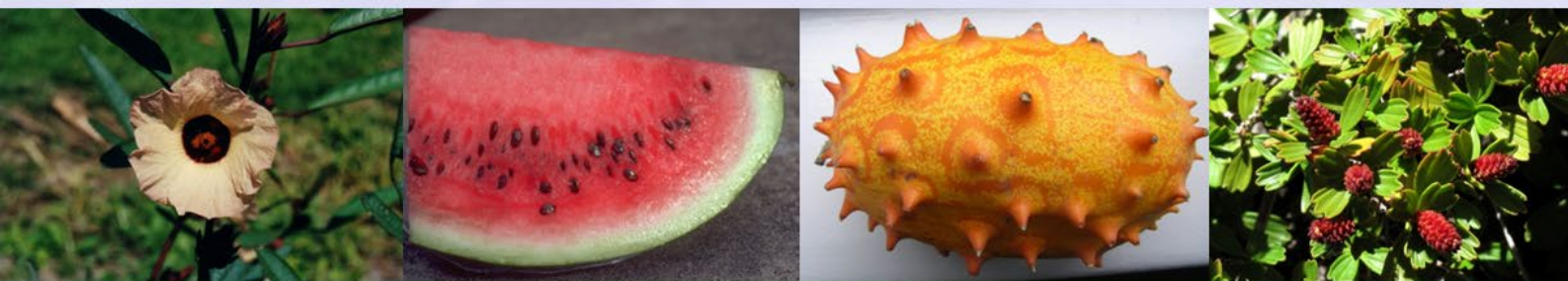


Potentially Important Food Plants of Zimbabwe



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 Zimbabwe

Dedication

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

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

Publication of this guide was made possible through donations from Diana Traversi and the Rotary Club of Hobart.

Preface

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

The selection of plants included in this guide has been developed by Tom Goninon 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 an indicative guide to indicate some important food plants that serve as examples for this purpose. Other important nutritious plants may be equally useful, and it is recommended that the FPI database be used to source information on the full range of plants known to occur in Zimbabwe. This guide has been developed with the best intention to create interest and improve understanding of the important local food plants of Zimbabwe, and on the understanding that it will be further edited and augmented by local specialists with appropriate knowledge and understanding of local food plants.

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

Disclaimer: Unless otherwise indicated, the information and images in this Field Guide have been obtained from the Food Plants International “Edible Plants of the World” database under the provisions of the Creative Commons Attribution 3.0 Licence ([Creative Commons — Attribution-NonCommercial-NoDerivs 3.0 Unported — CC BY-NC-ND 3.0](https://creativecommons.org/licenses/by-nc-nd/3.0/)). Minor editing may have occurred to meet the requirements of page formatting. 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 1
- STARCHY STAPLES..... 10
- LEGUMES..... 18
- LEAFY GREENS 26
- FRUIT..... 33
- VEGETABLES 42
- NUTS, SEEDS, HERBS AND OTHER FOODS 53
- NUTRITIONAL VALUES OF FOOD PLANTS BY PLANT FAMILY..... 61

Introduction

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

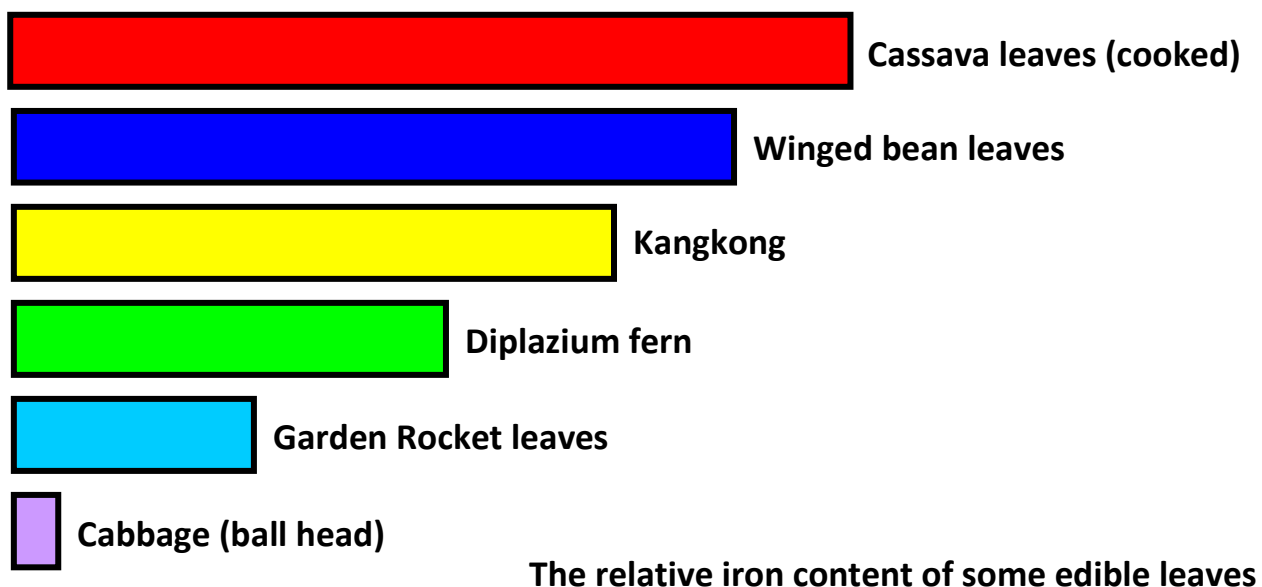
Naming of plants

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.



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

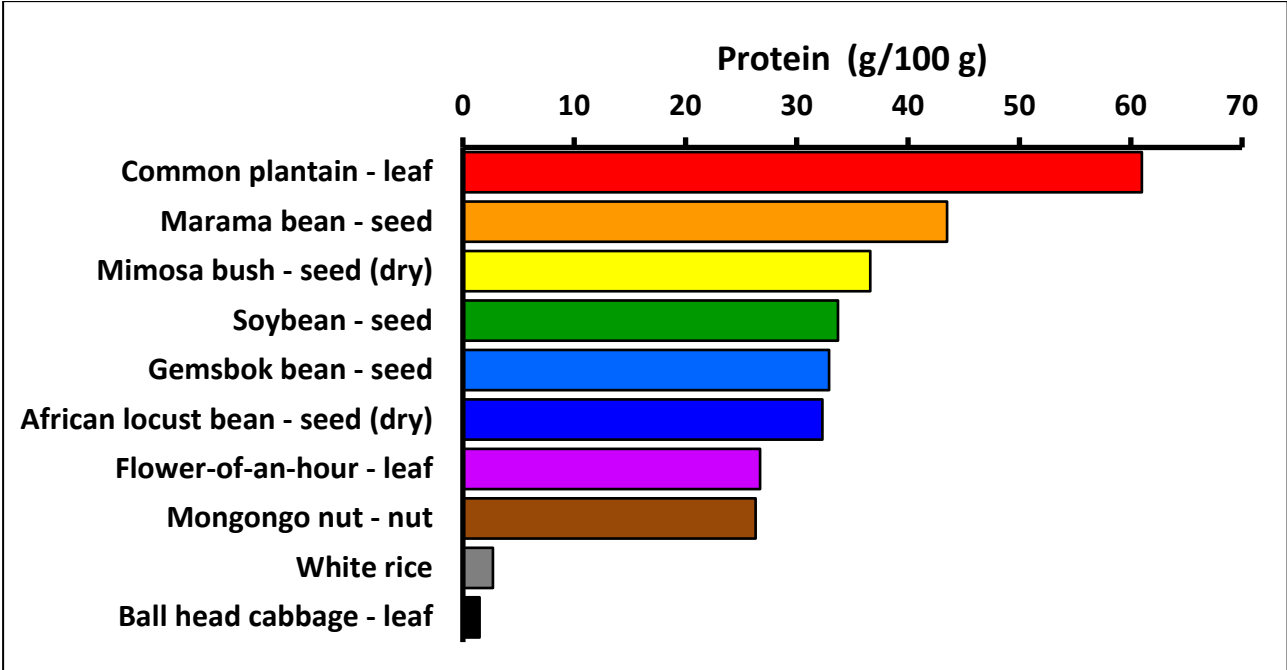
There are a large number of insects that enjoy sharing our food with us! We should not try to kill all these insects as they have an important role to play in keeping everything in nature in balance. What we need to do is to learn to manage these insects so we can all get some food to eat! Some insects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

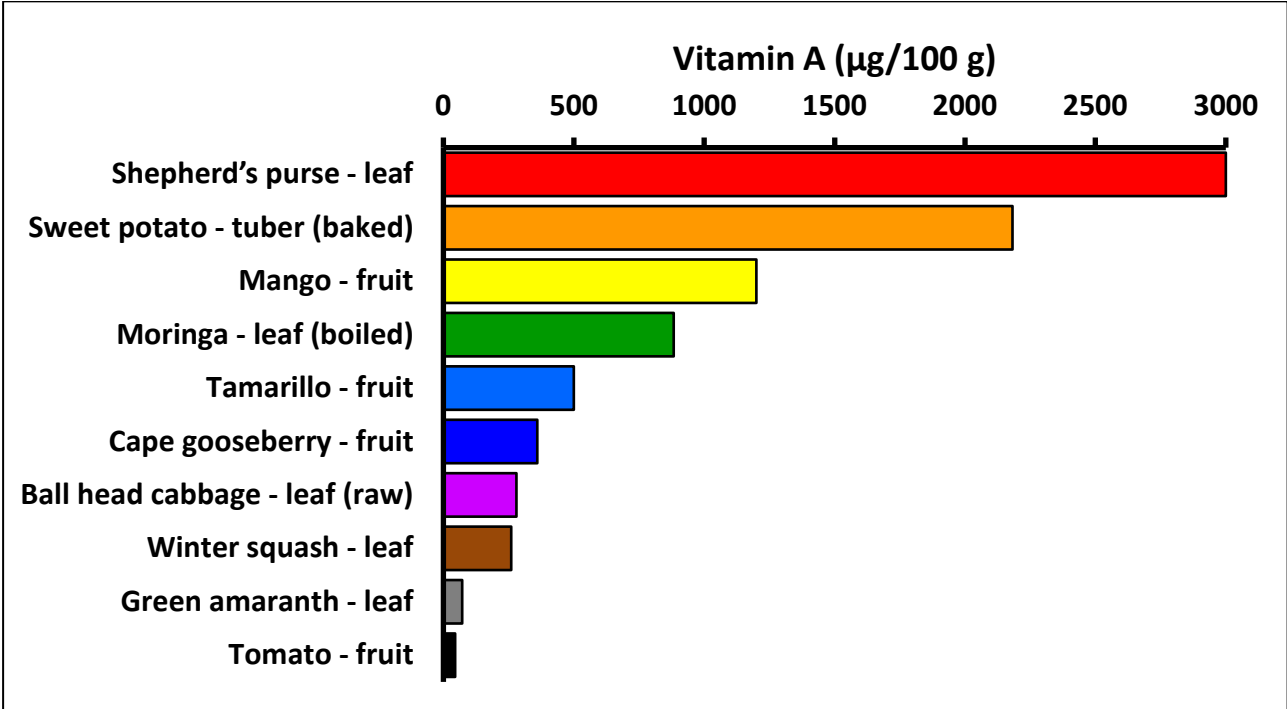
Diseases

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.

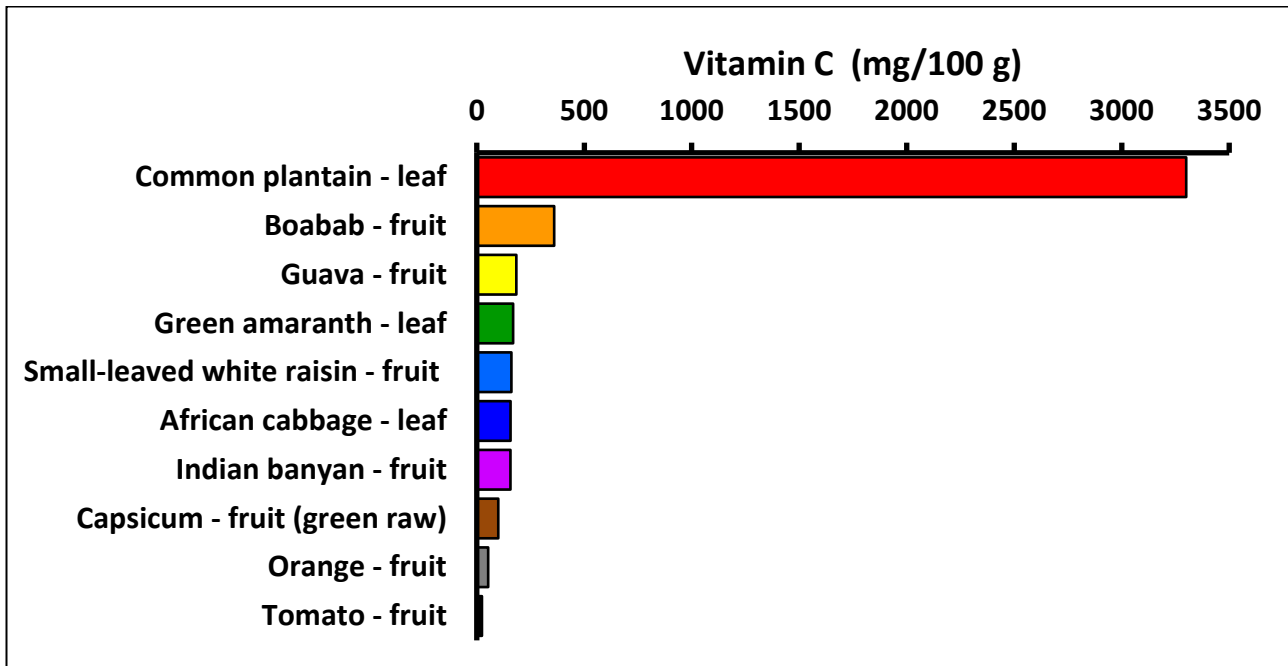
Food value charts for a selection of plants from Zimbabwe



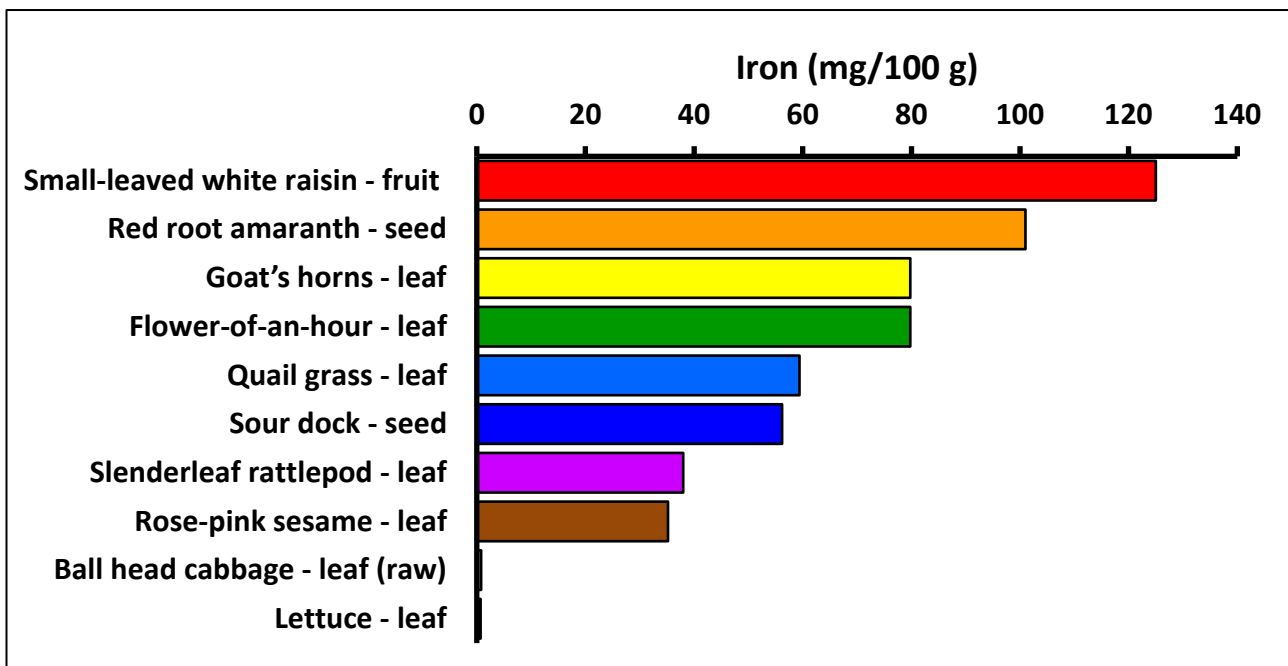
Protein helps the body repair cells and make new ones. Protein is also important for growth and development in children, teens, and pregnant women. Symptoms of protein deficiency include wasting and shrinkage of muscle tissue, and slow growth (in children).



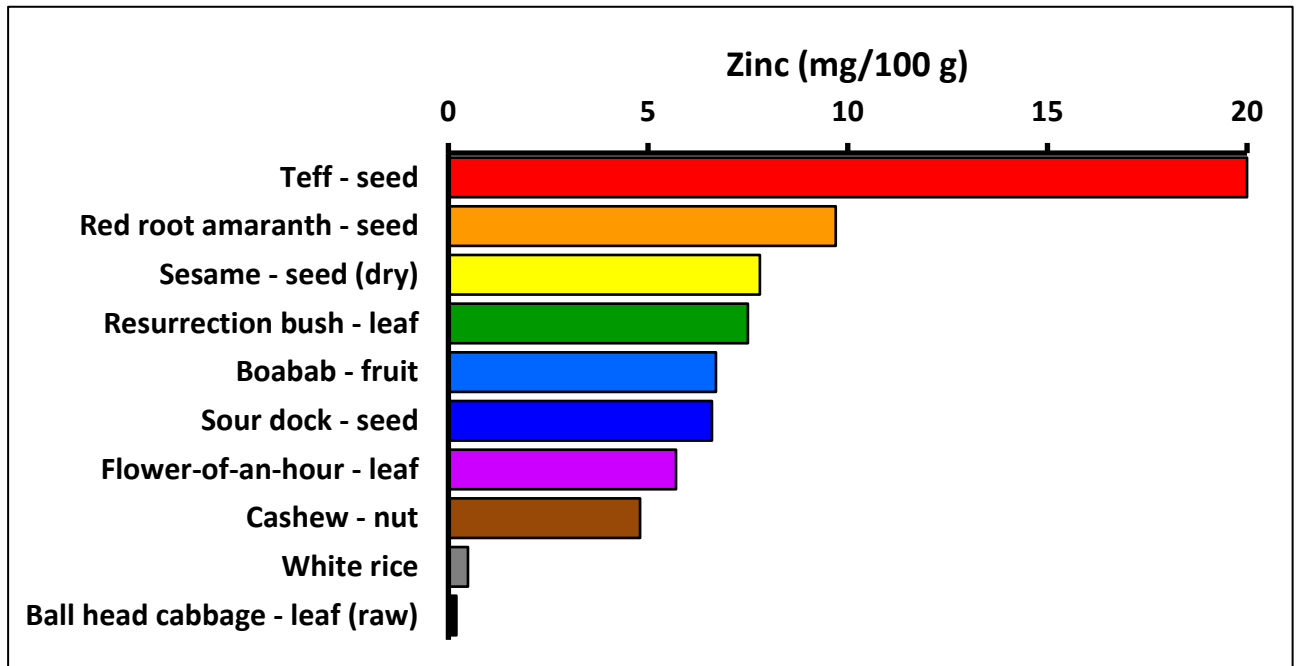
Vitamin A is very important for eyesight and fighting disease, particularly in infants, young children and pregnant women. People who are short of Vitamin A have trouble seeing at night.



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: African rice

Local:

Scientific name: *Oryza glaberrima*

Plant family: POACEAE

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

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

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



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

Production:

Food Value: Per 100 g edible portion

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

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

Starchy staples

Common name: Taro

Local:

Scientific name: *Colocasia esculenta*

Plant family: ARACEAE

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



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

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

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

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

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

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

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

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

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

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

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

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

Food Value: Per 100 g edible portion

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

Starchy staples

Common name: Bullrush millet

Local:

Scientific name: *Pennisetum glaucum*

Plant family: POACEAE

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



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

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

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

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

Food Value: Per 100 g edible portion

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

Starchy staples

Common name: 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

Common name: Sorghum

Local:

Scientific name: *Sorghum bicolor*

Plant family: POACEAE

Description: Sorghum is a millet grass. A mature sorghum plant resembles maize in its stature. Plants vary in height from 45 cm to 4 m. It is an annual grass with erect solid stems. The stems can be 3 cm across at the base. Prop roots occur at the base of the plant. There are numerous sorghum varieties. Some have one main stem while others produce multiple tillers. More tillers are produced when plants are widely spaced. The nodes on the stem are slightly thickened. Short types have up to 7 leaves while tall late



varieties may have up to 24 leaves. The leaf blade can be 30-135 cm long. Leaves are bluish green and waxy. They have a prominent midrib. The large flower panicle can be 20-40 cm long. The flower occurs at the top of the plant. It can stick upright or bend over. The flower can be open or compact.

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

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

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

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

Food Value: Per 100 g edible portion

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

Starchy staples

Common name: Common millet

Local:

Scientific name: *Panicum miliaceum*

Plant family: POACEAE

Description: An annual grass which grows up to 1 m high. It spreads to 15 cm across. It has a fibrous root system. The stalks are tufted. They are hairy at the base and on the nodes. The leaves are 30-50 cm long by 1-5 cm wide. They are narrow and flat. The edge is slightly rough with a few long hairs near the base. The seed head is much branched. The flower is yellow. The fruit is a grain. There are several races.



Distribution: It is a temperate plant. It requires a moderately fertile well-drained soil in full sunlight. Once established it can tolerate heat and drought. It suits warm temperate and subtropical climates. Plants are frost sensitive. In Nepal it grows up to 2200 m altitude. It can grow in arid places. It suits hardiness zones 5-9.

Use: The seeds can be cooked and eaten whole or ground into flour. They can be used in bread, pasta or dumplings. They are often browned in a skillet before using in casseroles, stews and for stuffings. They are fermented into *tempeh* or *miso*. The seed can be sprouted and added to soups and salads.

Cultivation: It is grown from seed which takes one week to germinate.

Production: Seeds for harvest can be produced in 10 weeks.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A μ g	proVit C mg	Iron mg	Zinc mg
seed	9.6	1548	11	-	-	-	-

Starchy staples

Common name: 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 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

Legumes

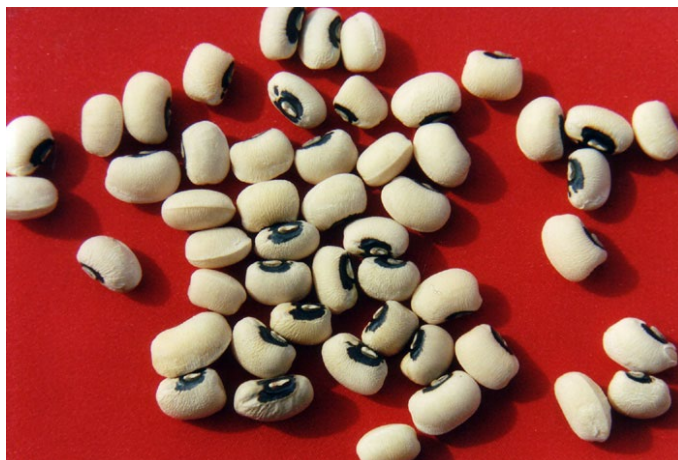
Common name: Cowpea

Local:

Scientific name: *Vigna unguiculata*

Plant family: FABACEAE

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



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

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

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

Food Value: Per 100 g edible portion

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

Legumes

Common name: Soybean

Local:

Scientific name: *Glycine max*

Plant family: FABACEAE

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



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

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

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

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

Food Value: Per 100 g edible portion

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

Legumes

Common name: Peanut

Local:

Scientific name: *Arachis hypogaea*

Plant family: FABACEAE

Description: Peanuts grow on spreading bushy plants up to about 40 cm high. The leaves are made up of 2 pairs of oppositely arranged leaflets. Flowers are produced in the axils of the leaves. Two main kinds of peanuts occur. The runner kind (Virginia peanut) has a vegetative or leafy branch between each fruiting branch and therefore produces a spreading bush. The bunch type (Spanish-Valencia peanuts) produces fruiting branches in a sequence one after the other along the branches. They grow as a more



upright plant and grow more quickly. Pods are produced on long stalks which extend underground and they contain between 2-6 seeds. The stalk or peg from the flower grows down into the soil and then produces the pod and seed under the ground. The flowers need to be no more than 18 cm from the soil surface for the seed pod to develop underground.

Distribution: Peanuts grow in tropical and subtropical areas. They grow well from sea level up to about 1650 metres in the equatorial tropics. They require temperatures of 24-33°C. Plants are killed by frost. They need a well-drained soil and cannot stand water-logging and often require raised garden beds. Peanuts need 300-500 mm of rain during the growing season. Dry weather is needed near harvest.

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

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

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

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed (dry)	4.5	2364	24.3	0	-	2.0	3.0
seed (fresh)	45	1394	15	-	10	1.5	-
leaf	78.5	228	4.4	-	-	4.2	-

Legumes

Common name: Gemsbok bean

Scientific name: *Tylosema esculentum*

Local:

Plant family: FABACEAE

Description: A herb or shrub that climbs and keeps growing from year to year. It has tuberous roots. The stems lie along the ground. They can be 6 m long. The lower parts can be woody. There are forked tendrils 1-4 cm long. The leaves are simple and arranged alternately. The leaf blade has two lobes. These are kidney shaped and 4-5 cm long by 5-6 cm wide. The flowers are in groups 16 cm long and at the sides. The flowers contain both sexes and are yellow turning red with age. The fruit is an oval pod 4-6 cm long by 3-4 cm wide and flattened. It is woody and usually has 1-2 seeds. The pod is constricted between the seeds. The seeds are round or oval and 2-2.5 cm long by about 1.5 cm wide. They are reddish-brown.



Distribution: A tropical plant that is native to the Kalahari desert. It grows in hot arid areas. It can tolerate drought and low soil fertility. It often grows in areas with daily maximum temperatures of 37°C and a low rainfall of 100-900 mm. It is on sandy and limestone soils. It can tolerate frost. It grows between 800-1600 m above sea level. It can grow in arid places.

Use: The root is sweet and nutritious. It is baked, boiled or roasted. The seeds are roasted or boiled and eaten. They are shelled and pounded and added to water to make soup. The seeds also produce an edible oil. The young stems are roasted and eaten. Young leafy shoots are occasionally eaten.

Cultivation: Plants are grown from seed. They germinate 9-10 days after planting. Plants can re-grow from the tubers. Seeds should not be soaked or planted in waterlogged soils.

Production: Plants flower 2-4 years after planting. A tuber can weigh about 1 kg. They can weigh 12 kg but become fibrous with age. The seeds can be stored for several years and are still edible.

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	3.9	2660	32.9	-	-	-	-
leaf (raw)	73.3	343	4.3	-	-	-	-
tuber	90.5	125	0.6	-	2.5	0.3	0.2

Legumes

Common name: African locust bean

Local:

Scientific name: *Parkia filicoidea*

Plant family: FABACEAE

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



Distribution: A tropical and subtropical tree of lowland rainforests. It grows in Africa in forests near streams. It occurs in sub-humid and humid places with an annual rainfall of 950-1750 mm annually. It grows from 250-1370 m above sea level. It can grow in arid places.

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

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

Production:

Food Value: Per 100 g edible portion

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

Image accessed from:

http://www.westafricanplants.senckenberg.de/images/pictures/fabmimo_parkia_filicoidea_cbch_6118_4049_b8ed36.jpg

Legumes

Common name: Marama bean

Local:

Scientific name: *Tylosema fassoglensis*

Plant family: FABACEAE

Description: A trailing or climbing plant. It is evergreen and shrubby. It can be 6 m long. It has a large tuberous root. This can be to a depth of 2.5 m. Young plant parts have rusty coloured hairs. The leaves are simple and almost round but with two lobes or divided at the tip. Leaves are 5-20 cm long by 6-23 cm wide. There are rusty hairs on the veins underneath the leaf. The flower clusters are 2-42 cm long on stalks 2-17 cm long. The flowers have 5 petals. Four of these are yellow and one is reduced to a green stub.



The petals are yellow. The outer layer or sepals have wings. Fruit are 7-12 cm long and 4-7 cm wide. The seeds are not quite round and are 1.7-2.8 cm long.

Distribution: It is a tropical plant. It does well in seasonally wet and dry climates. It needs well-drained soil. In Malawi it grows at 900-1200 m altitude, while in Tanzania it grows up to 1500 m above sea level and in areas with a rainfall between 1000-1600 mm. It needs full sun. It can grow in arid places. It suits hardiness zones 9-12.

Use: The pods are eaten raw or cooked. Young pods are eaten raw. The seeds can be eaten raw but are usually cooked or roasted. The seeds are also used as a coffee substitute. The tubers are eaten raw. They also provide water. They can be roasted and eaten or then stored for later use. They can also be crushed and pounded to make a meal.

Cultivation: Plants can be grown from seeds.

Production: Plants grow rapidly. Tubers up to 78 kg have been recorded. Seeds are collected at the end of the rainy season.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	7.5	452	43.5	-	-	-	-
pod	72.5	446	6.4	-	39	0.5	2.2
tuber	79.4	237	1.6	-	6.5	0.3	0.5

Image accessed from:

<http://palkowitschia.cz/sukulenty/img/travelling/kenya/flora/Tylosema%20fassoglensis%20Ghazi%20Kenya%2020140192.jpg>

Legumes

Common name: Mimosa bush

Scientific name: *Acacia farnesiana*

Local:

Plant family: FABACEAE

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



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

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

Cultivation: It is grown from seed.

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

Food Value: Per 100 g edible portion

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

Legumes

Common name: Bambara groundnut

Local:

Scientific name: *Vigna subterranea*

Plant family: FABACEAE

Description: An annual plant that can be either a bunchy bush or a trailing plant. Often the creeping stems are near ground level. It often appears as if bunched leaves arise from branched stems near ground level. It has a well-developed taproot. The leaves have 3 leaflets. The leaf stalk is erect and thickened near the base. The end leaflet is slightly larger than the side leaflets. Leaflets are about 6 cm long by 3 cm across. The flowers are yellowish-white and occur in pairs. The flower/fruit stalk elongates after being fertilised and pushes into the soil. The fruit



are pods which are round and have one seed. Some kinds have 3 seeds. This pod develops under the ground on a long stalk. The seeds are hard and are of many colours. Pods can be 3.7 cm long.

Distribution: It is a tropical plant that can grow in hot climates. It can also grow on poor soils. It does best with moderate rainfall and sunshine. It can tolerate drought. Long day-lengths can reduce or prevent pod development in some kinds.

Use: Seeds can be eaten fresh or roasted while immature. Mature seeds are hard so must be boiled before being used in cooking. Seeds can be dried and made into flour and used for baking. They can be popped like corn. The seeds are roasted as a coffee substitute. Young pods are cooked and used as a vegetable or in stews. The leaves can be eaten.

Cultivation: Plants are grown from seed. Plants are often put in rows 50 cm apart and with 15 cm spacing between plants. Ridges are formed to enable the pods to penetrate the soil. It is mostly grown intercropped with other plants. Soil should be light and friable and the seed bed loose and fine. Normally the whole plant is pulled up for harvesting. Any pods which become detached are harvested by hand. Pods are dried in the air before threshing.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	7.3	1572	18.4	-	-	4.6	2.2
seed (boiled)	66.4	578	7.7	-	-	1.4	1.1
seed dried	10	1541	18	10	0	12.2	-
seed fresh	57	638	7.8	-	-	-	-

Leafy greens

Common name: Goat's horns

Local:

Scientific name: *Sida cordifolia*

Plant family: MALVACEAE

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



Distribution: A tropical plant that grows in open waste places in the tropics and sub-tropics. It is common and widely distributed in the Philippines. It grows in hot arid places with a marked dry season. It grows in places with an annual rainfall below 520 mm. It grows in dry sandy soils and can grow in salty soils. It grows below 1100 m altitude. It can tolerate shade and can grow in arid places.

Use: The leaves are edible when cooked.

Cultivation:

Production:

Food Value: Per 100 g edible portion

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

Image accessed from

[http://upload.wikimedia.org/wikipedia/commons/f/f4/Sida_cordifolia_\(Bala\)_in_Hyderabad,_AP_W_IMG_9420.jpg](http://upload.wikimedia.org/wikipedia/commons/f/f4/Sida_cordifolia_(Bala)_in_Hyderabad,_AP_W_IMG_9420.jpg)

Leafy greens

Common name: Quail grass

Scientific name: *Phyllanthus maderaspatensis*

Local:

Plant family: PHYLLANTHACEAE

Description: A herb or small shrub that can grow for more than year. It grows 10-60 cm tall. Leaves are broadly sword shaped and 1-3 cm long by up to 1 cm wide. The fruit are round with 3 lobes. They are 3 mm across.

Distribution: It is a tropical and subtropical plant that grows on sandy soils and limestone. It grows from sea level to 1500 m above sea level.

Use: The leaves are cooked in curries with pulses.

Cultivation:

Production:



Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	60.9	552	3.0	-	-	59.4	1.0

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

Leafy greens

Common name: Spotted cat's ear

Local:

Scientific name: *Hypochaeris radicata*

Plant family: ASTERACEAE

Description: A herb that keeps growing from year to year. The young plant is a ring of leaves near the ground. The stem is solid, round and with a groove along it. It gives off white sap when cut. The leaves have irregular lobes. The leaves are hairy, 25 cm long and in a ring near the base. Branched flowering stems arise from the centre of the ring of leaves. These are about 30-40 cm long. The flowers are 2-3 cm across.



Distribution: It is a temperate plant that grows in grassland. It grows at high altitude in the tropics. In Zimbabwe it grows from 1500-1800 m above sea level. In Argentina it grows from sea level to 1500 m above sea level.

Use: The young leaves are cooked and eaten. They can also be used in salads, soups and stews. The roots can be cooked as a vegetable or roasted and ground as a coffee substitute.

Cultivation:

Production:

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	-	-	0.8	-	-	42	0.3

Image sourced from: <https://i.pinimg.com/originals/0c/ea/1a/0cea1ae59b35657e8e0f5b20a63d031e.jpg>

Leafy greens

Common name: Slenderleaf rattlepod

Local:

Scientific name: *Crotalaria brevidens*

Plant family: FABACEAE

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



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

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

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

Production: Plants are ready for harvesting after 8 weeks. Harvesting can continue for 4 months.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	74.5	-	8.8	-	-	38	-

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

Leafy greens

Common name: Rose-pink sesame

Local:

Scientific name: *Sesamum calycinum*

Plant family: PEDALIACEAE

Description: A herb that grows for one or a few years. The stem can be single or branched. The leaves at the top are long and thin and with almost no stalk. Lower leaves can have stalks and be divided into lobes. The flowers are 2-5 cm long and purple or pink. The fruit is a narrow capsule.

Distribution: A tropical plant. In Kenya it grows from sea level to 3000 m altitude. It grows in light clay and sandy soils. It can grow in arid places.

Use: The young leaves are cooked and eaten. They are often cooked with other leaves such as Corchorus.

Cultivation: Plants can be grown from seeds. A spacing of 20 cm is suitable.

Production: The tender leaves are plucked off the bush.



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	76.5	-	5.6	-	47.0	35.2	-

Image accessed from: <http://www.zimbabweflora.co.zw/speciesdata/images/15/152550-2.jpg>

Leafy greens

Common name: Green amaranth

Local:

Scientific name: *Amaranthus viridis*

Plant family: AMARANTHACEAE

Description: An erect smooth branched herb without thorns that grows 30-60 cm tall. It grows from seeds each year. The stems are slender. The leaves are broad near the base and narrow near the top. Usually the leaves have notches. Leaves are 1-3 cm long with exceptionally long petioles. The flowers occur in the angles of the leaves and the seeds are small and brown or black. The spikes are not bristly.



Distribution: It is a tropical plant but also grows in temperate places. It is common in open waste places and can grow in arid places.

Use: The young leaves and seeds are cooked and eaten. The harvested leaves can only be stored for 2-3 days.

Cultivation: It can be grown from seed or cuttings. Seeds grow easily.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	87.3	-	4.5	72	169	6.0	-

Image sourced from: https://c2.staticflickr.com/8/7032/6410387909_045351f52d_b.jpg

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

Common name: Boabab

Local:

Scientific name: *Adansonia digitata*

Plant family: BOMBACACEAE

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



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

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

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

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

Food Value: Per 100 g edible portion

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

Fruit

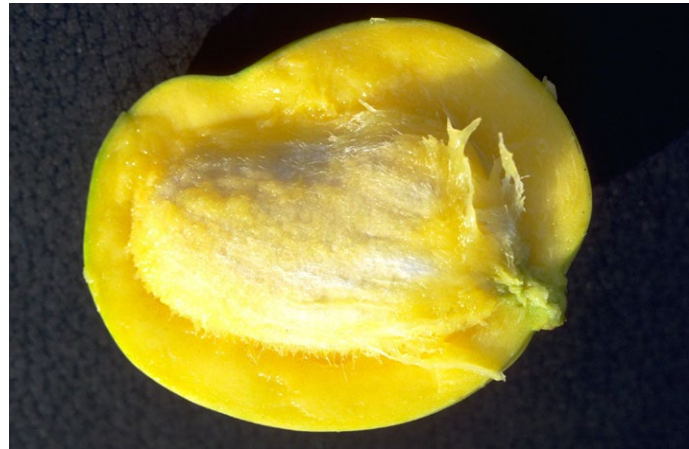
Common name: Mango

Local:

Scientific name: *Mangifera indica*

Plant family: ANACARDIACEAE

Description: An erect, branched evergreen tree. It can grow to 10-40 m high and is long lived. (Trees grown by vegetative means are smaller and more compact.) Trees spread to 15 m across. It has strong deep roots. The trunk is thick. The bark is greyish-brown. The leaves are simple and shaped like a spear. Some kinds of mangoes have leaves with a wavy edge. They can be 10-30 cm long and 2-10 cm wide. They are arranged in spirals. The leaf stalk is 1-10 cm long and flattened. Leaves are often brightly coloured and brownish-red when young. These tender leaves which are produced in flushes become stiff and dark-green when mature. The flower stalks are at the ends of branches. They are 10-50 cm long and branching. Up to 6000 flowers can occur on a stalk. Most of these are male and up to 35% have both male and female flower parts. Fruit are green, yellow or red and 2.5-30 cm long. The fruit hang down on long stalks. The outside layer of the seed is hard and fibrous and there is one seed inside. Several embryos can develop from one seed by asexual reproduction. The fruit shape and colour vary as well as the amount of fibre and the flavour. India has many varieties and they cannot tolerate humidity.



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

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

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

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

Production: Seeds germinate after about 20 days. Seedling trees produce after 4-6 years and increase in production up to 20 years. Trees often bear better each second year. Rain at flowering reduces fruit setting. Fruiting is at the end of the year. Fruit take 4-5 months to mature. Fruit vary in weight from 200-1000 g. Trees can produce one million flowers but only 500 fruit. Trees last for many years.

Food Value: Per 100 g edible portion

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

Fruit

Common name: Tamarillo

Local:

Scientific name: *Cyphomandra betacea*

Plant family: SOLANACEAE

Description: A small, soft-wooded fruit tree in the tomato and tobacco family. It grows as a shrub up to 4 m tall and is shallow rooted. The brittle stem is 5-10 cm across. The leaves are large (25 cm x 12 cm) and soft and heart-shaped at the base. The sweet smelling flowers are 1-2 cm across and occur in loose clusters near the ends of branches. Flowers are normally self-pollinating but need wind. The red or orange egg-shaped fruit are 6-12 cm long and hang off the ends of the branches. The skin of the fruit is somewhat tough, but the flesh around the seeds is soft and juicy. The edible flesh varies from yellow to dark purple. The edible seeds are black, thin and nearly flat. There are several named cultivated varieties.



Distribution: A subtropical plant suited to tropical highlands. It grows at 750-2200 m altitude in the equatorial tropics, and up to 3000 m in the continental tropics. It is more cold hardy than tomato, and does best where average temperatures are 15-21°C. It cannot stand much frost, although mature trees will survive short periods of light frosts. It can't stand water-logging or drought. Trees can grow under shade but do better in sun, unless it is hot and dry. Deep, fertile, permeable, disease-free soil is best. Plants don't fruit at low altitudes in the tropics due to constant high temperatures. They need shelter from wind. It suits hardiness zones 9-11.

Use: The fruit is eaten raw or cooked. The layer just under the skin can be bitter. The layer around the seeds is sweet. The seeds can be eaten, or strained out. The outside skin is easily removed by immersing fruit in boiling water for 1-2 minutes. The fruit can be boiled, stewed, grilled, baked or pickled, or used in jams, jellies, chutneys, conserves, pies, preserves and sauces.

Cultivation: They can be grown from seed or cuttings. Seeds grow better if they are washed and dried, then placed in a freezer for 24 hours before planting out. Seeds produce a high branched erect tree. Cuttings produce a lower bushier plant. Cuttings of 60-90 cm long stalks are suitable and should be taken from 1-2 year old wood which is 1-2 cm thick. Root cuttings can also be used. It has shallow roots, so needs careful weeding. A spacing of 3 m apart is sufficient. Because the roots are easily damaged by nematodes, plants grafted or budded onto nematode resistant rootstocks will live longer. Root rot fungus can make it difficult to get plants established in old gardens. High humidity can also cause stem rots. Young plants can be pruned to produce lower branches and fruiting. Fruit is produced on new branches, so branches which have fruited can be pruned out. Flowers are self-compatible so pollination by wind can occur within the one plant.

Production: Fruiting commences in the second year when grown from seed. Trees bear hundreds of fruit throughout the year. Yields of 20 kg per plant are possible. Trees live 5-6 years, although if infested with root knot nematodes, may live only 3-4 years. Fruit are ready to harvest when the red or yellow colour develops. Fruit can be stored above 3°C in a refrigerator for 10 weeks.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	86.2	113	2.0	500	28	0.7	-

Fruit

Common name: Guava

Local:

Scientific name: *Psidium guajava*

Plant family: MYRTACEAE

Description: A small evergreen tree 8-10 m tall with smooth, mottled bark which peels off in flakes. It is shallow rooted and branches close to the ground. The branches are four-angled. The leaves are opposite, dull green, and somewhat hairy. They are oval and somewhat pointed at both ends, 15 cm long by 2-5 cm wide with short leaf stalks. The showy flowers are white and borne in loose, irregular arrangements of 1-3 flowers that grow in the axils of leaves on new growth. The petals are



1.5-2 cm long. Both self and cross-pollination occurs. The fruit are rounded and 4-5 cm long. They are green, turning yellow when ripe. The skin is firm and encloses a pink, or nearly white, sweet-smelling, edible pulp with many seeds. In better selected varieties, the skin and the seeds are fully edible. Fruit vary from very acid to very sweet.

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

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

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

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

Food Value: Per 100 g edible portion

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

Fruit

Common name: Small-leaved white raisin

Local:

Scientific name: *Grewia tenax*

Plant family: MALVACEAE

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



Distribution: A tropical plant that grows in arid zones. It occurs in very dry woodland and semi-desert scrub. It grows on rocky and gravelly soils. It grows in the Sahel. It is often near temporary pools. It grows in areas with over 200 mm rainfall. It can tolerate salt. In East Africa it grows between sea level and 1500 m altitude.

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

Cultivation: Plants can be grown from seeds.

Food Value: Per 100 g edible portion

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

Image accessed from:

[http://www.southernafricanplants.net/photocollection/batch005/medium/G/TILLIACEAE_Grewia_tenax_Arandis_20090215_072_\(1\).jpg](http://www.southernafricanplants.net/photocollection/batch005/medium/G/TILLIACEAE_Grewia_tenax_Arandis_20090215_072_(1).jpg)

Fruit

Common name: Indian banyan

Local:

Scientific name: *Ficus benghalensis*

Plant family: MORACEAE

Description: An evergreen tree. It grows to about 35 m high. It has a spreading canopy. The branches have many aerial roots. They are like thick columns. They grow down from the spreading branches. These support the widely spreading crown. One tree can be 60 m wide. The bark is pale grey. The leaves are alternate and stalked. They are 10-20 cm long by 5-12.5 cm wide. They are oval and rounded at the base. They are deep green above and paler underneath. They are also hairy underneath. They are thick and leathery. The flowers are very small and inside the fig. The figs grow between the upper part of the leaf stalk and stem. The figs are round and scarlet when ripe.



Distribution: A tropical plant. In Nepal it grows up to 1400 m altitude. They are common over the plains of India. They grow wild in the sub-Himalayan forests. It is a tropical plant. It can tolerate frost. It can grow in arid places. It suits hardiness zones 11-12.

Use: The figs are eaten fresh. They can also be dried. The young shoots are used as a famine food. The young leaves are eaten as a vegetable and are a famine food.

Cultivation: Plants can be grown from seeds or cuttings. Young branches should be used for cuttings. Cuttings root easily. One famous tree in Calcutta covers 1.6 ha.

Production: In India fruit are available June to September.

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	13.0	-	8.1	-	156.6	4.1	-

Fruit

Common name: Cape gooseberry

Local:

Scientific name: *Physalis peruviana*

Plant family: SOLANACEAE

Description: A perennial herb that grows 45-90 cm tall. They are often grown as annuals. It is hairy and slightly branched. The spreading branches are purplish and ribbed. The leaf blade is 6-15 cm long by 4-10 cm wide. The leaves are heart shaped at the base and taper to the tip. They are slightly wavy and toothed along the edge. The flowers occur singly and hang down in the axils of leaves. The flowers are white with violet anthers and slightly spotted petals. The fruit is a berry 1-1.5 cm across. They are orange-yellow or pale brown. This is inside an inflated husk. The seeds are yellow and 2 mm across. There are several named cultivated varieties.



Distribution: A temperate plant that grows in the tropical highlands. It suits warm climates and does best in warm sunny conditions. It needs well drained soil. Plants are not killed by a slight frost but it grows best free from severe frosts and strong winds. In Indonesia plants are found from 700-2300 m altitude, but fruit best above 1500 m. It can grow in arid places and suits hardiness zones 8-10.

Use: The ripe fruit are eaten fresh or cooked. They are used for jam. They can be dried, preserved, stewed, pureed, or used in pies, cakes, jellies and sauces. Roasted seeds are pickled. The leaves have been used instead of hops in beer. The leaves are also used as a potherb.

Cultivation: Plants are grown from seed that is broadcast over the soil. Seeds should be sown 1.5 cm deep in loose soil. Seed germinate irregularly. Plants should be spaced 45 cm apart. In the tropics, plants keep growing from year to year, but in the subtropics they regrow from seed each year. Plants can be grown from softwood cuttings from the upper parts of the shoots. Seedlings can be transplanted.

Production: Plants produce fruit in 1 year.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit (mature)	84.2	201	2.0	360	30	1.5	-

Vegetables

Common name: Common plantain

Local:

Scientific name: *Plantago major*

Plant family: PLANTAGINACEAE

Description: A herb that keeps growing from year to year. It has a short, stout rootstock. It has a ring of ribbed leaves near the ground. They are soft and oval shaped. The leaves narrow into the stalks. The leaf stalks are fairly long and have wings. The leaves can be 30 cm long by 15 cm wide. The leaves have 5-9 easy to see veins running along them. The flower stem is leafless and as long as or shorter than the leaves. The flowers are in a dense spike. This can be as long as or longer than its stem.



Distribution: It is a temperate plant. It grows in damp places. It grows in wetlands, mostly in cool places. In Argentina it grows below 500 m above sea level.

Use: Young leaves are lightly cooked. Older leaves become more bitter. The leaves are used in soups. The leaves can be dipped in batter and fried over low heat. They are also used in chutney. The leaves are used for *sarma* in Turkey. They are rolled around a filling of rice or minced meat. The dried leaves are used for tea. The seeds are used to give a jelly like effect in drinks. They can be ground into a meal. The seeds yield an edible oil. The roots are eaten cooked.

Cultivation: Plants can be grown by seeds

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	81.4	255	61	3.8	3300	19	-

Vegetables

Common name: Moringa

Local:

Scientific name: *Moringa oleifera*

Plant family: MORINGACEAE

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



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

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

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

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

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	76.4	302	5.0	197	165	3.6	-
flower	84.2	205	3.3	-	-	5.2	-
leaf (boiled)	87	189	4.7	883	31.0	2.0	0.2
pod (raw)	88.2	155	2.1	7	141	0.4	0.5
seed	6.5	-	46.6	-	-	-	-

Vegetables

Common name: Chinese taro

Local:

Scientific name: *Xanthosoma sagittifolium*

Plant family: ARACEAE

Description: A herb that grows up to 2 m tall with a short stem and large leaves at the top. A corm grows at the base of the plant, and produces about 10 flask-shaped cormels, each 15-25 cm long. They get wider towards the tip. The oval leaf blade is 50-75 cm long with a vein around the edge and has triangular lobes at the bottom. The flower is produced below the leaves. The large bract around the flower is pale green and about 20 cm long. The bases of the bract overlap. The closely arranged spike of flowers is about 15 cm long. The smaller female part is at the bottom of the spike and the larger male part towards the top.



Distribution: It grows in many tropical countries and suits tropical rainforest regions. It can tolerate high rainfall and light shade. It does well in regions with an annual average temperature of 26°C and a well distributed rainfall of 1400-2100 mm during the growing season. It grows from sea level up to about 2000 m. Soils need to be well-drained, but moist with a pH of 5.5-6.8.

Use: Cormels, or small corms, are eaten roasted or boiled. Main corms are often fed to pigs. Young leaves can be eaten after cooking.

Cultivation: The top piece of the main central corm or stem is normally planted. Pieces weighing 1.5 kg are often used. It can also be grown by using the small side corms which may weigh 0.3 kg, or pieces of the corm can be used as long as they have some buds on them. These are often pre-sprouted before planting. To multiply large amounts of planting material and still achieve acceptable yields, the latter method of using sections of the main corm works well. In crop growth, an axillary bud is produced in the axil of each leaf but only some of these develop into cormels. Often 10 or more cormels develop per plant into cormels 15-25 cm long.

Production: The crop grows for about 9 months, although may be left for 12 months before harvest. Crops can be planted at any time of the year, but are often planted to make best use of natural rainfall. The middle of the dry season should be avoided. Naturally loose or well cultivated soils are needed. The water table must be at least 45 cm below the soil surface. *Xanthosoma taro* grows better in good soils with plenty of nitrogen. It can be grown in poorer soils and still give satisfactory yield. It can grow in shade and is inter-cropped under cacao and coconuts. Yield is reduced, but it is still worth doing if no other land is available. Weed control is important. The corms can be harvested without digging out the whole plant by carefully digging soil away from the plant and breaking off small corms. The main stem is then covered to produce a new crop. The corms store well under dry, cool, well-ventilated conditions. The corms will also remain in good condition if they are left growing in the ground and just harvested when needed.

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	67.1	559	1.6	5	13.6	0.4	0.5
leaf	90.6	143	2.5	3300	37	2.0	-
shoot	89.0	139	3.1	-	82	0.3	-

Vegetables

Common name: Shepherd's purse

Local:

Scientific name: *Capsella bursa-pastoris*

Plant family: BRASSICACEAE

Description: A cabbage family herb. It is an annual plant or it can take 2 years to complete its life cycle. The stem is erect and grows to 60 cm high. It has a rosette of leaves near the base. The leaves vary in shape and are toothed along the edge. The upper leaves are smaller, sword shaped and without stalks. The flowers are white. They occur in clusters at the ends of branches. The fruit is a flat, triangular, pod.



Distribution: It grows in temperate and subtropical places. It grows in higher rainfall areas and does best in moist soils. It is resistant to frost and drought and can survive winter snow. In Zimbabwe, it grows from 1490-1920 m above sea level.

Use: The young tender leaves are cooked and used as a vegetable. They can also be eaten raw in salads. They need to be gathered before the flowers appear. The dried seed pods give a pepper like flavouring. The fresh or dried roots can be used as a ginger substitute. **Caution:** Eating this food is not recommended during pregnancy as it can cause miscarriage.

Cultivation: Plants are grown from seed. The seeds can lie dormant in the soil for 30 years.

Production: The seeds contain 15-20% 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	88.2	138	4.2	3000	91	4.8	-

Image sourced from: https://fr.wikipedia.org/wiki/Fichier:Capsella_bursa-pastoris_1.JPG

Vegetables

Common name: Cassava

Local:

Scientific name: *Manihot esculenta*

Plant family: EUPHORBIACEAE

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



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

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

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

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

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

Because cassava can still grow satisfactorily in poorer soils it is often put last in a rotation after others crops have already been grown on the piece of land. Cassava is more responsive to nitrogen

and potassium than phosphorus under many field situations. Nitrogen can increase cyanide levels. Under very acid conditions with high soluble aluminium levels, cassava has been able to achieve and maintain top growth but with significantly reduce root yields. When drainage is good and soil moisture is adequate, cassava stalks can be planted at any orientation from horizontal to vertical, but in very sandy soils horizontal planting is best and in heavy clay soils vertical planting is best.

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

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

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

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

Food Value: Per 100 g edible portion

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

Vegetables

Common name: Capsicum

Local:

Scientific name: *Capsicum annuum*

Plant family: SOLANACEAE

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



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

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

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

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

Food Value: Per 100 g edible portion

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

Vegetables

Common name: Sweet potato

Local:

Scientific name: *Ipomoea batatas*

Plant family: CONVOLVULACEAE

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



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

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

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

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

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

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

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

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
tuber (baked)	72.9	431	1.7	2182	24.6	0.5	0.3
tuber (raw)	70.0	387	1.2	4000	25	0.7	0.4
tuber (boiled)	72.0	363	1.1	1705	15	0.6	0.3
leaf	86.3	168	3.9	105	58	2.9	-

Vegetables

Common name: African cabbage

Local:

Scientific name: *Brassica carinata*

Plant family: BRASSICACEAE

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



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

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

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

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

Food Value: Per 100 g edible portion

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

Nuts, seeds, herbs and other foods

Common name: Red-root amaranth

Local:

Scientific name: *Amaranthus retroflexus*

Plant family: AMARANTHACEAE

Description: An annual herb that grows 60-90 cm tall. It has furry stems and the root is usually rosy red. The leaves and stems are often quite red in colour. The leaves are oval or sword shaped. The seed spikes are green and bristly. These can be at the top of the plant or in the axils of leaves.



Distribution: A temperate and Mediterranean plant. It grows in waste land and amongst crops in most temperate regions of the world. It will grow in the tropics. It can grow in arid places.

Use: The young leaves are edible cooked. They are used in stews and pies. They are fried and used in soups. They can be high in oxalates. The seeds are eaten in starch and cereal based preparations.

Caution: Amaranth grown in high nitrogen soils can accumulate nitrates which are poisonous in large quantities.

Cultivation: It can be grown from seed or cuttings. It can inhibit the germination and growth of other plants and vegetables.

Production:

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	10.3	1944	17.3	-	-	101	9.7
leaf	93.2	-	1.6	-	-	-	-

Nuts, seeds, herbs and other foods

Common name: Winter squash, 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

Nuts, seeds, herbs and other foods

Common name: Sesame

Local:

Scientific name: *Sesamum indicum*

Plant family: PEDALIACEAE

Description: A small, erect annual plant. It is very branched and grows 1-2 m tall. The stem is stout, 4 sided and furrowed along its length. It is densely covered with fine, downy, glandular hairs that vary in shape. The lower leaves have long stalks and are spear shaped, often with lobes or a toothed edge. The leaf stalks are 3-11 cm long. The leaf blade is 4-20 cm long by 2-10 cm wide. Upper leaves are narrow and oblong. They are 0.5-2.5 cm wide. The flowers occur in the axils of upper leaves, either on their own, or



in groups of 2 or 3. They can be white, pink, purplish and with yellow spots and stripes. The fruit can be smooth or rough and there are 2 chambers in the capsule. The fruit are brown or purple. They are oblong and deeply grooved. The seeds are small and oval. They are 3 mm by 1.5 mm and vary in colour from white, yellow, grey, red, brown or black. The fully ripe pods burst open.

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

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

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

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

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed (dry)	4.7	2397	17.7	1	-	14.6	7.8
leaf (raw)	85.5	188	3.4	-	-	-	-
oil	0.1	3683	0.2	-	-	-	-

Nuts, seeds, herbs and other foods

Common name: Resurrection bush

Local:

Scientific name: *Myrothamnus flabellifolius*

Plant family: MYROTHAMNACEAE

Description: A shrub that can lie along the ground or be erect. It has many branches. It grows 30-90 cm tall. The young branches are 4 sided. There are narrow wings. The leaves cross over along fast-growing long branches. The leaves are 10-14 cm long by 6-8 cm wide. The flowering stalks are 2-3 cm long. They are on the ends of short branches. The fruit is a capsule with 3 lobes. The seeds are 0.5 mm long. The leaves can shrink and appear dry in the dry season, then turn green in a few minutes after rain, so is called the resurrection bush.



Distribution: It is a tropical plant. It grows in hot, arid places. It can grow in semi-desert. It is drought tolerant. In Zimbabwe it grows 500-1900 m above sea level.

Use: The leaves are used for medicinal tea. They are also used as a spice. The twigs are used to flavour tea.

Cultivation:

Production:

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	6.3	1130	7.6	-	-	17.9	7.5

Image accessed from: <http://www.zimbabweflora.co.zw/speciesdata/images/12/125310-8.jpg>

Nuts, seeds, herbs and other foods

Common name: Sand apple

Local:

Scientific name: *Parinari capensis*

Plant family: CHRYSOBALANACEAE

Description: A shrub with underground stems that are woody and up to 1 cm thick. These form a branching network. Aerial stems arise from these. These can be 20 cm high. There are a few erect leaves. The leaf blade is sword shaped and 8 cm long by 1.5 cm wide. The lower surface has a white felt. The flowers are in loose clusters. They are cream coloured. The fruit is oval and fleshy. They are 1.8 cm long and have one seed. The fruit has a strong smell.

Distribution: A tropical plant. It grows amongst rocks and in sand and clay soils. It can be in seasonally flooded grassland. It grows between 900-1200 m above sea level. In Zimbabwe it grows between 1200-1600 m above sea level. It can grow in arid places.

Use: The sweet outer layer of the fruit is eaten. It is buried in the sand to become ready to eat. It can be dried and eaten as a soft cake. It is also used to make beer. Juice of the fruit can be drunk fresh or boiled to a firm consistency. The crushed kernels are eaten as a relish with meat.



Cultivation:

Production:

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
nut	1.9	2919	26.3	-	-	4.7	3.7

Image accessed from: https://live.staticflickr.com/3703/9620913891_f88b567cb3_b.jpg

Nuts, seeds, herbs and other foods

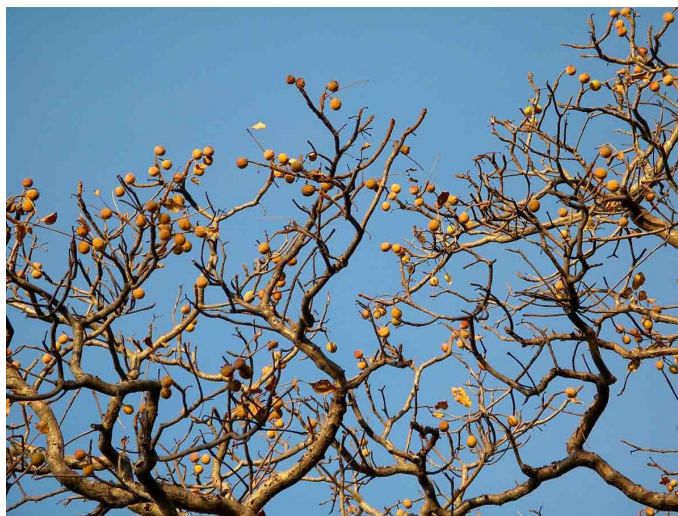
Common name: Mongongo nut

Local:

Scientific name: *Schinziophyton rautanenii*

Plant family: EUPHORBIACEAE

Description: A large spreading tree. It has a sturdy trunk up to 1 m across. It usually grows 7-9 m tall but can be 24 m tall. The crown is rounded. It has smooth green or golden bark and stubby branches. There are reddish-brown furry hairs on the young branches and stalks. These disappear with age. The plant has a cloudy latex. The leaves are produced one after another along the stalk. The leaves are compound and leaflets arranged like fingers on a hand. The leaves have 3-7 leaflets and these are 5-13 cm long and 2.5-9 cm wide. They are velvety grey underneath. The leaf stalks are 15 cm long.



The base of the leaflets is unequal. They are dark green on top and paler underneath. The leaves have star shaped hairs in both sides. There are 1-3 flat dark glands where the leaf joins the stalk. It loses its leaves during summer. The male and female flowers on different plants. The buds are rusty red and velvety and on long furry stalks. The flowers are small and white or yellow. The female flowers are more tightly grouped together than the male flowers. The fruit is egg shaped and 35 mm long by 25 mm wide. They are velvety. When young they are hairy and when mature have a tough brown shell. There is a thick layer of pulp around a very hard and finely pitted stone. Inside this are two light-coloured kernels. The fruit and the kernel are edible.

Distribution: A tropical plant. It grows on Kalahari sand. It needs a hot subtropical climate. It grows in deep, well-drained, dry sandy soils. It is often over limestone material. It does well with average temperatures above 20°C and often above 30°C. It will grow with rainfall between 200-1000 mm per year. It grows at altitudes between 200-1000 m. It can tolerate frost. It can grow in arid places.

Use: The fresh and dried fruits are eaten. The fruit flesh and the seeds are eaten raw or cooked. The nuts are also eaten. They are eaten raw, dried, cooked, whole or pounded and mixed with other ingredients to make a variety of dishes. The fruit is eaten raw or cooked. It is also used to make soup and beer. The nuts also produce an oil used for cooking.

Cultivation: Cultivation has proven difficult. Seed grow more easily if they have passed through an elephant.

Production: Trees take 25 years until fruiting. Fruit are harvested off the ground.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
nut	4.2	2717	26.3	-	-	3.4	3.5
fruit	8.6	1409	7.8	-	27.0	2.5	1.7
press cake	12.0	1338	56.5	-	-	-	-

Image sourced from: http://zambiaflora.com/speciesdata/image-display.php?species_id=135650&image_id=2

Nuts, seeds, herbs and other foods

Common name: Cashew

Local:

Scientific name: *Anacardium occidentale*

Plant family: ANACARDIACEAE

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



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

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

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

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

Food Value: Per 100 g edible portion

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

Nuts, seeds, herbs and other foods

Common name: Sour dock

Local:

Scientific name: *Rumex crispus*

Plant family: POLYGONACEAE

Description: An erect herb that can grow up to 1 m tall. It keeps growing from year to year. The leaves are smooth, sword shaped or oblong, and up to 30 cm long. They are wavy along the edges. The leaves at the base are larger with larger leaf stalks. The flowers are very small and greenish. They are crowded in rings on a branched flower stalk. The flowering stems can be 1.2 m high. The fruit is dry, three angled and has one seed. The seed valves are broad and 4-6 mm long. They do not have spines.



Distribution: It is a temperate plant. It often grows self-sown in waste ground. It can grow in cobble beach shores. It can grow in waterlogged soil and wetlands and survive being covered with water in floods. In Zimbabwe it grows from 1220-1700 m above sea level. In Argentina it grows from sea level to 3700 m above sea level.

Use: The very young leaves can be added to salads. They are also used in soup. Older leaves are boiled. If they are bitter the water should be changed 2 or 3 times. They are used in soups. When cooked in milk the astringent taste goes. The leaves are used for *sarma* in Turkey. They are rolled around a filling of rice or minced meat. The seeds can be cooked and eaten but are bitter. They are used in pancakes.

Cultivation: One plant can produce 60,000 seeds. These can remain viable for over 80 years in the soil.

Production: Plants can flower 9 weeks after germination. Plants grow in winter and spring and flower in response to increasing daylength.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	8.6	1750	13.4	-	-	56.2	6.6
leaf (boiled)	93.6	84	1.8	347	26.3	2.1	0.2
leaf (dry)	-	-	32.0	-	-	-	-

Nutritional values of food plants by plant Family

Plant Family	Scientific name	Common name	Edible part	Moisture %	Energy kJ	Protein g	Vit A µg	Vit C mg	Iron mg	Zinc mg	Page
AMARANTHACEAE	<i>Amaranthus viridus</i>	Green amaranth	leaf	87.3	-	4.5	72	169	6.0	-	31
AMARANTHACEAE	<i>Amaranthus retroflexus</i>	Red root amaranth	seed	10.3	1944	17.3	-	-	101	9.7	53
ANACARDIACEAE	<i>Anacardium occidentale</i>	Cashew	nut	4.0	2478	17.5	-	-	2.8	4.8	59
ANACARDIACEAE	<i>Mangifera indica</i>	Mango	fruit	83.0	253	0.5	1200	30	0.5	0.04	34
ARACEA	<i>Colocasia esculenta</i>	Taro	root	66.8	1231	1.96	3	5	0.68	3.2	11
ARACEA	<i>Xanthosoma sagittifolium</i>	Chinese taro	root	67.1	559	1.6	5	13.6	0.4	0.5	44
ASTERACEAE	<i>Hypochaeris radicata</i>	Spotted cat's ear	leaf	-	-	0.8	-	-	4.2	0.3	28
BOMBACACEAE	<i>Adansonia digitata</i>	Boabab	fruit	16.0	1212	2.2	-	360	7.4	6.7	33
BRASSICACEAE	<i>Brassica carinata</i>	African cabbage	leaf	88.0	86.1	3.5	-	157.0	1.3	0.9	52
BRASSICACEAE	<i>Capsella bursa-pastoris</i>	Shepherd's purse	leaf	88.2	138	4.2	3000	91	4.8	-	46
CHRYSOBALANCEAE	<i>Parinari capensis</i>	Sand apple	nut	1.9	2919	26.3	-	-	4.7	3.7	57
CONVOLVULACEAE	<i>Ipomoea batatas</i>	Sweet potato	tuber (baked)	72.9	431	1.7	2182	24.6	0.5	0.3	50
CUCURBITACEAE	<i>Cucurbita maxima</i>	Winter squash	leaf	88.0	160	4.9	260	28	2.5	0.9	54
EUPHORBIACEAE	<i>Manihot esculenta</i>	Cassava	tuber	62.8	625	1.4	30	15	0.23	0.48	47
EUPHORBIACEAE	<i>Schinziophyton rautanenii</i>	Mongongo nut	nut	4.2	2717	26.3	-	-	3.4	3.5	58
FABACEAE	<i>Acacia farnesiana</i>	Mimosa bush	seed (dry)	8.1	1522	36.6	-	-	6.0	0.6	24
FABACEAE	<i>Arachis hypogaea</i>	Peanut	seed (dry)	4.5	2364	24.3	0	-	2.0	3.0	20
FABACEAE	<i>Crotalaria brevidens</i>	Slenderleaf rattlepod	leaf	74.5	-	8.8	-	-	38.0	-	29
FABACEAE	<i>Glycine max</i>	Soybean	seed	9.0	1701	33.7	55	-	6.1	-	19
FABACEAE	<i>Parkia filicoidea</i>	African locust bean	seed (dry)	7.0	1780	32.3	-	6	33.2	-	22
FABACEAE	<i>Tylosema esculentum</i>	Gembok bean	seed	3.9	2660	32.9	-	-	-	-	21
FABACEAE	<i>Tylosema fassoglensis</i>	Marama bean	seed	7.5	452	43.5	-	-	-	-	23
FABACEAE	<i>Vigna subterranean</i>	Bambara groundnut	seed	7.3	1572	18.4	-	-	4.6	2.2	25
FABACEAE	<i>Vigna unguiculata</i>	Cowpea	seed (dry)	11.2	1189	23.5	-	1.5	6.4	-	18
MALVACEAE	<i>Grewia tenax</i>	Small-leaved white raisin	fruit	59.1	-	4.5	-	161	125	-	39
MALVACEAE	<i>Hibiscus trionum</i>	Flower-of-an-hour	leaf	6.3	1263	26.7	-	-	79.8	5.7	32
MALVACEAE	<i>Sida cordifolia</i>	Goat's horns	leaf	6.6	1296	24.2	-	-	79.8	-	26
MORACEAE	<i>Ficus benghalensis</i>	Indian banyan	fruit	13.0	-	8.1	-	156.6	4.1	-	40
MORINGACEAE	<i>Moringa oleifera</i>	Moringa	leaf (boiled)	87	189	4.7	883	31.0	2.0	0.2	43
MYROTHAMNACEAE	<i>Myrothamnus flabellifolius</i>	Resurrection bush	leaf	6.3	1130	7.6	-	-	17.9	7.5	56

Plant Family	Scientific name	Common name	Edible part	Moisture %	Energy kJ	Protein g	Vit A µg	Vit C mg	Iron mg	Zinc mg	Page
MYRTACEAE	<i>Psidium guajava</i>	Guava	fruit	77.1	238	1.1	60	184	1.4	0.2	38
PEDALIACEAE	<i>Sesamum indicum</i>	Sesame	seed (dry)	4.7	2397	17.7	1	-	14.6	7.8	55
PEDALIACEAE	<i>Sesamum Calycinum</i>	Rose-pink sesame	leaf	76.5	-	5.6	-	47.0	35.2	-	30
PHYLLANTHACEAE	<i>Phyllanthus maderaspatensis</i>	Quail grass	leaf	60.9	552	3.0	-	-	59.4	1.0	27
PLANTAGINACEAE	<i>Plantago major</i>	Common plantain	leaf	81.4	255	61	3.8	3300	19	-	42
POACEAE	<i>Eleusine caracana</i>	Finger millet	seed	11.7	1594	6.2	-	-	5.3	-	14
POACEAE	<i>Eragrostis tef</i>	Teff	seed	9.3	1541	8.9	-	-	9.9	20	17
POACEAE	<i>Oryza glaberrima</i>	African rice	seed	11.3	1538	7.4	-	-	3.4	-	10
POACEAE	<i>Panicum miliaceum</i>	Common millet	seed	9.6	1548	11	-	-	-	-	16
POACEAE	<i>Pennisetum glaucum</i>	Bullrush millet	seed	11.6	1442	10.5	-	-	6.5	1.7	13
POACEAE	<i>Sorghum bicolor</i>	Sorghum	seed	-	1459	11.1	-	-	-	-	15
POLYGONACEAE	<i>Rumex crispus</i>	Sour dock	seed	8.6	1750	13.4	-	-	56.2	6.6	60
SOLANACEAE	<i>Capsicum annum</i>	Capsicum	fruit (green raw)	93.5	65	0.9	59	100	0.4	0.2	49
SOLANACEAE	<i>Cyphomandra betacea</i>	Tamarillo	fruit	86.2	113	2.0	500	28	0.7	-	36
SOLANACEAE	<i>Physalis peruviana</i>	Cape gooseberry	fruit	84.2	201	2.0	360	30	1.5	-	41



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

www.foodplantsolutions.org

