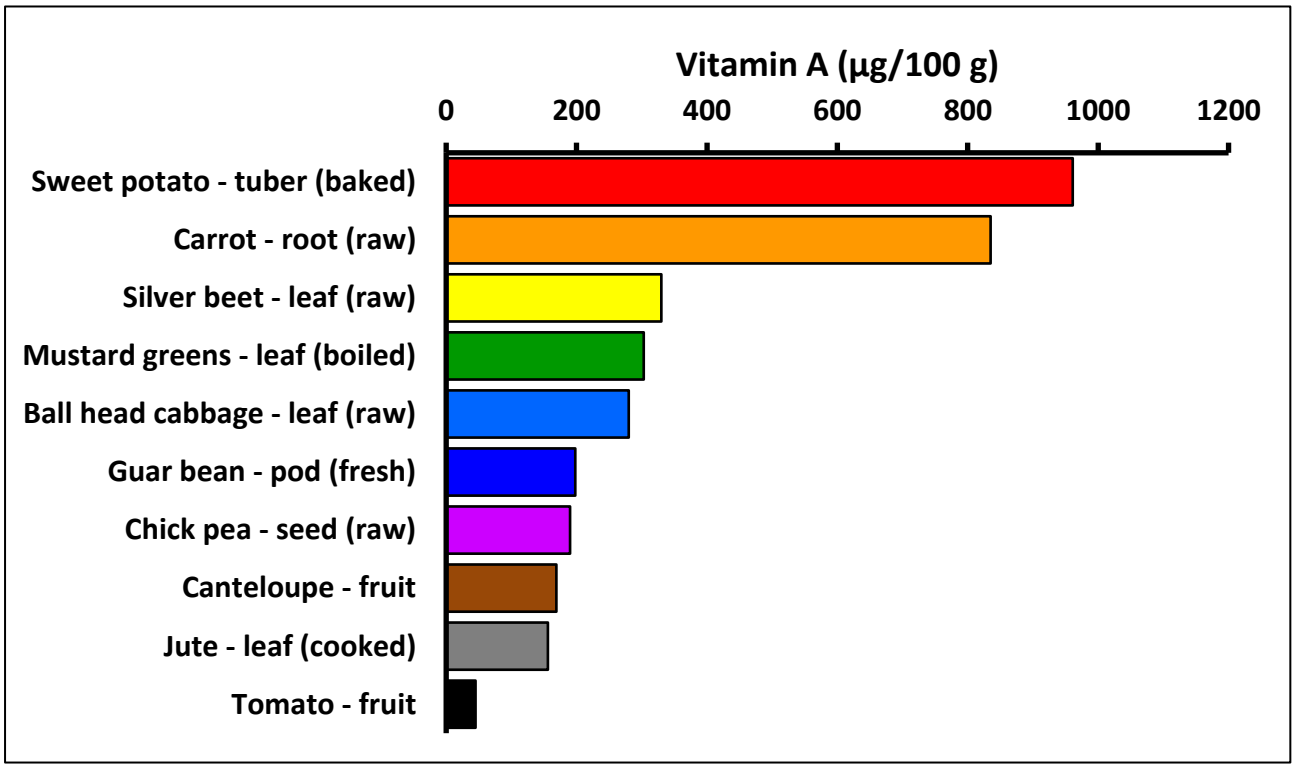
Diseases

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.

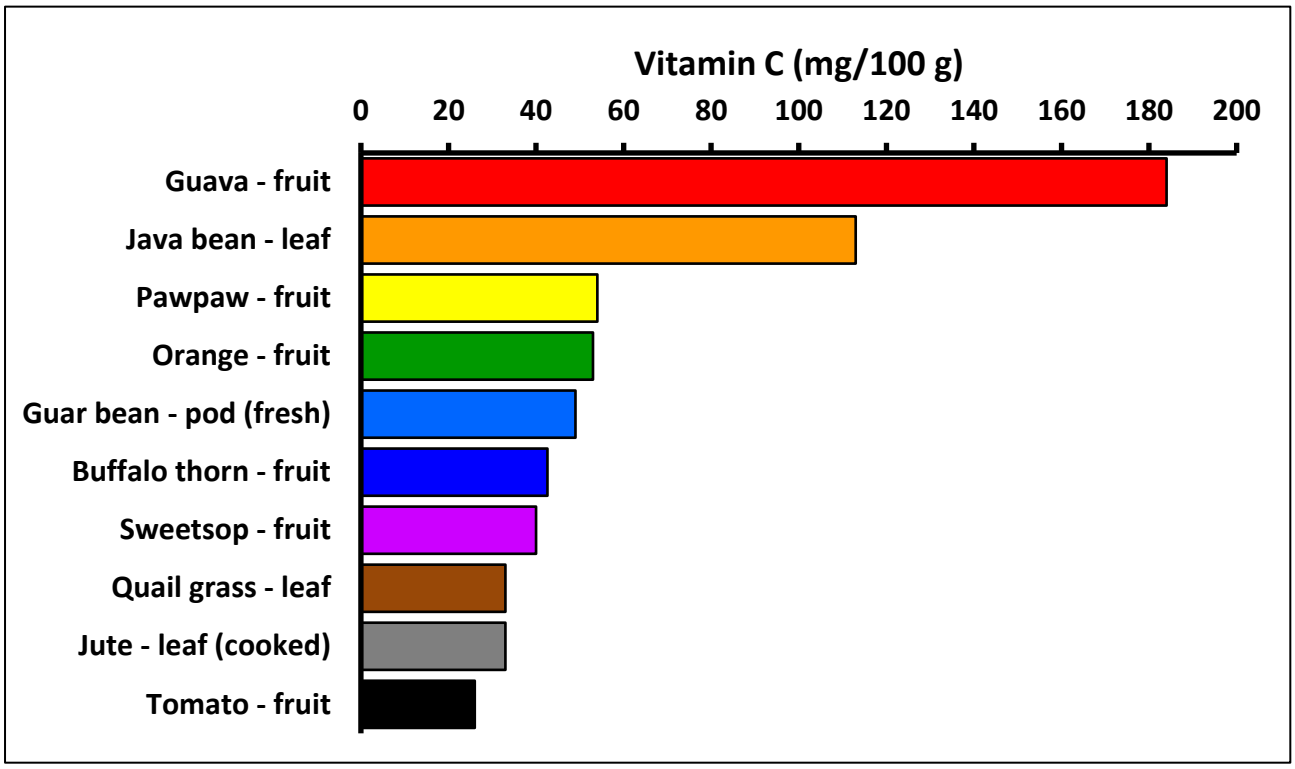
Food value charts for a selection of plants from Somalia



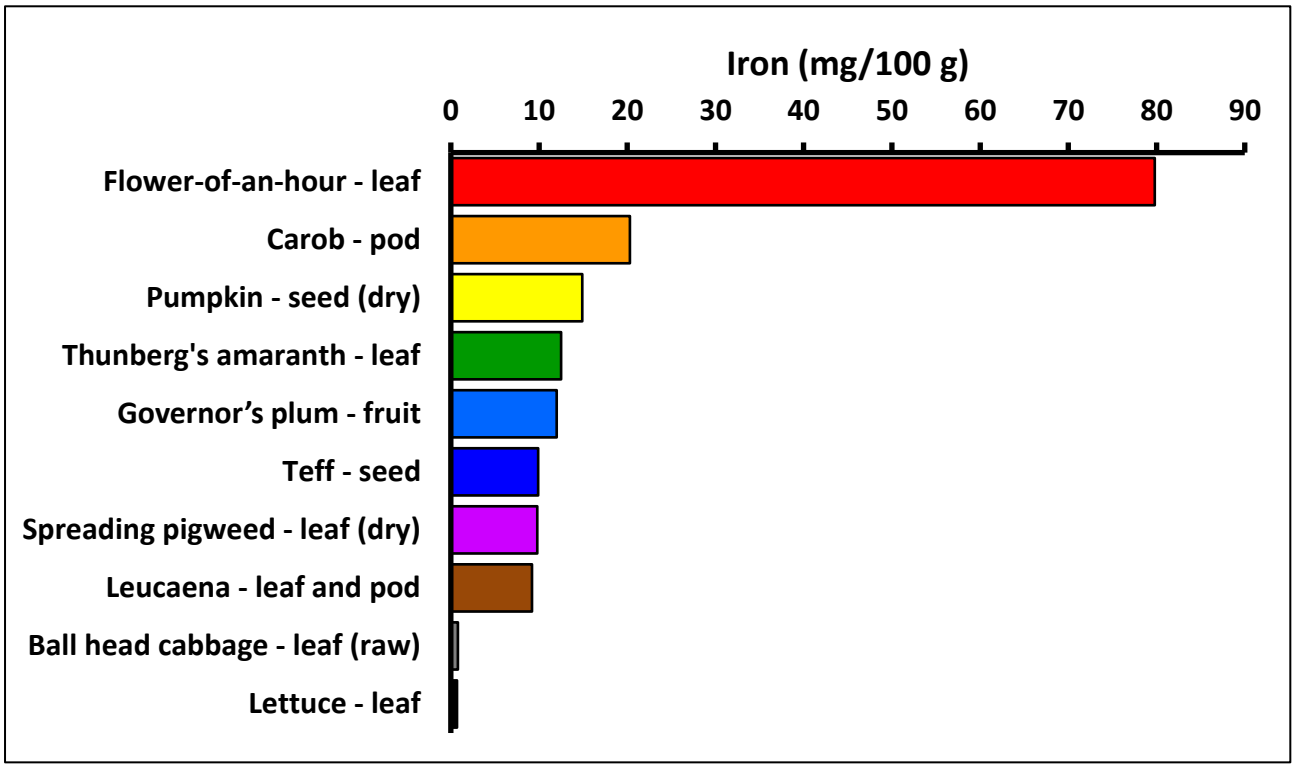
Protein helps the body repair cells and make new ones. Protein is also important for growth and development in children, teens, and pregnant women. Symptoms of protein deficiency include wasting and shrinkage of muscle tissue, and slow growth (in children).



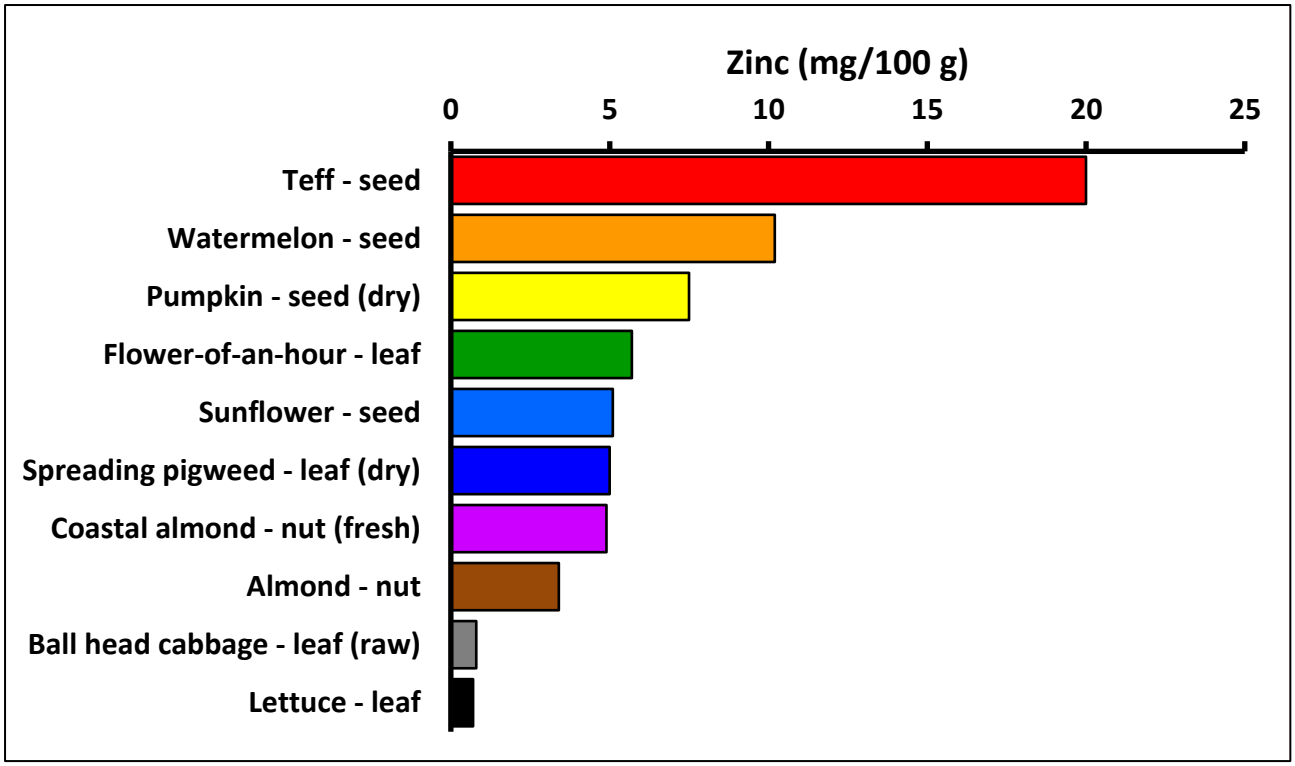
Vitamin A is very important for eyesight and fighting disease, particularly in infants, young children and pregnant women. People who are short of Vitamin A have trouble seeing at night.



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: Yeheb nut
Local:

Scientific name: *Cordeauxia edulis*
Plant family: FABACEAE

Description: A small evergreen shrub. It has many stems. It grows to about 1.6 m tall but can grow to 2.5 m tall in good growing conditions. It has a long tap root. The leaves are 3-5 cm long. They are divided into 4 pairs of leaflets. The leaflets are oval and leathery. They are 1-2.5 cm long and 1-1.4 cm wide. The flowers have both sexes and are carried in clusters at the ends of branches. They are bright yellow and 2.5 cm across. The pods are 4-6 cm long and curved with a beak. The pods are leathery and slightly flattened. The pods contain 1-4 seeds. The seeds are round and about 12 mm across.

Distribution: A tropical plant. It grows in arid and semi-arid areas in Somalia and Ethiopia. It is a very hardy shrub. It can survive droughts. It suits areas with an average temperature of 25°C. It grows in Ethiopia from 300-1000 m altitude. The average rainfall is 250-400 mm but it can grow with rainfalls down to 150-200 mm. It grows in poor low nitrogen soils.

Use: Seeds are dried then boiled or roasted or eaten raw. Tea is made from the leaves.

Cultivation: Plants naturally re-seed easily. Seeds are best sown where the plant is to grow due to the large taproot. Seeds should be sown fresh as they remain viable for only a few months.

Production: Plants grow slowly in the early stages. They may produce few pods in the first three years. Trees can live for very many years. In humid conditions plants produce more leaves but few seeds. Plants are pollinated by insects. Pods can develop 2 weeks after flowering. Immature fruit can remain dormant on the plant until further rains allow them to reach maturity. Yields of about 5 kg of seed per shrub can be obtained. A seed weighs 2-3 g.

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	11.1	1664	10.8	-	-	6.4	-

Image sourced from: https://plant.daleysfruit.com.au/l/yeheb-nutyebnut-9221.jpeg

Starchy staples

English: Sorghum
Local:

Scientific name: *Sorghum bicolor*
Plant family: POACEAE

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

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

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

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

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

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	-	1459	11.1	-	-	-	-

Starchy staples

English: Finger millet
Local:

Scientific name: *Eleusine coracana*
Plant family: POACEAE

Description: An annual millet grass. It is robust and forms many tillers or young shoots from the base. It grows 40-120 cm tall. The stems are somewhat flattened and the leaves are narrow. The flower heads are made up of 2-7 finger like spikes, 1.5 cm across and 10-15 cm long. These in turn have about 70 smaller spikes. Each one of these smaller spikes has 4-7 seeds. The seeds are roughly rounded and 1-2 mm across. There are *coracana* and *africana* subsp.

Distribution: It is a very drought resistant tropical plant. For good yields, it needs good soil drainage and adequate moisture. It cannot stand water-logging. It is an important crop in areas where annual rainfall is 900-1250 mm. It especially suits areas with long hot summers. It needs a minimum temperature above 18°C and does best where temperatures are above 27°C. It grows from sea level to 2400 m altitude in Africa. It is a short day length plant and does best where day length is 12 hours. It can grow in arid places.

Use: The seed are eaten either roasted or ground into flour. This is used for porridge and flat bread. Alcohol is brewed from the grain. The leaves are also edible.

Cultivation: It is grown from seed. Often plants are grown mixed with sorghum or maize. Good soil preparation is needed to reduce weed competition. Seed can be broadcast or drilled. Young plants need to be weeded and thinned. Seed viability drops to about 50 % after 2 years. Spacings of 5 cm apart in rows 30-33 cm apart, or 10-12 cm apart in rows 25 cm apart are recommended. About 25-35 kg of seed per hectare are needed if seed are broadcast. 5-10 kg per hectare are required if seed are drilled. Using fertiliser can dramatically increase yield. 125 kg per hectare of sulphate of ammonia when plants are 15 cm high is used in Uganda.

Production: It is self-pollinating and pollination occurs over 8-10 days. Millet seed stores very well and can be stored without damage for 10 years. Often it is stored on the head. Yields of about 450-900 kg of dried grain per hectare are usual. This can easily be increased to 1,650 kg per hectare. Crops take 3-6 months until harvest.

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	11.7	1594	6.2	-	-	5.3	-

Starchy staples

English: Teff
Local:

Scientific name: *Eragrostis tef*
Plant family: POACEAE

Description: It is an annual tufted millet grass that grows 60-120 cm tall. It has a slender stem and long narrow smooth leaves. The flowers occur in loose open panicles 15-35 cm long. The branches are very thin and droop over. The seeds are very small (1-1.5 mm long). There are about 2500-3000 seeds per gram. Brown and white-seeded types are recognised.

Distribution: A drought resistant tropical grass. It grows in places with a distinct dry season. It grows best at about 2000 m altitude in Ethiopia in temperatures of 25-28°C. It is grown from 1700-2800 m. Brown teff is grown at the higher locations. The rainfall in this region is about 950-1000 mm. It can be grown with rainfall of 400 mm. Soils should be permeable. It can tolerate frost and can grow in arid places.

Use: Seeds are ground into flour and cooked in a variety of ways. It can be used in stews or to make unleavened bread. This is called *injera* in Ethiopia.

Cultivation: Teff is best grown in fallowed land or after legume crops. Land preparation needs to be very thorough. A fine firm weed-free seed bed is needed. Seed are mostly broadcast. Driving sheep or cattle over the land is used to trample in the seed. Seed is sown at 25-30 kg per hectare. Nitrogen fertiliser is recommended. It is usually harvested with sickles.

Production: It is fast growing. Plants take 90-120 days for early varieties and 120-160 days for late maturing varieties. Yields range between 300 kg and 3000 kg per hectare. Seeds can be stored for many years as a reserve food supply.

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	9.3	1541	8.9	-	-	9.9	20

Starchy staples

English: Sweet potato
Local:

Scientific name: *Ipomoea batatas*
Plant family: CONVOLVULACEAE

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

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

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

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

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

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

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

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

Food Value: Per 100 g edible portion

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

Starchy staples

English: 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

English: 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	-	-	-	-

Image soruced from: https://commons.wikimedia.org/wiki/File:Cenchrus_biflorus_MS6631.jpg

Starchy staples

English: Bullrush millet
Local:

Scientific name: *Pennisetum glaucum*
Plant family: POACEAE

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

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

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

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

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

Food Value: Per 100 g edible portion

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

Legumes

English: Pigeon pea
Local:

Scientific name: *Cajanus cajan*
Plant family: FABACEAE

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

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

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

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

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

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	10.0	1449	19.5	55	-	15.0	-
pod (young)	64.4	477	8.7	-	-	2.0	-
seed (young, boiled)	71.8	464	6.0	2	28.1	1.6	0.8

Legumes

English: Chick pea
Local:

Scientific name: *Cicer arietinum*
Plant family: FABACEAE

Description: Chick peas are erect, annual herbs with a strong taproot. Plants grow up to 60 cm high and all parts are hairy. Plants are often bluish green in colour. The leaves are up to 5 cm long and have 9-15 pairs of leaflets along a stalk and a single leaflet at the end. The leaflets are 1-2 cm long by 0.3-1.4 cm wide and are strongly pointed and with a toothed edge. The flowers are carried singly on long stalks in the axils of leaves and are white, pink or purple. The flowers normally never open and are self pollinated. The pods are inflated, 2-3 cm long and have 1 or 2 seeds. The seeds are angular and up to 1 cm across. They have a pointed beak. The seed colour can vary from brown, white, red or black. There are many named varieties.

Distribution: Chick pea is a sub-tropical crop. It suits high altitudes in the tropics because it needs cold nights with dew. It is well suited to semi arid regions. It can tolerate salt and drought. It does not do well in warm, humid places. It needs well drained soil and is damaged by frost. For best growth, night temperatures between 18-26°C, and day temperatures of 21-29°C, are required. The temperature range of 8°C between day and night is required. Annual rainfall of 600-750 mm and a relative humidity of 20-40% is suitable. The best soil pH is 5.5-7.5 but they will grow on alkaline soils.

Use: Mainly the ripe seeds are eaten. They are most commonly boiled and mashed but they can also be roasted or fried or used in stews and soups. The young leaves, shoots and pods are sometimes eaten. Sprouted seeds can be eaten. When roasted they can be eaten as a snack. The seeds can also be used to make flour. Chick peas are used in hummus, coucous, falafel, and to make pita bread. They can be fermented into miso and tempeh and the roasted roots and seeds can be used as a coffee substitute.

Cultivation: Chick peas are grown from seed. Often other crops are grown mixed with Chick peas but these are planted 3-4 weeks after sowing the Chick peas. Seed should be planted 2-12 cm deep. Seed will germinate at temperatures above 5°C but are best above 15°C. Spacing plants 10 cm apart in rows 25-30 cm apart is suitable if plants are put in rows. Plants are cut and harvested when leaves turn brown.

Production: Yields of 400-1600 kg per hectare of seed are average for chick peas. Plants can reach maturity in 4.5-5 months, but 7 months or longer are taken for some types.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed (raw)	9.9	1362	20.2	190	3	6.4	-

Legumes

English: Butterfly bean
Local:

Scientific name: *Clitoria ternatea*
Plant family: FABACEAE

Description: A perennial herb that grows 3-4.5 m tall and spreads to 4 m wide. The stem is slender and twines. The leaves are green and divided. They are 6-12 cm long. The 5-9 leaflets are oval. The flowers are bright purple. They are pea like and 3-5 cm across. They have yellow tinted white centres. The flowers occur either singly or in pairs. The fruit are 7 cm long flat pods. The pods twist after the seeds fall. The seeds are dark brown to black.

Distribution: It is a tropical plant that will grow on most soils. It needs a sheltered sunny position, and is drought and frost tender. They mostly grow on the edge of forests. It grows where the minimum temperature is 16°C. It can grow in arid places. It suits hardiness zones 10-12.

Use: The leaves are cooked and eaten. The juice is also used to colour food green. The flowers are cooked with rice to colour it blue. The dried flowers are steeped in boiling water and the coloured water used to tint rice cakes and sweets. The young pods are cooked and eaten. The seeds are used in soup. **Caution:** The seeds are poisonous.

Cultivation: Plants can be grown from seed or cuttings. The temperature should be at least 19-24°C for seed germination. This can be improved by filing, or soaking in hot water to break the hard seed coat. It is grown as an annual plant in temperate zones.

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
pod & seed	80.0	276	3.8	-	-	0.4	-

Legumes

English: Guar bean
Local:

Scientific name: *Cyamopsis tetragonolobus*
Plant family: FABACEAE

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

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

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

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

Production: Plants mature in 3-3.5 months.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	9.9	1452	30.5	-	-	-	-
pod (fresh)	82.0	-	3.7	198	49	5.8	-

Legumes

English: Mung bean
Local:

Scientific name: *Vigna radiata*
Plant family: FABACEAE

Description: An upright hairy bean plant which can grow to 1 m tall. It has many branches. The leaves have 3 leaflets, are dark green and grow on long leaf stalks. There are oval stipules at the base of the leaf. Flowers are pale yellow and small. They occur in bunches of 10-20 on the ends of long hairy flower stalks. Pods are black and straight. They do not have a beak. Pods contain 10-20 seeds which are usually green or golden yellow. They are smaller than black gram. The beans can be black. They have a flat white hilum. There are 2000 varieties.

Distribution: A tropical and subtropical plant. The plant will grow from sea level up to about 2000 m in the tropics. It is drought resistant but can't stand water-logging. Plants are damaged by frost. They cannot stand salinity. Rainfall at flowering is detrimental. It requires a deep soil. Both short day and long day varieties occur. It can grow where annual temperatures are from 8-28°C. It can tolerate a pH from 4.3-8.1. It suits a drier climate and can grow in arid places. It suits hardiness zones 10-11.

Use: Seeds are eaten ripe, raw or roasted. They are added to soups and stews. They are also fermented. Young pods and leaves can be eaten. The seeds can be germinated for sprouts and used in salads and stir-fried dishes. The seeds are ground and used for starch to make noodles.

Cultivation: Plants are grown from seed. In some areas these are broadcast while for small plots often 2-3 seeds are sown in holes 50-60 cm apart. Seeding rates of 6-22 kg per ha are used in different locations. It normally requires phosphorus fertiliser for adequate growth. Seeds germinate in 3-5 days.

Production: Green pods are ready after about 2 months and ripe pods may take another 1-2 months. For ripe beans the whole plant is harvested and dried before threshing. Yields of 450-560 kg/ha of seeds are common.

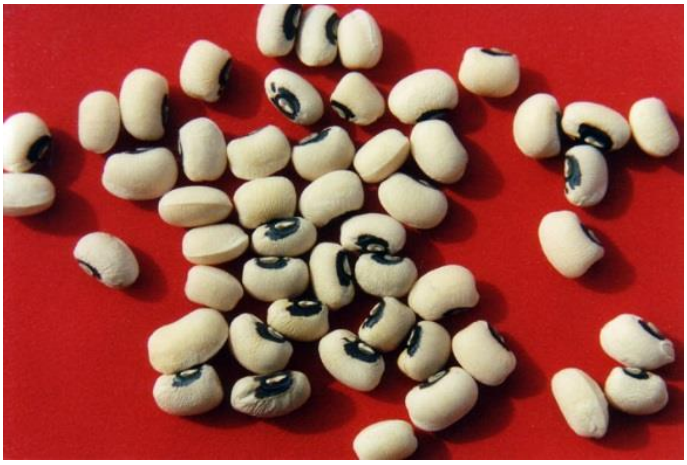
Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	11.0	1432	22.9	55	4	7.1	-
seed (cooked)	-	439	7.0	2.4	1.0	1.4	-
seed (sprouted)	90.4	126	3.0	2	13.2	0.9	0.4

Legumes

English: 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 metres 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

English: Leucaena
Local:

Scientific name: *Leucaena leucocephala*
Plant family: FABACEAE

Description: A small erect tree. It grows to 6-10 m high. It has fine divided leaves. The leaves have 2 rows of leaflets. The leaves are 15 to 25 cm long and the leaflets 8 to 16 cm long. They are a dark dull green on top and dull greyish green underneath. The flowers are white and in round heads. They are in the axils of leaves or on the ends of branches. The pods are flat and 10-15 cm long and 1.8 cm wide with 15-25 seeds inside. It has shiny brown seeds. There are 3 subspecies.

Distribution: It is a tropical plant. It is introduced and common at low and medium altitudes throughout the tropics. It is widespread from sea level up to about 1700 m altitude in the tropics. It is often used as shade for coffee. It is drought resistant. It grows in the Sahel. It can grow on dry and poor soils. It can tolerate salt. It needs well drained soil and full sun. It can grow in arid places. It suits hardiness zones 10-12.

Use: The mature seeds are toasted and ground and used as a coffee substitute. They are also added to stews. The young leaves are sometimes used as a vegetable. The leaves can be eaten in small amounts. The tender pods and shoots are cooked as a vegetable. They are used in curries. **Caution:** The leaves contain a chemical (mimosine) which causes hair to fall out.

Cultivation: It grows easily from seeds. It also regrows from cut stumps and it can be grown from cuttings. Plants are hard to eliminate and can become a weed problem in dry areas.

Production: It grows very quickly. It grows to 8 m in 18 months. It can stand only light frosts.

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	79.5	284	2.9	-	-	-	-
leaf and pod	80.7	247	8.4	-	-	9.2	-

Leafy greens

English: Spreading pigweed
Local:

Scientific name: *Amaranthus graecizans*
Plant family: AMARANTHACEAE

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

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

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

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

Production: It grows after rain and the first leaves can be harvested after 12 days.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf (dry)	6.3	903	26.1	-	-	9.8	5.0

Leafy greens

English: Thunberg's amaranth
Local:

Scientific name: *Amaranthus thunbergii*
Plant family: AMARANTHACEAE

Description: An annual herb growing to 50 cm tall. The plant usually sprawls along the ground. The leaves are simple and arranged in spirals. The leaf stalk is 4 cm long. The leaf blade is spoon shaped and 2-5 cm long by 1-3 cm wide. They are wedge shaped at the base. The flowering shoots are leafy. The flowers have prickly hair-like points. The flowers are green in clusters in the axils of leaves.

Distribution: A tropical plant. It suits hot and arid places. It often grows in places with a marked dry season. In Zimbabwe it grows up to 1400 m above sea level.

Use: The leaves are edible when cooked. The seeds are ground into flour and cooked. **Caution:** This plant can accumulate poisonous nitrates if grown with high nitrogen inorganic fertilisers.

Cultivation: Plants can be grown from seeds. Seeds should be sown shallowly and emerge in 3-5 days. Repeated harvesting stimulates the continued growth of new shoots.

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	83.6	147	4.3	-	-	12.5	0.7

Leafy greens

English: Chinese violet
Local:

Scientific name: *Asystasia gangetica*
Plant family: ACANTHACEAE

Description: An erect herb that can clamber over other objects. It keeps growing from year to year, but can also be grown each year from seed. It grows 60-100 cm tall. The leaves are oval or heart shaped and 3-6 cm long. The flowers are bell-shaped with lobes which flare out. They are usually light violet with a light yellow throat, but can be all yellow. They occur in spikes and are 3-5 cm wide. The fruit is a capsule that splits open. It is cylinder-shaped and 2.5 cm long.

Distribution: It is a tropical plant that grows in the lowlands. It grows naturally in India and Malaysia and probably East Africa. It prefers moderate moisture but can tolerate dry periods. It can grow in full sun or light shade. It suits hardiness zones 9-12.

Use: The leaves are used as a pot-herb or stir-fried. They are added to fish and meat stews. The leaves are also dried and stored.

Cultivation: It can be grown from seed, layering of the stems or cuttings.

Production: It is fast growing. The leaves are harvested by plucking.

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	82.6	234	3.7	-	42	4.7	-

Leafy greens

Common name: Silver beet
Local:

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

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

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

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

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

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

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf (boiled)	92.7	84	1.9	314	18	2.3	0.3
leaf (raw)	92.0	80	1.8	330	30	1.8	0.4

Leafy greens

Common name: Java bean
Local:

Scientific name: *Senna obtusifolia*
Plant family: FABACEAE

Description: An annual or perennial herb that grows 0.6-2.5 m tall. The leaf has leaflets in 3 pairs that are oval and 1-6 cm long by 0.5-3.9 cm wide. The top of the leaf is rounded but with a sharp tip. It is wedge shaped at the base. The flower stalks have 1 or 2 flowers. The stalk for the flower cluster is very short, but the stalk for the individual flowers is 1-3.5 cm long. The flower petals are orange-yellow and 1-2 cm long. The fruits are thin, slightly curved and tapering pods. They are 13-23 cm long and 4-7 mm wide. The seeds are brown. They are 4.5-6.5 cm long by 2-4mm wide.

Distribution: A tropical plant that grows throughout the tropics. It is mostly a weed of roadsides and waste places. It grows from sea level to 2000 m altitude. It grows along rivers and near lakes. In Africa it grows up to 1700 m altitude. It can grow in arid places.

Use: The young leaves are cooked and used as a vegetable. The leaves are fermented into a high protein supplement to meat. The juice during fermentation is made into a stew with okra, beef and salt. The seeds are occasionally dried and ground into powder and cooked and eaten. Seeds are also roasted and used as a coffee substitute. **Caution:** Older leaves can cause diarrhoea. The seeds are possibly poisonous and should be well cooked.

Cultivation: It can be 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	79.7	251	5.6	-	113	5.9	-

Image accessed from: https://tse2.mm.bing.net/th?id=OIP.ZJkno9RQyqSH5azcrmABAwHaFj&pid=Api

Leafy greens

English: Quail grass
Local:

Scientific name: *Celosia argentea*
Plant family: AMARANTHACEAE

Description: An erect short lived annual herb that grows up to 1 m tall. The leaves are alternate and light green, and 2 cm wide by 6 cm long. They are dark green and longer on the flowering shoots. The 20 cm long flower spike grows on the end of the main stem and is red or purple. The seeds are small (1 mm across). Two kinds occur as red and green forms.

Distribution: It is a tropical plant that grows well in the lowland humid forest zone. It suits damp, humid places and is often on clay soil. The plant is widespread as a wild plant at low altitudes. Temperatures of 25-30°C at night and 30-35°C in the day are best. It needs good sunlight and does best in soils with high organic matter. It can grow in light shade and in dry conditions. It can grow in arid places.

Use: The tender leaves and young flowers are cooked and eaten as a vegetable. It is best eaten before flowering. The dried leaves can be added to wheat flour and cooked. They are used in soups, sauces and stews. An edible oil can be extracted from the seeds. The red colouring from the flowers can be used to colour lamb stew.

Cultivation: The plant can be grown by seeds. The seeds are very small so can be mixed with sand to allow more even distribution. The seed are broadcast then mulched with dry grass, which is removed once the seeds have germinated. Seedlings do not transplant easily. They can be transplanted after 2-3 weeks. It is good for inter-cropping amongst other vegetables. These plants are often grown as ornamentals.

Production: Harvesting of leaves can commence about 4-5 weeks after planting. Tops can be cut off over a period of 3-5 months. It grows slowly at first, therefore repeated picking of tips gives better production than harvesting whole small 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
leaf	84.0	185	4.7	-	33	7.8	-

Leafy greens

English: Silver spinach
Local:

Scientific name: *Celosia trigyna*
Plant family: AMARANTHACEAE

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

Distribution: A tropical plant that grows in tropical lowlands and highlands in Africa. It is often along the coast but grows from sea level to 1,960 m above sea level. It needs an annual rainfall of up to 2500 mm and an average temperature of 25-30°C. It cannot tolerate a temperature below 15°C. It grows best on fertile, well drained soils.

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

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

Production: Plants can be uprooted and harvested or leaves removed. Harvests of 4-5 t/ha can be achieved from weekly harvests over 2 months.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	89.0	139	2.7	94	10	5.0	-

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

Leafy greens

Common name: Flower-of-an-hour
Local:

Scientific name: *Hibiscus trionum*
Plant family: MALVACEAE

Description: An annual herb. It can be erect or lie over. It is 25-70 cm high. The leaves are alternate. The leaf stalk is 2-4 cm long. The leaf blade has 3-5 lobes arranged like fingers on a hand. The leaf blade is 3-6 cm across. The central lobe is longer. The leaf blade is covered with coarse star like hairs. The flowers occur singly in the axils of leaves. They are yellow and purple at the base. They are like a Hibiscus flower. The fruit is a capsule which is about 1 cm across. It is a hairy five celled capsule. There are many black seeds.

Distribution: It suits tropical, subtropical and temperate regions. It does best in a sunny position. It does not occur in hot humid tropical rain forest zones. It suits drier warmer places. It can grow in hot arid zones with a marked dry season. It grows up to 2635 m above sea level. It can grow in arid places. It suits hardiness zones 10-12.

Use: The shoots and leaves are cooked and eaten. The pods are used in soups and stews. The pods are sun-dried and powdered and used later in food in Sudan. The seeds are eaten raw and have a sesame flavour.

Cultivation: Plants can be grown from seed or cuttings.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	6.3	1263	26.7	-	-	79.8	5.7
shoot	-	-	21.0	-	-	21.8	9.4

Image accessed from: https://i.pinimg.com/originals/29/a5/c2/29a5c2c4457308d0fc36439ee5e26310.jpg

Fruit

English: Buffalo thorn
Local:

Scientific name: *Ziziphus mucronata*
Plant family: RHAMNACEAE

Description: A shrub or small tree that grows up to 9 m tall. It has many sharp thorns. It has spreading and often drooping branches. The trunk is often crooked. The leaves are simple and alternate. They are shiny and have 3 veins from the base. The leaves are 2.5-8 cm long by 1.9-8 cm wide. Leaves and young plant parts can be hairy. There can be thorns at the nodes. The flowers are small and green and occur in small clusters in the axils of leaves. The fruit are round, red and shiny. There is a sweet, mealy pulp around a large seed.

Distribution: A tropical plant that grows in the lowlands and highlands. It grows in open scrub and can grow on a range of soils. It is often on embankments and termite mounds. In East Africa it grows up to 2000 m above sea level. It is drought resistant and can grow in arid places.

Use: The fruit are eaten fresh, dried or can be ground and used in coffee. Often they are eaten in porridge. The roasted seeds are crushed and used as a coffee substitute and the fruit can be fermented for beer.

Cultivation: Plants can be grown by seeds or cuttings. It is best to remove the seeds from the stone by cracking with a hammer. Seeds germinate in 2-3 weeks when outside the stone or 2 months when inside the stone.

Production: Seedlings grow quickly. They can be 4-6 m high in 4-5 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	56.4	659	3.8	-	42.6	1.0	0.5

Fruit

English: Sweetsop
Local:

Scientific name: *Annona squamosa*
Plant family: ANNONACEAE

Description: A bushy, deciduous tree, growing up to 6 m tall. It has irregular, spreading branches. The leaves are oblong and narrow, often 12 cm long by 4 cm wide. The leaves have fine hairs underneath. The leaves are dull green and smell when crushed. The flowers droop or hang from branches either singly or in groups of 2 or 3. The flowers are greenish-colour. The fruit are 8-10 cm across and greenish in colour. The fruit is covered with round, fleshy scales which drop off as the fruit ripens. Inside the fruit are several shiny, black seeds about 1.5 cm long. The fruit flesh is white and soft.

Distribution: It has been taken to most tropical countries. It suits drier, lowland climates. The trees will probably grow satisfactorily up to about 1000 m altitude in equatorial zones. Sweetsop cannot stand frost, but is able to survive droughts better than many fruit trees. Trees do not like wet soils. Sweetsop can grow in fairly poor, dry, stony soils. It suits areas with an annual rainfall of 500-1000 mm per year. It suits hardiness zones 10-12.

Use: The fruit is eaten raw. The sweet, soft, fleshy layer around the seeds can be eaten raw. It is also used in ice cream. The juice is used for drinks. **Caution:** The seeds, leaves and roots are poisonous. An alkaloid, and hydrocyanic acid, occur in these parts of the plant.

Cultivation: It is normally grown from seeds and the seeds retain their viability (usefulness) for several years. It is better to grow sweetsop from fresh seeds and it is best to soak seeds for 3 days before sowing. Seeds germinate and start to grow 50-70 days after planting. The fruit is borne on old and new wood. As the fruit is more common on new wood, pruning is an advantage. Trees can be budded or grafted. A small branch of a selected variety is grafted onto another seedling sweetsop. Plants are very hard to get to grow from cuttings. A spacing of 6 m apart is suitable for sweetsop trees. When the fruit is ripe, it is easy to separate the different soft fleshy parts of the fruit. It is often easiest and best to harvest the fruit when they are nearly ripe and then let them ripen in a warm place.

Production: The tree is slow growing. Trees can start to produce fruit two years after they are planted. Fruit are often 200-300 g each. The pulp is 20% sugar.

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	76.4	441	2.1	1	40	0.6	0.1

Fruit

English: 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

Fruit

English: 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 don't tolerate water-logging. Plants die after 48 hours in standing water. It needs a pH between 5-8 and suits hardiness zones 11-12.

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

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

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

Food Value: Per 100 g edible portion

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

Fruit

English: Grapefruit
Local:

Scientific name: *Citrus paradisi*
Plant family: RUTACEAE

Description: A medium-sized, evergreen tree that grows up to 10-15 m tall and 5 m across. The stem is stout and crooked. The branches hang down, giving a rounded crown. The thorns are small. The leaves are dark shiny green and sword-shaped. They can be 18 cm long. The leaves are leathery and have rounded teeth along the edge. The leaf stalk usually has a broad wing. The flowers are creamy white and large. The flowers occur either singly or in clusters (2-20) in the axils of leaves. The flowers are 4-5 cm across. The fruit are large, yellow and in clusters. Fruit can be 9-15 cm across. Fruit are very juicy with a sweet-sour pulp. The juice sacs are large, but closely packed. There are many cultivars.

Distribution: It grows in many tropical countries. Plants grow from sea level up to 2000 m altitude in the tropics. It is frost tender. It prefers well-drained soils and a protected sunny position. It is drought-sensitive and does best in humid climates. It suits hardiness zones 9-11.

Use: The fruit is eaten fresh, or the juice is used as a drink.

Cultivation: Plants can be grown from seed. The seed should be sown fresh. Trees are best grown by layering or grafting.

Production: Fruiting tends to be seasonal, from April to August, in the southern hemisphere.

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	43.5	45	0.3	-	19	0.1	0.1

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	169	30	0.4	0.2

Fruit

English: Governor's plum
Local:

Scientific name: *Flacourtia indica*
Plant family: FLACOURTITACEAE

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

Distribution: A tropical plant that grows in the lowlands. They thrive in dry, shrubby areas at low altitudes. Trees grow in coastal areas and up to 700 m or higher. In Africa it grows from sea level to 2400 m above sea level. It grows in sub-tropical, broadleaved, evergreen forest. It can grow in arid places. It also grows on limestone.

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

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

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

Food Value: Per 100 g edible portion

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

Fruit

English: Salt bush
Local:

Scientific name: *Salvadora persica*
Plant family: SALVADORACEAE

Description: An evergreen shrub or small tree, which grows 4.-6.m high. It has many branches forming a rambling habit. The stems are crooked and can grow along the ground. The branches are drooping and twisted. They are slender and greenish white. The bark is thin and rough. It is cream coloured. The leaves are on short stalks and occur opposite one another along the stem. They are greenish blue and have small stipules. The leaves are oval and 7 cm long by 3 cm wide, they are smooth and fleshy but thick and leathery. They end in a short stiff point. The flowers are small and yellow. The flower arrangements are 5-8 cm long, many flowers occur together in a branched arrangement near the ends of branches. The fruit is a round berry about 6 mm across, which is red when ripe. Dark red seedless fruit can occur. The fruit are edible.

Distribution: A tropical plant. It grows in the dry tropics. It grows in the Sahel. It occurs at low altitudes. It suits high temperatures. Temperatures of 20-30°C annual average are appropriate. It cannot stand frost. It occurs in areas with an annual rainfall of 50-300 mm but also in areas with 1100 mm. In high rainfall areas it occurs on saline soils. It prefers clay to sandy soils such as on flood plains. It can be in mangroves. It can be used to reclaim salty soils. In Kenya it grows from sea level to 1,500 m altitude. It can grow in arid places.

Use: The fruit are edible when cooked. They are also used to make a drink. The fruit can be dried and stored. The leaves are cooked as a vegetable. They are also used in sauces. The tender shoots and leaves are eaten raw in salads. The seed oil is edible. A fat from the seeds is used as a substitute for vegetable butters in chocolate. The seeds have a spicy taste like mustard. A vegetable salt is derived from the ash of the plant.

Cultivation: Plants can be grown by seeds. Many seeds are produced. Germination is poor due to substances in the fruit flesh. Therefore, it is important to remove seeds from the fruit before planting. Plants can be grown in a nursery then transplanted when 3 years old.

Production: In the Sahel the plant flowers in January-February and fruit ripens February-March.
In Tanzania, fruit are collected 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
Fruit	70.8	458	1.9	-	12.1	-	-

Vegetables

Common name: Mustard greens
Local:

Scientific name: *Brassica integrifolia*
Plant family: BRASSICACEAE

Description: A cabbage family herb that is grown as an annual. It grows 1.2 m high. The leaves have lobes along the stalk. The flowers are yellow. They are in groups on long stalks at the top of the plant. The fruit is a long capsule.

Distribution: A tropical plant that can tolerate frost. It grows in areas with an annual rainfall of 600-1600 mm. It can grow in dry and salty soils but does best in fertile soil. It can grow in arid places.

Use: The seeds are used in pickles and the oil in prepared foods. Mustard sauce is made from the seeds.

Cultivation: Plants are grown from seeds.

Production: Seeds can be harvested after 90-100 days. The yield can be 200-500 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	8.5	2261	20	-	0	17.9	-
leaf (boiled)	94.5	63	2.3	303	25.3	0.7	0.1

Image sourced from: https://www.ydhvn.com/upload/media/posts/2018-10/02/593c51b5012094bbc00c834b97082c46_1538471321-b.jpg

Vegetables

English: Jute
Local:

Scientific name: *Corchorus olitorius*
Plant family: MALVACEAE

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

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

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

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

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

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf (raw)	80.4	244	4.5	574	80	7.2	-
leaf (cooked)	87.2	155	3.4	156	33.0	3.1	0.8

Vegetables

English: African horned cucumber
Local:

Scientific name: *Cucumis metuliferus*
Plant family: CUCURBITACEAE

Description: An annual pumpkin family plant. It grows to 0.5 m tall and spreads to 1.5 m wide. The stems are trailing and hairy. The tendrils are curled and do not branch. The leaves have 3 lobes and are heart shaped. The edges of the leaves have teeth. The flowers are funnel shaped and yellow. They open into five lobes. Male and female flowers occur on the same plant. The female flower is above a prickly green ovary which enlarges to become the fruit. The fruit are oblong and spiny and change from green to orange as they ripen. They are 12 cm long and 6 cm across. The fleshy pulp surrounding the seeds is bright green. The seeds are white. It tastes and smells like a cucumber. The skin is not eaten.

Distribution: A tropical plant. It requires conditions similar to cucumbers. It prefers light well drained soil. It needs a protected sunny position. It is drought and frost tender. It grows at low and medium elevations in Zimbabwe. It grows from 210-1800 m above sea level. It can grow in arid places.

Use: The peeled fruit are eaten raw. They can also be cut open and sun dried for storage and use in preserves. The young leaves are stripped and cooked then eaten. The seeds are pounded and used for flavouring. **Caution:** If the plants are bitter they need to be used with caution.

Cultivation: Plants are grown from seed. They take 8-16 days to germinate in warm soil.

Production: Plants grow rapidly. They flower and set fruit in 6-8 weeks. It is then 7 weeks to maturity.

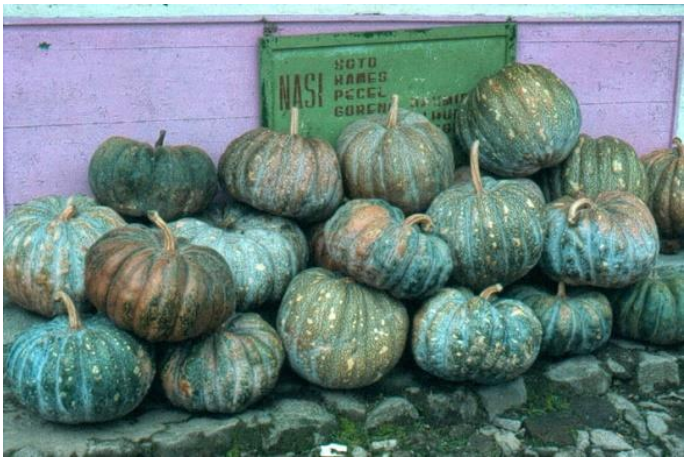
Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	91.0	136	1.1	-	18.6	0.5	0.3

Vegetables

English: Pumpkin
Local:

Scientific name: *Cucurbita maxima*
Plant family: CUCURBITACEAE



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

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

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

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

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

Food Value: Per 100 g edible portion

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

Vegetables

English: Marrow
Local:

Scientific name: *Cucurbita pepo*
Plant family: CUCURBITACEAE

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

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

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

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

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

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed (dry)	3.7	2266	29.4	-	-	7.3	-
leaf	89.0	113	4.0	180	80	0.8	-
fruit (mature)	92.0	105	1.6	17	16	2.4	-
fruit	91.3	102	1.1	-	12	0.8	0.2
yellow fruit	92.0	97	1.0	180	8	1.4	-
immature fruit (raw)	92.0	92	1.5	-	9	0.4	0.1

Vegetables

Common name: Bush onions
Local:

Scientific name: *Cyperus bulbosus*
Plant family: CYPERACEAE

Description: A sedge. These grow in clumps and have grass like leaves and solid stalks. It is a herb. It grows 10-40 cm high. The rhizomes are slender. They produce brown to black tubers are the tips. The leaves are 10-20 cm long by 0.2-0.3 cm wide. They are flat and erect. They are shiny green. The culms are 20-40 cm tall. The spikelets are 1-3 cm long.

Distribution: A tropical plant. It grows in tropical regions. In Australia it is inland near salt lakes. It grows in dry regions and seasonally wet grasslands. It grows in areas with an annual rainfall of about 300 mm. In East Africa it grows from 300-2400 m altitude. It can grow in arid places.

Use: The husk is removed and the bulb is eaten raw or roasted. The bulbs are also ground and added to flour.

Cultivation: Plants can be grown by division or tubers. They can also be grown from seed.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
bulb	42.8	883	3.4	-	32	3.4	0.6

Image sourced from: https://alchetron.com/Cyperus-bulbosus

Vegetables

English: Carrot
Local:

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

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

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

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

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

Production: There are tropical varieties that mature within 90-110 days.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
root (raw)	89.9	180	1.0	835	6	0.6	0.4
root (boiled)	91.5	79	0.6	852	4	0.4	0.3
leaf	87.4	-	2.2	65	-	-	-

Vegetables

English: Horseradish tree
Local:

Scientific name: *Moringa oleifera*
Plant family: MORINGACEAE

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

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

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

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

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

Food Value: Per 100 g edible portion

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

Nuts, seeds, herbs and other foods

English: 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

English: Desert date
Local:

Scientific name: *Balanites aegyptiaca*
Plant family: ZYGOPHYLLACEAE

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

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

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

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

Production: Trees produce after 5-8 years. Fruit mature in 60 days. In Tanzania, fruit are collected between April and June. A good tree can produce 10000 fruit in one year. Ripe fruit can be sun dried and stored. Seed kernels can be 60% oil.

Food Value: Per 100 g edible portion

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

Nuts, seeds, herbs and other foods

English: Carob
Local:

Scientific name: *Ceratonia siliqua*
Plant family: FABACEAE

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

Distribution: It is a subtropical plant that is native to Arabia. It suits warm temperate zones and hot, semi-arid regions. It tends to grow in rocky places near the sea shore. It needs a well-drained, moderately fertile soil. It does well on calcareous soils but can grow in alkaline soils. It is commonly seen on deep chalky soils where the limestone is cracked. It is very drought resistant and has deep roots that find moisture. It grows in areas with an annual rainfall of 300-4030 mm. It can tolerate some salt spray. It is frost tender. Symbiotic relationships with soil bacteria enable it to fix nitrogen. It does not fruit well in high rainfall areas. It grows in Miombo woodland in Africa. It suits hardiness zones 8-11.

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

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

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

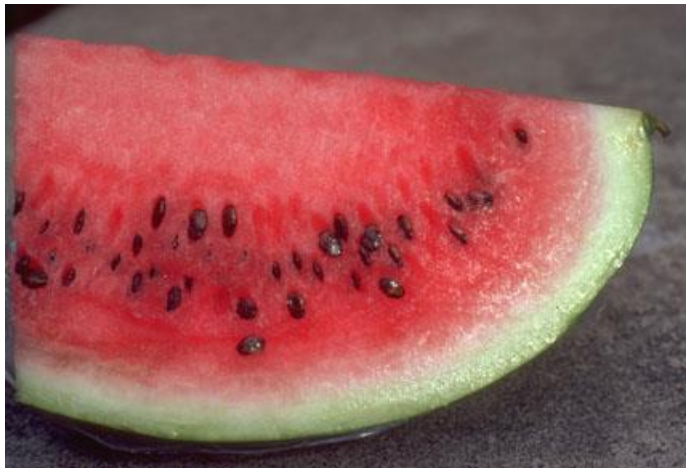
Food Value: Per 100 g edible portion

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

Nuts, seeds, herbs and other foods

English: Watermelon
Local:

Scientific name: *Citrullus lanatus*
Plant family: CUCURBITACEAE



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

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

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

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

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

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	94.0	92	0.4	20	5	0.3	0.1
seed	5.1	2330	28.3	0	0	7.3	10.2

Nuts, seeds, herbs and other foods

English: Sunflower
Local:

Scientific name: *Helianthus annuus*
Plant family: ASTERACEAE

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

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

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

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

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

Food Value: Per 100 g edible portion

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

Nuts, seeds, herbs and other foods

English: Date palm
Local:

Scientific name: *Phoenix dactylifera*
Plant family: ARECACEAE

Description: An unbranched, evergreen palm that grows to 30 m tall. The trunk can be 30-40 cm across. The trunk is covered with fibres and has the bases of old leaves along it. It produces suckers on the trunk and at the base. The fronds are grey-green. The leaves are 6-7 m long. The leaflets are 20-40 cm long. They are spaced in two irregular rows along each side of the stalk. Male and female flowers are produced on separate trees. The flowers spadices are yellow-brown. There are 1000-1500 fruit in a cluster. The fruit is small, brown and very sweet. It has one grooved seed. The fruit is 2.5-5 cm long. When ripe, the fruit is dull yellow and the flesh soft. The skins of the fruit darken when dried. Strands of fruit have 25-35 dates. The fruit are edible.

Distribution: They suit dry, subtropical climates. It needs hot, dry arid climates while fruit mature. It can tolerate salty or brackish water. It can also grow in alkaline soils but with reduced yields. In cold temperate regions the palm grows but rarely flowers. It does best in areas with long dry summers and sufficient heat for fruit to ripen. It should not have rain during flowering and fruit set. It needs 3400 heat units above 10°C for fruit to fully mature. It suits plant hardiness zones 9-12.

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

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

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

Food Value: Per 100 g edible portion

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

Nuts, seeds, herbs and other foods

English: Almond
Local:

Scientific name: *Prunus dulcis*
Plant family: ROSACEAE

Description: A deciduous tree. It grows 7.5-12 m high. It can spread 7.5-9 m wide. It grows straight then spreads later. The bark is dark grey and cracks. The bark has yellow rings of pores around the trunk. The leaves are alternate and long pointed. They are 12 cm long by 4 cm wide. They hang down. The leaves have fine soft teeth around the edge. The leaves are folded along the midrib. It loses its leaves during the year. The flowers appear before the leaves. The flowers occur either singly or in pairs. They are pink and 5 cm across. The fruit are green and contain edible nuts. The fruit are 6 cm long. The flesh is dry and leathery. There is one stone and the white seed inside is edible.

Distribution: It is native to North Africa, Central and South-West Asia. They are frost hardy and suit a Mediterranean climate. They need a warm summer to fully ripen. It suits hardiness zones 7-10.

Use: The oil from the kernel can be bitter and contains HCN which needs to be removed by heating. The oil is used as food flavouring. The kernels of sweet kinds are eaten. They can be eaten fresh or dried, crushed, flaked, ground and used as ingredients. The nuts can be blended with water to form almond milk, made into almond butter or pressed for their edible oil. The oil is used in salads.

Cultivation: Almond trees cannot pollinate themselves. For good fruit set pollinating cultivars are planted along with others.

Production: Trees can bear for 50 years. A tree can produce 10-15 kg per 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	5.3	2418	21.3	1	-	4.3	3.4

Nuts, seeds, herbs and other foods

English: Coastal almond
Local:

Scientific name: *Terminalia catappa*
Plant family: COMBRETACEAE

Description: A large tree, up to 25-40 m tall. It loses its leaves during the year. The trunk can be straight or twisted. There can be buttresses up to 3 m tall. The branches lie horizontally and come out in layers. The leaves are long, smooth and shiny, with an abrupt point at the tip and a rounded base. Leaves tend to be near the ends of branches. Leaves can be 17-29 cm long and 10-15 cm wide. Young leaves have soft hairs. The leaves turn red and fall off twice a year. Flowers are greenish-white and in a spike at the end of the branches. The lower flowers on a spike are female, and the others are male. The fruit is about 6 cm long by 3-4 cm wide, thick and flattened, with a flange around the edge. The fruit are green and turn red when ripe. The pulp is edible.

Distribution: It grows on beaches in almost all tropical countries in the world, including Solomon Islands. It is a tropical plant, and sometimes cultivated as a shade tree. The tree is common in lowland areas particularly on sandy or rocky beaches. Seeds are spread by bats and sea water, as well as being planted by people. It is common along streets in coastal towns. It will grow from sea level up to about 800 m altitude. Plants are frost-susceptible. It can tolerate drought. It suits hardiness zones 11-12.

Use: The kernel of the fruit is eaten raw. An edible oil can also be extracted.

Cultivation: Plants can be grown from seed. Seeds can be stored dry for a year or more. Seeds germinate freely and most seeds grow. Insects can badly damage the leaves of young seedlings.

Production: It is fast growing. Nut production is seasonal.

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 (fresh)	31	1810	15.9	-	4	4.6	4.9
nut (dry)	4.2	2987	20.0	-	2	6.3	8.8

Nutritional values of food plants by plant Family

Plant Family	Scientific name	Common name	Edible part	Moisture %	Energy kJ	Protein g	Vit A µg	Vit C mg	Iron mg	Zinc mg	Page
ACANTHACEAE	*Asystasia gangetica*	Chinese violet	leaf	82.6	234	3.7	-	42	4.7	-	30
AMARANTHACEAE	*Amaranthus graecizans*	Spreading pigweed	leaf (dry)	6.3	903	26.1	-	-	9.8	5.0	28
AMARANTHACEAE	*Amaranthus thunbergii*	Thunberg's amaranth	leaf	83.6	147	4.3	-	-	12.5	0.7	29
AMARANTHACEAE	*Celosia argentea*	Quail grass	leaf	84.0	185	4.7	-	33	7.8	-	33
AMARANTHACEAE	*Celosia trigyna*	Silver spinach	leaf	89.0	139	2.7	94	10	5.0	-	34
ANACARDIACEAE	*Anacardium occidentale*	Cashew	nut	4.0	2478	17.5	-	-	2.8	4.8	53
ANNONACEAE	*Annona squamosa*	Sweetsop	fruit	76.4	441	2.1	1	40	0.6	0.1	37
APIACEAE	*Daucus carota* subsp. *sativus*	Carrot	root (raw)	89.9	180	1.0	835	6	0.6	0.4	51
ARECACEAE	*Phoenix dactylifera*	Date palm	fruit (dry)	22.5	1151	2.0	5	-	1.2	0.3	59
ASTERACEAE	*Helianthus annuus*	Sunflower	seed	5.4	2385	22.8	5	1.4	6.8	5.1	58
BRASSICACEAE	*Brassica integrifolia*	Mustard greens	leaf (boiled)	94.5	63	2.3	303	25.3	0.7	0.1	45
CARICACEAE	*Carica papaya*	Pawpaw	fruit	88.0	163	0.5	290	54	0.4	0.18	39
CHENOPODIACEAE	*Beta vulgaris* subsp.*cicla*	Silver beet	leaf (raw)	92.0	80	1.8	330	30	1.8	0.4	31
COMBRETACEAE	*Terminalia catappa*	Coastal almond	nut (fresh)	31	1810	15.9	-	4	4.6	4.9	61
CONVOLVULACEAE	*Ipomoea batatas*	Sweet potato	tuber (baked)	72.9	431	1.7	961	24.6	0.5	0.3	15
CUCURBITACEAE	*Cucumis melo var.cantaloupensis*	Canteloupe	fruit	93.0	109	0.5	169	30	0.4	0.2	42
CUCURBITACEAE	*Cucumis metuliferus*	African horned cucumber	fruit	91.0	136	1.1	-	18.6	0.5	0.3	47
CUCURBITACEAE	*Cucurbita maxima*	Pumpkin	seed (dry)	6.9	2264	24.5	38	1.9	14.9	7.5	48
CUCURBITACEAE	*Cucurbita pepo*	Marrow	fruit (mature)	92.0	105	1.6	17	16	2.4	-	49
CUCURBITACEAE	*Citrullus lanatus*	Watermelon	seed	5.1	2330	28.3	0	0	7.3	10.2	57
CYPERACEAE	*Cyperus bulbosus*	Bush onions	bulb	42.8	883	3.4	-	32	3.4	0.6	50
EUPHORBIACEAE	*Manihot esculenta*	Cassava	tuber	62.8	625	1.4	30	15	0.23	0.48	17
FABACEAE	*Cordeauxia edulis*	Yeheb nut	seed	11.1	1664	10.8	-	-	6.4	-	11
FABACEAE	*Cajanus cajan*	Pigeon pea	seed (young, boiled)	71.8	464	6.0	2	28.1	1.6	0.8	21
FABACEAE	*Cicer arietinum*	Chick pea	seed (raw)	9.9	1362	20.2	190	3	6.4	-	22
FABACEAE	*Clitoria ternatea*	Butterfly bean	pod & seed	80.0	276	3.8	-	-	0.4	-	23
FABACEAE	*Cyamopsis tetragonolobus*	Guar bean	pod (fresh)	82.0	-	3.7	198	49	5.8	-	24
FABACEAE	*Vigna radiata*	Mung bean	seed (cooked)	-	439	7.0	2.4	1.0	1.4	-	25
FABACEAE	*Vigna unguiculata*	Cowpea	young pod + seed (boiled)	89.5	142	2.6	45	17.0	0.7	0.2	26
FABACEAE	*Leucaena leucocephala*	Leucaena	leaf and pod	80.7	247	8.4	-	-	9.2	-	27
FABACEAE	*Senna obtusifolia*	Java bean	leaf	79.7	251	5.6	-	113	5.9	-	32
FABACEAE	*Ceratonia siliqua*	Carob	pod	11.2	753	6.5	-	-	20.3	1.7	56
FLACOURTITACEAE	*Flacourtia indica*	Governor's plum	fruit	69.5	452	0.5	15	14	12	-	43
MALVACEAE	*Hibiscus trionum*	Flower-of-an-hour	leaf	6.3	1263	26.7	-	-	79.8	5.7	35
MALVACEAE	*Corchorus olitorius*	Jute	leaf (cooked)	87.2	155	3.4	156	33.0	3.1	0.8	46
MORINGACEAE	*Moringa oleifera*	Horseradish tree	leaf (boiled)	87	189	4.7	40	31.0	2.0	0.2	52
MYRTACEAE	*Psidium guajava*	Guava	fruit	77.1	238	1.1	60	184	1.4	0.2	38
POACEAE	*Sorghum bicolor*	Sorghum	seed	-	1459	11.1	-	-	-	-	12
POACEAE	*Eleusine coracana*	Finger millet	seed	11.7	1594	6.2	-	-	5.3	-	13
POACEAE	*Eragrostis tef*	Teff	seed	9.3	1541	8.9	-	-	9.9	20	14
POACEAE	*Cenchrus biflorus*	Sandbur grass	seed	9.8	1547	17.8	-	-	-	-	19
POACEAE	*Pennisetum glaucum*	Bullrush millet	seed	11.6	1442	10.5	-	-	6.5	1.7	20

Plant Family	Scientific name	Common name	Edible part	Moisture %	Energy kJ	Protein g	Vit A µg	Vit C mg	Iron mg	Zinc mg	Page
RHAMNACEAE	*Ziziphus mucronata*	Buffalo thorn	fruit	56.4	659	3.8	-	42.6	1.0	0.5	36
ROSACEAE	*Prunus dulcis*	Almond	nut	5.3	2418	21.3	1	-	4.3	3.4	60
RUTACEAE	*Citrus paradisi*	Grapefruit	fruit	43.5	45	0.3	-	19	0.1	0.1	41
SALVADORACEAE	*Salvadora persica*	Salt bush	Fruit	70.8	458	1.9	-	12.1	-	-	44
ZYGOPHYLLACEAE	*Balanites aegyptiaca*	Desert date	nut (dry)	5.0	2286	23.0	-	-	7.0	-	54

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