

Potentially Important Food Plants of Lesotho



**FOOD PLANT
SOLUTIONS**
ROTARIAN ACTION GROUP

*Solutions to Malnutrition
and Food Security*



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

www.foodplantsolutions.org

Potentially Important Food Plants of Lesotho

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.

Preface

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

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

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

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

- makes any expressed or implied representation as to the accuracy of the information contained in the database or the Field Guide, and cannot be held legally responsible or accept liability for any errors or omissions
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- 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.

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Introduction

This book is designed as a simple introduction to the more common food plants of Lesotho. It is hoped people will take greater pride and interest in these plants and become confident and informed about how to grow and use them. Many of the local food plants that occur in every country are very good quality foods. Unfortunately, people often reject traditional food plants and grow more introduced vegetables in preferences. For example, ballhead cabbage does not have the same food value as many traditional, tropical, dark green, leafy vegetables.

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 these plants, and in many cases, 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 showing there are often much better choices of local foods with higher levels of important nutrients.

An Important Note

The principle behind Food Plant Solutions is to encourage the use of local plants. Some of these may be major agricultural crops that are already well known. Examples include:

- Rice
- Oats
- Mango
- Wheat
- Maize/corn
- Banana

There are others, but these serve as examples.

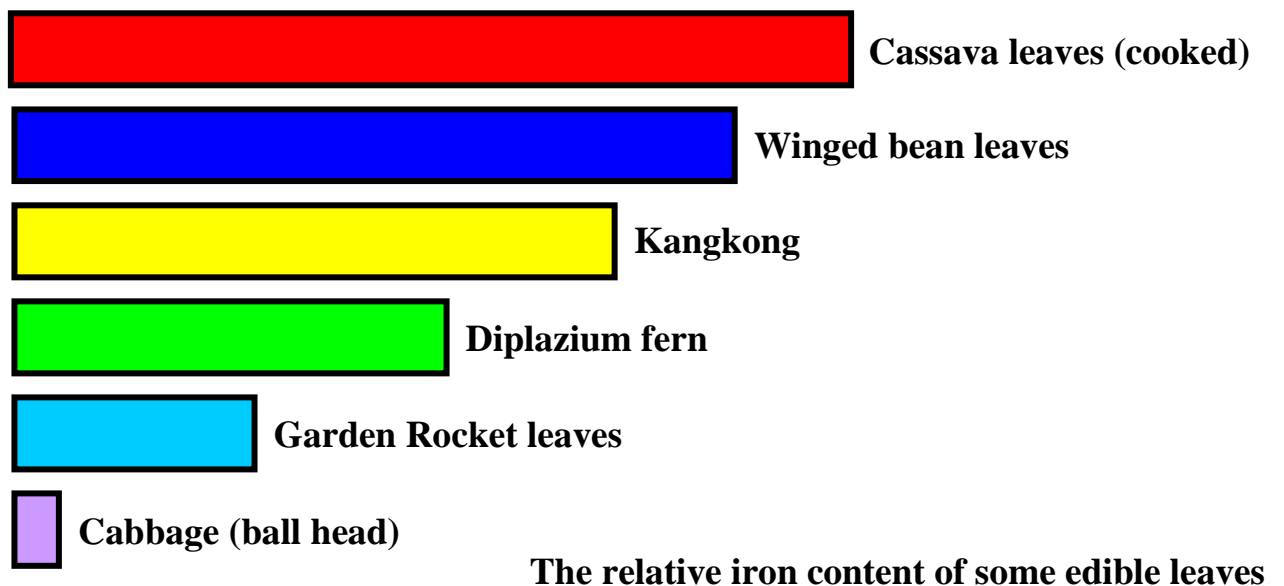
As a general principle, these types of plants should not be included in a field guide, as they are well known, and in some cases (e.g. corn), are relatively high input crops. The purpose of the Food Plants Solution project is to look beyond these types of crops, and focus on plants that are less well known and, as noted above, often have superior food value and lower input requirements.

It is also important to note that while some plants have extremely high levels of some nutrients, many of these are used as flavouring foods (condiments), and are generally used only in small amounts. Therefore, the nutritional contribution they make to the diet will be relatively small. Typical of these types of plants are coriander, parsley etc. Once again, these should not be considered as major food sources. A few may be included in the *Nuts, Seeds, Herbs and other foods* section of the field guide.

Nutrient Value

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, (and keeping it watered), 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. In many cases, small tubers of yams, taro etc. are stored for planting for the next crop. This is not always good practice, as the small tubers could be the result of diseases (such as viruses) in the plant. A good rule is to take cutting or save tubers from the best plants for re-planting.

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. 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! Once again saving seed from the better plants helps ensure that you have better crops the next time you 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. 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. Cutting it into small pieces will help it break down more quickly into usable compost.

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. Compost returns nutrients to the soil, improves the soil's ability to retain moisture and also helps improve soils that are acid or saline.

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. Cutting the plant material (especially stems), into small pieces no longer than about the width of a finger, will help it break down quicker. If possible, make layers of plant material, then a small layer of soil, and then scatter fire ash on top. Keep repeating this process to make a heap. A good compost heap should be warm inside. Be careful with diseased plant material. This should be burnt, otherwise the disease may be spread when you use the compost at a later date.

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

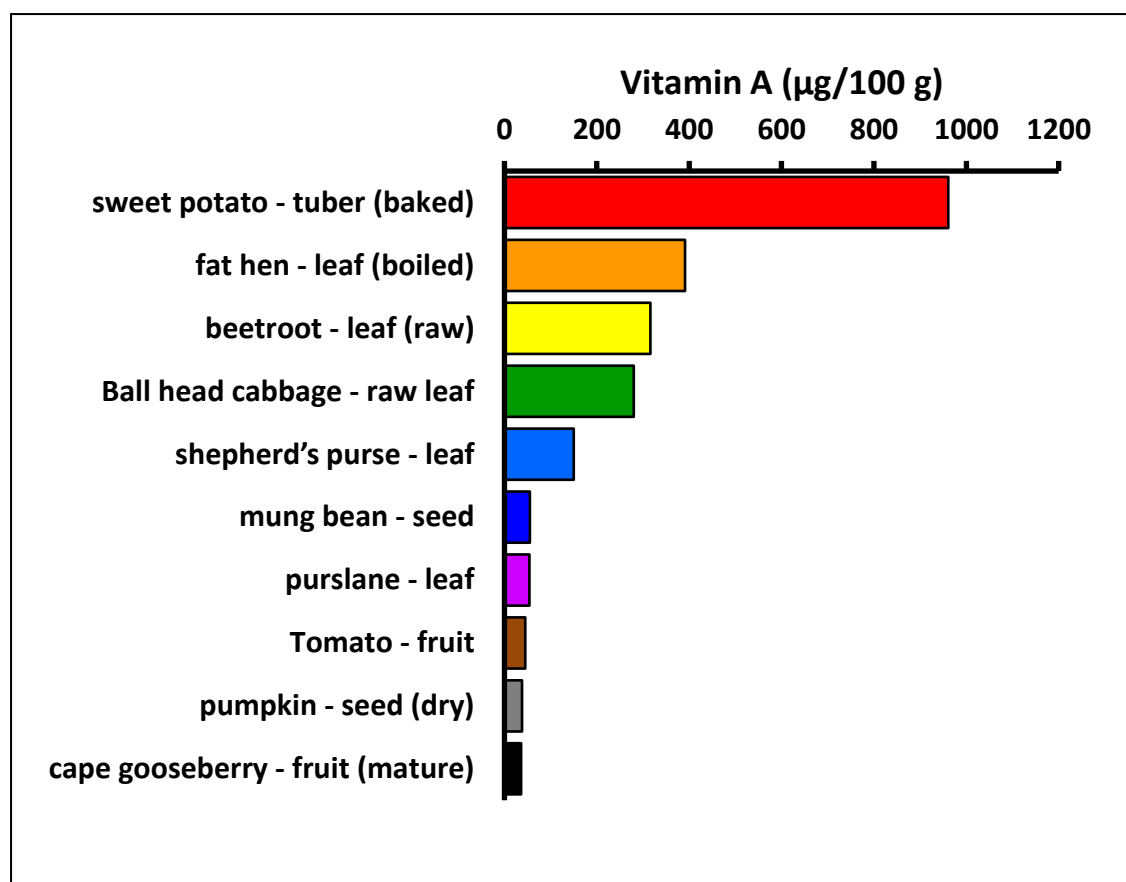
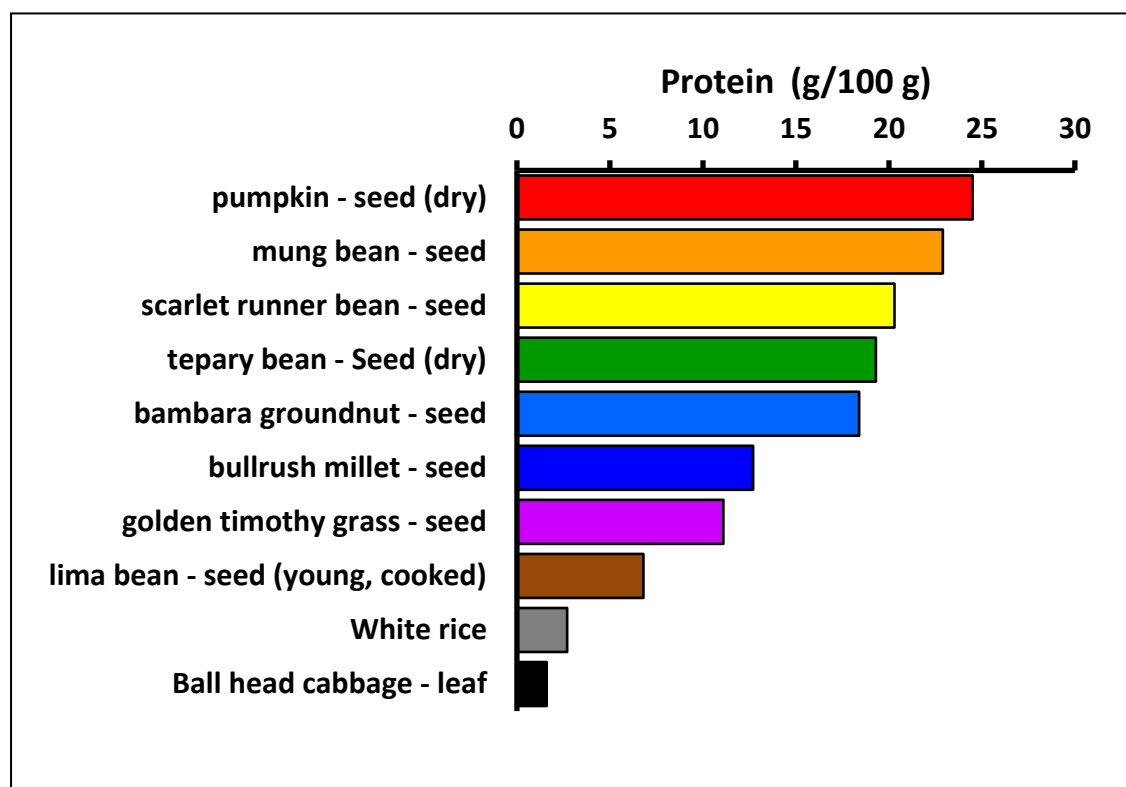
There are a large number of insects that enjoy sharing our food with us! We should not try to kill all these insects as they have an important role to play in keeping everything in nature in balance. What we need to do is to learn to manage these insects so we can all get some food to eat! Some insects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

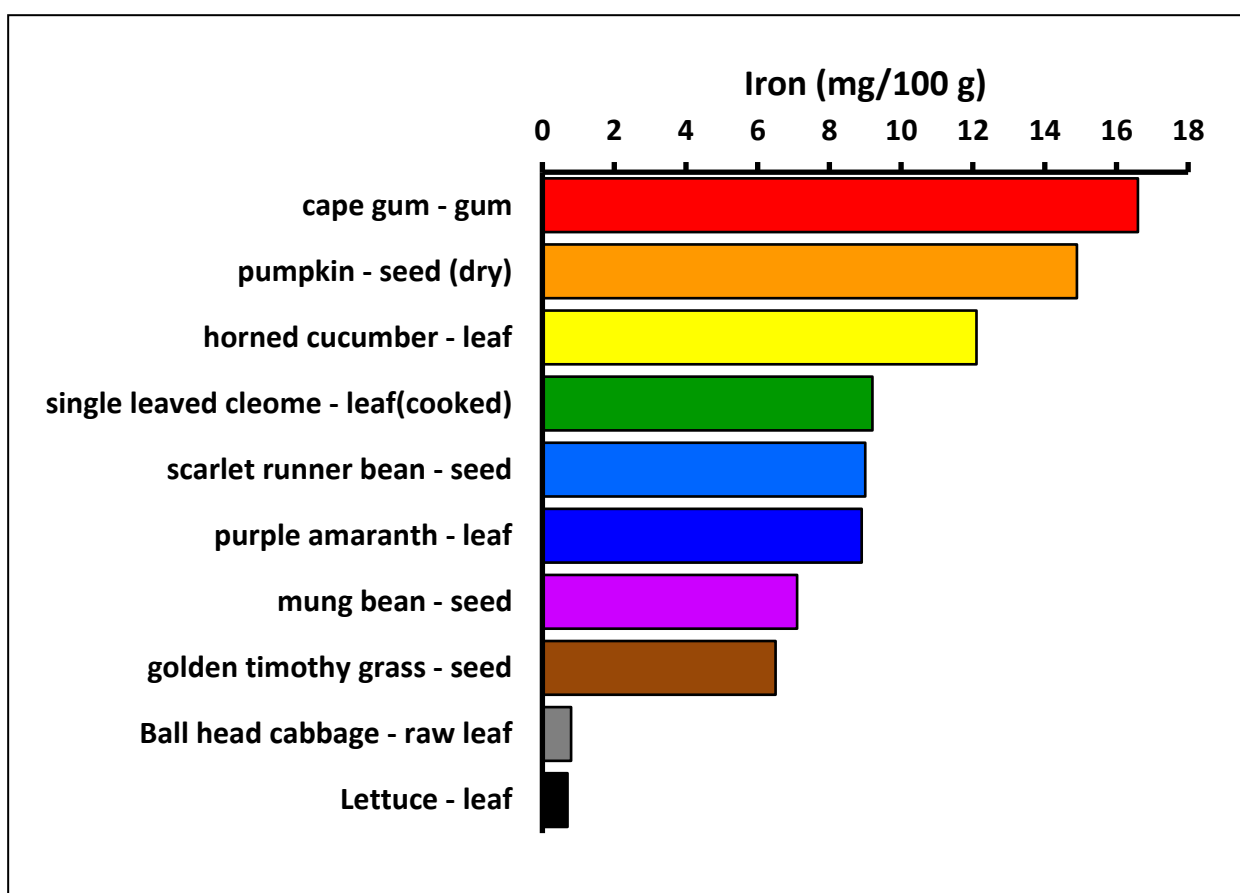
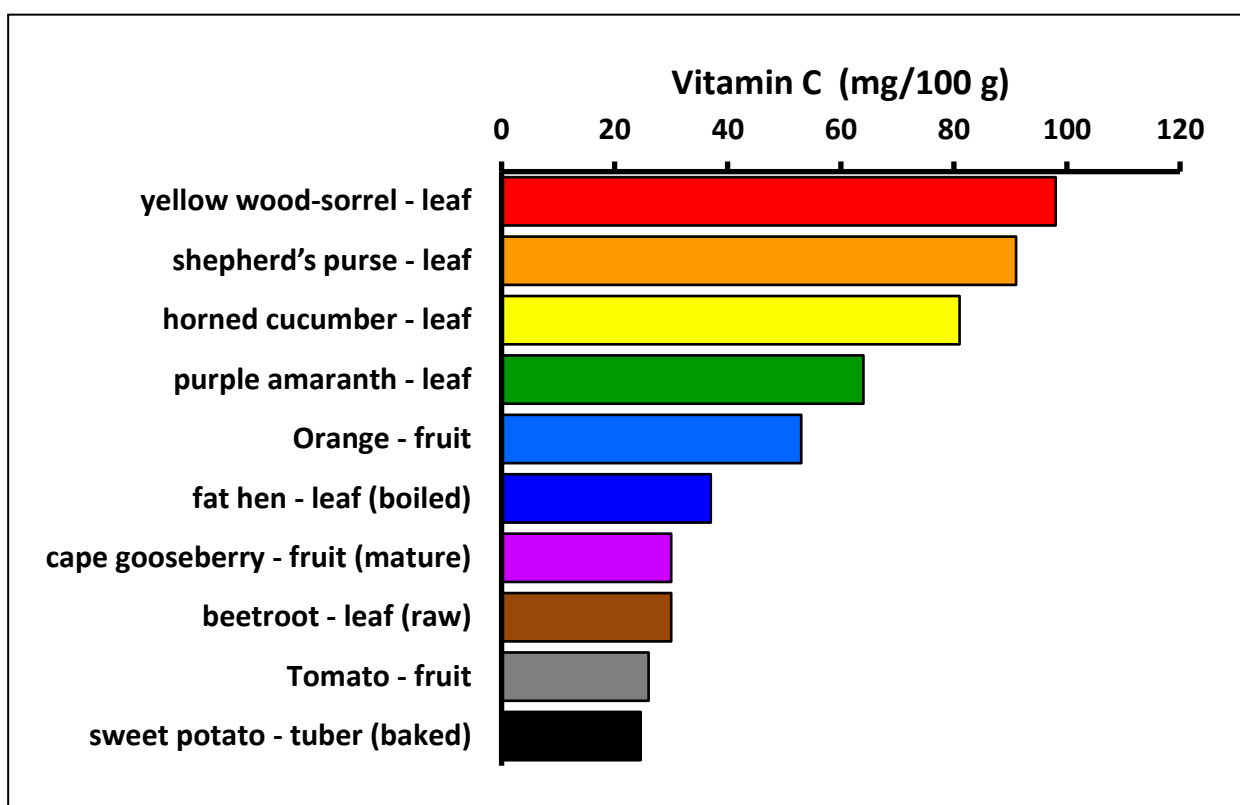
pulling off the leafy bracts over the banana fruit reduces the damage, as this lets sunlight in and the insect flies away. The best rule for reducing pest damage is to grow healthy plants, as they suffer less damage. Spiders, ladybirds, hover flies and many other insects also feed off the insect pests that attack our crops and should be encouraged.

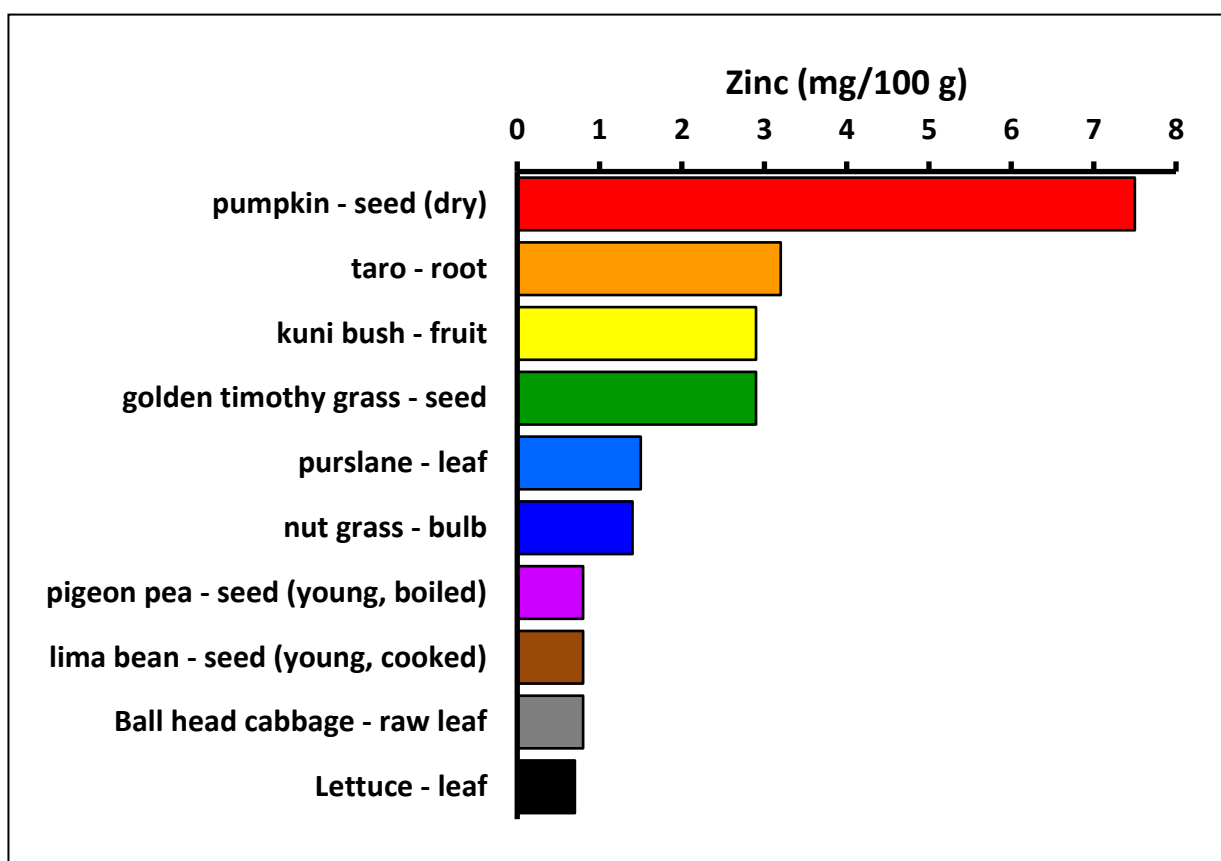
Diseases

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. Plants infected by viruses are often yellow, and may be stunted, or have curled or unusual shaped leaves. 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 Lesotho







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 program to concentrate on plants that are less well known and/or underutilised.

Starchy staples

English: Cassava

Local:

Scientific name: *Manihot esculenta*

Plant family: EUPHORBIACEAE

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



Distribution: A tropical plant. Plants grow from sea level up to about 1,650 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 10,000 to 30,000 plants per hectare are used. Plants from the higher density crops have been shown to have quick post harvest deterioration. Mulching has given significant yield increases in some conditions. It also reduces the incidence and damage of some root boring insects.

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

Food Value: Per 100 g edible portion

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

Starchy staples

English: 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. Under the ground fattened tubers are produced. 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 2,700 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. Under shaded conditions, both foliage growth and storage root production are decreased. Some cultivated varieties 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 leaves which are however larger. With increasing shade less tubers are produced and these grow more slowly. Sweet potato tends to be responsive to potassium fertiliser. cultivated varieties 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. 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 33,000 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 leaves which are however larger. With increasing shade less tubers are produced and these grow more slowly.

Sweet potato tends to be responsive to potassium fertiliser. Cultivars are often selected for yield under low fertility conditions.

Under lowland conditions in the tropics sweet potato tubers undergo active tuber enlargement from 6 - 16 weeks. Weed control is essential especially during early stages of growth. The rate of ground coverage by foliage varies greatly with growing conditions and cultivar but once ground coverage has occurred weed control is less of a problem. Sweet potato tuber initiation is subject to aeration in the soil. Either heavy clay soils, waterlogged conditions or other factors reducing aeration can result in poor tuber production. For this reason sweet potatoes are often grown on mounded beds. In well drained or high organic matter soils digging or mounding is not as essential. Leaf scab (*Elsinoe batatas*) can significantly reduce yield especially in sites where leaf production is low due to low soil fertility. To reduce sweet potato weevil damage plants need to be hilled or have the tubers well covered with soil. Cracking soils can allow the weevil access to tubers.

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

Food Value: Per 100 g edible portion

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

Starchy staples

English: Potato

Local:

Scientific name: *Solanum tuberosum*

Plant family: SOLANACEAE

Description: A branched annual plant up to 50 cm tall. The stems are soft and 4 angled with compound leaves. The leaves are irregular shape and have 6 - 8 pairs of leaflets as well as small irregular leaflets between the others. It has swollen stem tubers under the ground. The tubers can vary in colour from white to red and purple. The tuber shape can also vary greatly. The flowers are white pink or purple. The fruit is a berry. It is smooth, round and green but often striped.



Distribution: In the tropics they mostly grow at high altitude above 1,500 m, but they are grown between 900 and 2,800 m. Tubers form best when soil temperatures are 15.5°C. Tuber formation stops with a soil temperature of 30°C and decreases with temperatures above 20°C. Potatoes should have a mean temperature below 18°C. They are damaged by frost but slightly more frost tolerant than sweet potato. Short daylength helps tuber production. They can grow with a soil pH of 5.2 - 6.6. It suits hardiness zones 7 - 11.

Use: The tubers are cooked and eaten. They are also fried, canned and made into starch. The tubers are boiled, baked, roasted, mashed and used in soups, stews, dumplings, pancakes and potato salads. Potatoes are also use for alcoholic drinks. The tender leaves are also occasionally eaten.

Caution: The green tubers and leaves contain a poisonous alkaloid solanine.

Cultivation: Plants are grown from tubers. Due to virus diseases, it is necessary to get fresh seed tubers each few years. Large tubers can be cut to include a bud or "eye". A seed piece of 40 - 50 g is suitable. It is best to inter-crop as this stops bacterial wilt spreading. The plant is surrounded by dirt when 20 - 25 cm tall. Later the tubers need to be kept covered with dirt. Providing extra light (4 - 5 hours) allows plants to form flowers and true seed to be collected.

Production: The time to maturity is between 17 and 24 weeks. Yields of 5 - 12 t/ha can be expected. Higher yields can be obtained with good care.

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)	71.2	456	2.3	0	12.9	1.4	0.3
tuber	77.0	344	2.0	25	21	0.8	0.27
leaf	86.1	-	-	3.4	-	-	-

Starchy staples

English: Nut grass

Local:

Scientific name: *Cyperus rotundus*

Plant family: CYPERACEAE

Description: A sedge. It is a herb that continues growing from year to year. It has both rhizomes and tubers under the ground. The leaves of this plant have a blunt tip and do not have a shoulder along the leaf. The leaves mostly grow from the base of the plant. They are narrow and flat and 5-20 cm long. The flower is a compound flower with 5 leafy bracts near the base of the flower. These are of different lengths. The flower stem is 3-angled and 20-50 cm high. The fruit are 3 angled and brown. They are about 1.5 mm long. The tubers of this species are dark brown, in a chain and have a bitter or unpleasant taste.



Distribution: A tropical plant. It occurs world wide in warmer places. In Papua New Guinea it grows up to 1800 m altitude. In Nepal it grows between 300-2400 m altitude. It grows in moist places. It can grow in most soil types and most pH levels. It cannot tolerate salt or shade. It can grow in arid places.

Use: The tubers are eaten fresh. They are also roasted or boiled and can be dried and made into flour. The bases of the culms are cooked and eaten.

Caution: All parts of the plant can contain poisonous cyanide (the bitter taste) so must be well heated before eating.

Cultivation: Plants are grown by seed or tuberous rhizomes. Seeds often do not grow. Rhizomes and tubers are more common methods of reproduction.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
bulb	53.3	750	1.9	-	2	5.8	1.4

Starchy staples

English: Taro

Local:

Scientific name: *Colocasia esculenta*

Plant family: ARACEAE

Description: This plant has large flat leaves on the end of upright leaf stalks. It grows up to 1 m high. The leaf stalk or petiole joins the leaf towards the centre of the leaf. The leaves are 20 - 50 cm long. Near the ground a thickened rounded corm is produced. Around this plant 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 2,300 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, higher temperatures, and higher hours of sunlight, enhance production and determine seasonality of production.

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

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

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

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

Spacing affects total yield, and marketable, harvestable yield, of corms. Close spacing increases the corm yield per area, and the shoot yield per area, but decreases the corm yield per plant, and the contribution of sucker corms, to the yield. Where spacings of 30 cm x 30 cm are used, giving about 110,000 plants per hectare, a very large amount of planting material is required, which reduces the net return per unit of planting material. A spacing of 60 cm x 60 cm 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	92.2	2.7	424	35.5	1.2	0.2

Legumes

English: Mung bean

Local:

Scientific name: *Vigna radiata*

Plant family: FABACEAE

Description: An upright hairy bean plant which can grow to 1 m tall. It has many branches. The leaves have 3 leaflets, are dark green and grow on long leaf stalks. There are oval stipules at the base of the leaf. Flowers are pale yellow and small. They occur in bunches of 10 - 20 on the ends of long hairy flower stalks. Pods are black and straight. They do not have a beak. Pods contain 10 - 20 seeds which are usually green or golden yellow. They are smaller than black gram. The beans can be black. They have a flat white hilum. There are 2,000 varieties.



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

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

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

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

Food Value: Per 100 g edible portion

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

Legumes

English: Tepary bean

Scientific name: *Phaseolus acutifolius* var. *acutifolius*

Local:

Plant family: FABACEAE

Description: A twining or sprawling bean plant. It is an annual herb. It grows 45-100 cm high and spreads 30-60 cm wide. The leaves are compound. They have 3-5 narrow, pointed, sword shaped leaflets. The primary leaves do not have stalks. The flowers are white or yellow on short stalks. The fruit are oblong seed pods. These are slightly hairy and green but dry to a straw colour. There are 2-10 seeds per pod. These are normally flat.



Distribution: A tropical and subtropical plant. It can grow in hot dry regions. They do not do well in humid weather. It grows between 50 and 1920 m altitude. It requires an annual rainfall of 250-300 mm. It needs well drained soils. It needs a pH between 6.7-7.1. It can grow in arid places. It suits hardiness zones 8-11.

Use: The seeds are ground into flour and used for "instant" bean dishes. The seeds are eaten boiled or baked. They are used in soups and stews. The young tender pods are cooked and eaten. The leaves are tough so need to be cooked well.

Cultivation: Plants are grown from seed. Seed stored dry will remain viable for 3 years

Production: Plants flower 27-40 days after germination. They ripen 60-80 days after germination. Yields of 200-950 kg per ha are achieved. Yields are high with good fertiliser use.

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)	8.6	1476	19.3	-	-	-	-

Legumes

English: Scarlet runner bean

Scientific name: *Phaseolus coccineus* subsp. *coccineus*

Local:

Plant family: FABACEAE

Description: A climbing bean. It is a robust plant and keeps growing from year to year by re-growing from the fattened root. The stems are often hairy. It grows 1.8-2.4 m high. It can spread 1.8-2.4 m wide. It twines around a trellis. The leaves are compound and have three leaflets. The flowers are bright red. They are in clusters 2.5 cm long. The pods are long (30 cm) and with a wavy edge. The seeds are large and can be several different colours. It sometimes has a root tuber.



Distribution: A tropical plant. It grows naturally in the mountain regions from Mexico to Panama. It is grown in the highlands in the tropics. On the tropical coast seedlings die and pods are not formed. It is damaged by frost. It suits hardiness zones 8-10.

Use: The very young pods can be eaten. They are boiled, steamed, baked etc. The seeds are edible. They are dried then soaked. The flowers have a bean like flavour and are used in salads. Young leaves can be used as a potherb. The tubers can be eaten after they are cooked and the cooking water thrown away.

Cultivation: It is grown from seeds. Seed are planted 2.5 cm deep. Plants are spaced 20 cm apart. It needs sticks to climb up. It can be allowed to re-grow from the tubers or the tubers re-planted.

Production: It grows quickly.

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	12.0	1419	20.3	-	7	9.0	-

Legumes

English: Pigeon pea

Local:

Scientific name: *Cajanus cajan*

Plant family: FABACEAE

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



Distribution: A tropical plant that requires a tropical or subtropical climate. Plants grow from sea level up to about 1,800 m in the tropics. They can tolerate drought and are suited to a drier climate. They can grow in places with less than 600 mm rainfall per year. They do less well in the wet tropics. They suffer in waterlogged soils and are damaged by frost. It can also tolerate heat. It will grow on poor soils cannot grow on salty soils. It can grow in arid places and suits hardiness zones 10 - 12.

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

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

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

Food Value: Per 100 g edible portion

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

Legumes

English: Lima bean

Local:

Scientific name: *Phaseolus lunatus*

Plant family: FABACEAE

Description: A perennial climbing bean. It is often a tall, vigorously climbing plant which can keep growing for some years. The leaves are slightly rounded at the base and pointed at the tip. The flower is white or yellow. The keel of the flower is twisted which helps tell the difference between this bean and Lablab bean. The pods are long (10 cm), flattened and curved and have 3 - 4 seeds which are highly variable in colour. The seeds are large. The seeds have a short round hilum where the seed is attached to the pod. The seeds also have lines going out from this point across the bean seed.



Distribution: It suits warm and subtropical areas. In the tropics it is common from 500 - 2,100 m altitude but grows to the limit of cultivation (2,700 m). For germination it must have a soil temperature above 15.5°C and cannot withstand frost. In very hot weather seeds often do not set. It does best in a temperature range 14 - 21°C. It is sensitive to a pH less than 6. It can grow in arid places.

Use: The leaves, young pods and seeds are all eaten. The seeds are eaten fresh or after drying. They are also fried in oil. Dried beans are boiled or baked. They can be used in soups and stews. The seeds are sometimes grown as bean sprouts then cooked and eaten.

Caution: Some kinds have poison (hydrocyanic acid). This is destroyed by thorough cooking. The beans contain a protein inhibitor but this is also destroyed by cooking.

Cultivation: It is grown from seed. Coloured seeds are often hard to get to grow but white seeded kinds start growing easily. Sow 3 - 4 seeds in a hill and put a stick 2 - 3 m tall in the middle. Hills should be about 1 m apart. Seeds should be 2 - 4 cm deep.

Production: Harvesting can begin after about 100 days. Dried beans can be stored for several months. Yields of 0.12kg of seed per square metre have been obtained. The yield of pods can be 1kg per square metre.

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	12.0	1407	19.8	-	0	5.6	-
seed (young, cooked)	67.2	515	6.8	37	10.1	2.5	0.8
seed (young, raw)	70.2	473	6.8	30	23.4	3.1	0.8

Legumes

English: Broad bean

Local:

Scientific name: *Vicia faba*

Plant family: FABACEAE

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



Distribution: A temperate plant only suitable for the highlands over about 1,200 m. in the tropics. It mainly occurs from 1,900 - 2,700 m altitude in equatorial zones. It is frost tolerant and is resistant to drought. It can grow with temperatures down to 4°C. In the lowland hot tropics it often flowers but does not set seed. It requires fertile soils. It does best with adequate lime needing a soil pH of 6.4 - 7.2. It can tolerate some salinity.

Use: It is mostly the young beans that are eaten. The ripe beans and leaves are also edible. The dried beans can be boiled, ground into flour and added to soups or used for making tofu. Sprouted seeds are cooked and eaten. The tender pods are eaten as a vegetable.

Caution: Some people, mainly of Mediterranean origin can get a disease called Favism from these beans. The beans should be well cooked. They can react with some people using some antidepressant drugs.

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

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

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed (dry)	10.0	1448	26.2	130	16	6.7	-
seed (fresh, raw)	76.0	315	7.1	35	140	1.9	0.6
seed (fresh, boiled)	83.7	259	4.8	27	20	1.5	0.5

Legumes

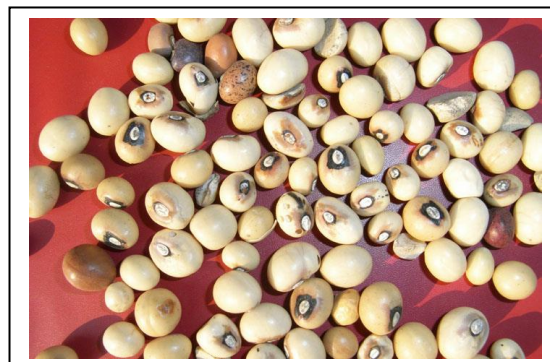
English: Bambara groundnut

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	-	1572	18.4	-	-	-	-

Legumes

English English: Lablab bean

Local:

Scientific name: *Lablab purpureus*

Plant family: FABACEAE

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



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

Use: The young pods, ripe seeds and young leaves are edible, cooked. Flowers can be eaten raw, steamed or added to soups and stews. Dried seeds can be cooked as a vegetable. The seeds can also be sprouted then crushed and cooked. The large starchy root is edible.

Caution: Many types can be poisonous. They should be boiled and the cooking water thrown away.

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

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

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed (dry)	10.0	1428	22.8	-	-	9.0	-
seed (young)	86.9	209	3.0	14	5.1	0.8	0.4
pod (fresh)	86.7	203	3.9	-	1	2.4	-

Leafy greens

English: Purple amaranth

Local:

Scientific name: *Amaranthus cruentus*

Plant family: AMARANTHACEAE

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



Distribution: It grows in the tropics and more temperate regions. In the tropics it grows mainly in the highlands. In Papua New Guinea it occurs between 1,200 and 2,200 m altitude. It needs a night temperature above 15°C and preferably a day temperatures above 25°C. It grows best in fertile, well drained soil and suits hardiness zones 8 - 11.

Use: The leaves and young plant are eaten cooked. They are also dried and stored. The seeds are ground into flour and used to make bread.

Caution: This plant can accumulate poisonous nitrates if grown with high nitrogen inorganic fertilisers.

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

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

Food Value: Per 100 g edible portion

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

Leafy greens

English: 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 1,490 – 1,920 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	-	4.2	150	91	4.8	-

Leafy greens

English: Fat hen

Local:

Scientific name: *Chenopodium album*

Plant family: CHENOPODIACEAE

Description: An annual plant that grows to 1 m tall and spreads to 1 m across. The stem is erect and succulent with no hairs. They often have soft mealy lumps which can be rubbed off. The leaves are simple, with one at each node, and occurring alternately up the stem. The leaves are oval and wedge shaped with saw like edges. They are 5 - 12 cm long by 3 - 10 cm wide. The leaf stalk is usually shorter than the leaf blade. The under surface of the leaf often has a white mealy layer which can be rubbed off. The flowers occur in dense white spikes



at the tip and ends of branches. The fruit is a small, roundish, papery pod that opens around the tip. The pod contains large numbers of shiny black seeds that are 1.2 - 1.8 mm across.

Distribution: A temperate plant that also grows in the tropics. It grows best on light to medium well drained soil. It suits an open sunny position but can tolerate shade. It is drought and frost resistant. It commonly occurs as a weed in old fields. In Zimbabwe, it grows from 1,100 - 1,600 m above sea level. It can grow in arid places and can tolerate temperatures of 5 - 30°C.

Use: The seeds can be ground into flour. They contain saponin which should be leached out. They are used for bread, pancakes, muffins and biscuits. The tender leaves are cooked and eaten as a vegetable. They are also used in stews. Young flowers are cooked and eaten. The sprouted seeds are edible.

Cultivation: Plants are grown from seed. Seedlings can be transplanted at a spacing of 30 cm. It does well in soils with lots of nitrogen. It is self sown and harvested from potato crops in India.

Production: The tops can be eaten before and after flowering. They are harvested after 40 days.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	-	1654	16	-	-	-	-
leaf (boiled)	88.9	134	3.2	391	37.0	0.7	0.3
leaf	87.7	113	5.3	33	108	-	-

Leafy greens

English: Blackberried nightshade

Local:

Scientific name: *Solanum nigrum*

Plant family: SOLANACEAE

Description: An erect, branched, smooth herb that grows about 60 - 100 cm tall. The stems are green and 3-angled. Leaves are pointed at both ends. The leaves are 1.3 - 9 cm long by 0.5 - 6 cm wide. They are oblong and taper to the tip. They can have wavy lobes. The inner ring of petals is white and about 8 mm across. The fruit are black, smooth and round and hang downwards.



Distribution: They occur in waste places at low and medium altitudes throughout the country. It grows from sea level up to high altitudes such as 2,700 m in the tropics. It often comes up self-sown after fires. It is grown in most tropical countries as a green, leafy vegetable.

Use: The ripe fruit are cooked and eaten. They are also used for soup. The leaves and young shoots are eaten cooked. It is a commonly used vegetable.

Cultivation: It is grown from seed. In highlands areas, it is almost always self-sown or encouraged by burning grassland, but then weeded and harvested as a normal part of the garden. In coastal areas, seeds are sown by broadcasting, or scattering. Good yields can be obtained under moderate fertility levels. A spacing of 40 cm x 40 cm is suitable. Topping, or removing the top of the plant, encourages branching. It can be grown from cuttings.

Production: Seeds germinate about a week after planting. Leaves can be harvested after about 8 - 10 weeks by cutting off the last 5 cm of each branch. High yields can be obtained and 5 - 8 harvests over 6 - 8 weeks are possible. It grows rapidly, has high seed production and high viability of seed. This gives it a competitiveness as a weedy species, but also means it is one of the first edible greens to be harvested from a new garden.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	87.0	160	4.3	2196	20	1.0	

Leafy greens

English: Single leaved cleome

Local:

Scientific name: *Cleome monophylla*

Plant family: CLEOMACEAE

Description: A small annual herb. It is erect and hairy. It grows 30-60 cm high. It can be spreading. The leaves are simple and undivided. They are 2.5-8 cm long and narrow. The flowers are pink and purple. The pods are long and thin. They are 5-11 mm long by 3 mm wide. They contain several small flat seeds.

Distribution: A tropical plant. It grows in the Sahel regions in West Africa. It grows in areas with a rainfall of about 100 mm per year. It grows in hot arid places. It grows between 30-2,100 m above sea level. It can grow in arid places.



Use: The leaves are used as a vegetable. It has an unpleasant smell and acrid taste. Sometimes it is cooked a day before eaten to remove these aspects.

Cultivation: It can be grown from seeds.

Production: Leaves are collected during the rainy season.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	75.5	297	21.9	-	-	-	-
leaf(cooked)	-	73	3.0	-	-	9.2	0.43

Image sourced from; www.zimbabweflora.co.zw

Leafy greens

English: Yellow wood-sorrel

Local:

Scientific name: *Oxalis corniculata*

Plant family: OXALIDACEAE

Description: A small herb. It lies along the ground. The root system is thin. Several stems grow and these usually lie along the ground. These can form roots at the nodes. It grows 5 cm high. The stem is branched. There are no swollen storage organs under the ground. The leaves are stalked. They are alternate. The leaves have 3 leaflets. The leaflets have short slender stalks. The leaves are deeply lobed at the tip and wedge shaped at the base. There are stipules which are rounded and joined to the leaf stalk. The flowers are small and single. They occur on a side stalk. The flowers are yellow. The fruit are narrow and oblong. They are 5 angled. They have a short beak. There are several brown seeds.



Distribution: It can grow from tropical to warm temperate places. In Nepal it grows up to about 2900 m altitude. In Zimbabwe it grows between 490-2,270 m above sea level. It can grow in hot arid places. It can grow in arid places.

Use: The young leaves are chewed when fresh. They are also pickled. The leaves are sour and can be added to salads. They can be cooked as a potherb. The leaves can be soaked in hot water for 10 minutes to make a drink.

Caution: Because the plant contains oxalates, eating it over extended periods can reduce the bodies ability to absorb calcium.

Cultivation: Plants are grown from seed. They can also be grown from rooted cuttings of the branches.

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	85.5	188	5.1	60	98	5.2	-

Fruit

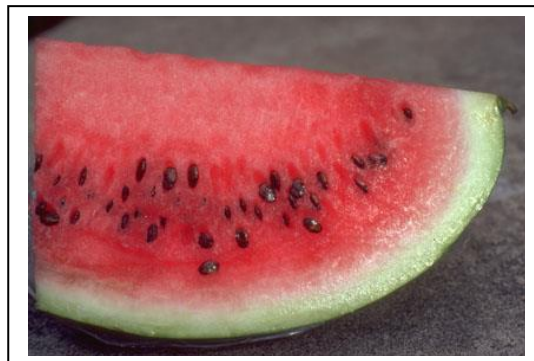
English: Watermelon

Local:

Scientific name: *Citrullus lanatus*

Plant family: CUCURBITACEAE

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



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

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

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

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

Food Value: Per 100 g edible portion

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

Fruit

English: 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 – 2,300 m altitude, but fruit best above 1,500 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	36	30	1.5	-

Fruit

English: Mutkuru

Local:

Scientific name: *Coccinia adoensis*

Plant family: CURCURBITACEAE

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



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

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

Caution: The roots are poisonous unless carefully cooked.

Food Value: Per 100 g edible portion

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

Image sourced from; www.westafricanplants.senckenberg.de

Fruit

English: Buffalo thorn

Local:

Scientific name: *Ziziphus mucronata*

Plant family: RHAMNACEAE

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



Distribution: A tropical plant that grows in the lowlands and highlands. It grows in open scrub and can grow on a range of soils. It is often on embankments and termite mounds. In East Africa it grows up to 2,000 m above sea level. It is drought resistant and can grow in arid places.

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

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

Production: Seedlings grow quickly. They can be 4 - 6 m high in 4 - 5 years.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	-	1200	3.2	-	-	-	-

Fruit

English: Kuni bush

Local:

Scientific name: *Rhus undulata*

Plant family: ANACARDIACEAE

Description: An evergreen shrub or small tree. It has several stems. The leaves have a scent. The bark has spines. The bark is grey and smooth. It grows up to 3-5 m high. The edges of the leaves are wavy. The flowers are small and green or cream. They are in heads 5 cm long in the axils of leaves or near the ends of branches. The fruit are shiny and green but turn red when ripe. They are round and 5-6 mm across.

Distribution: It grows on sandy soils or amongst rocks that are neutral or alkaline. In southern Africa it grows between 20-1,250 m altitude. It is often in dry, semi-desert places. It can grow in arid places.



Use: The fruit are eaten. They are used for porridges and in relishes. The dried fruit are eaten as a relish. For porridge they are cleaned of their husks and put in milk for 4 hours before eating. They are also used for beer.

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	13.3	1187	5.0	-	6.4	3.5	2.9

Image sourced from: www.irpl.altervista.org

Fruit

English: Red-leafed rock fig

Local:

Scientific name: *Ficus ingens*

Plant family: MORACEAE

Description: A small tree which loses its leaves. It is an erect tree and has a spreading crown. It grows up to 15 m tall. The branches touch the ground. It grows attached to other plants. The leaves are oval. They are 6-15 cm long by 3-10 cm wide. They are pale green and thinly textured. The new leaves are red. The base is slightly lobed and it tapers towards the tip. The fig fruit grow in the axils of the leaves. The fruit are round and 1-1.5 cm across. They are pale yellow or pink when ripe.



Distribution: A tropical plant. They usually grow on dry rocky soils. It is often on rocky slopes in cracks in the rocks. In Zimbabwe they grow between 300 and 1450 m altitude but are mostly at lower altitudes. They grow where the rainfall is below 100 mm. It can grow with annual rainfall between 100-1,300 mm. It is drought resistant. It grows between sea level and 2,100 m above sea level.

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

Cultivation: Plants can be grown from seed or cuttings. Fruit should be collected before they drop and the seeds removed. The seeds are small and need to be sown with fine sand. Seeds germinate in 15-30 days. Cuttings can be of softwood or hardwood. They root easily.

Production: Young seedlings grow slowly.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	75.2	255	1.6	-	7.6	2.0	0.8

Image sourced from; www.plantzafrica.com/plantefg/ficusingens.htm

Vegetables

English: Pumpkin

Local:

Scientific name: *Cucurbita maxima*

Plant family: CUCURBITACEAE

Description: A pumpkin family plant. It is a creeping vine with tendrils. It is an annual plant. The stems are soft and round in cross section. The leaves are large and hang loose. They are dark green and kidney shaped. The edges of the leaves are entire. There are large nodes at the base of the leaf. The tendrils are fairly stout and are divided half way along their length into many branches. Male flowers are carried on long upright stalks. The 5 petals are united into a long yellow tube. The female flowers are larger than the male and are fewer in number and carried on shorter stalks. The fruit varies in size, colour and patterns on the skin. They can be round, oval or flattened, with yellow, orange or green skin. The surface can be smooth and 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 2,400 m altitude. They need a fertile soil. *C. moschata* is better suited to coastal areas. They are frost sensitive but better suited to cooler areas than *C. moschata*. It can grow in arid places. It suits hardiness zones 8 - 11.

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

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

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

Food Value: Per 100 g edible portion

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

Vegetables

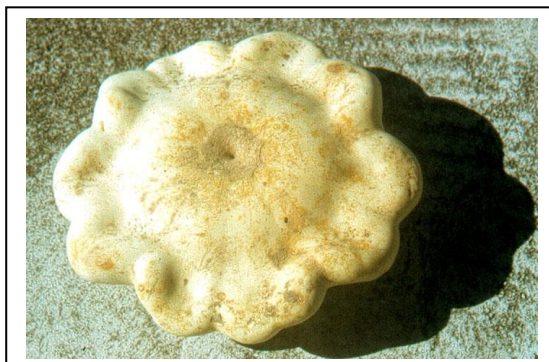
English: Marrow

Local:

Scientific name: *Cucurbita pepo*

Plant family: CUCURBITACEAE

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



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

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

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

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

Food Value: Per 100 g edible portion

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

Vegetables

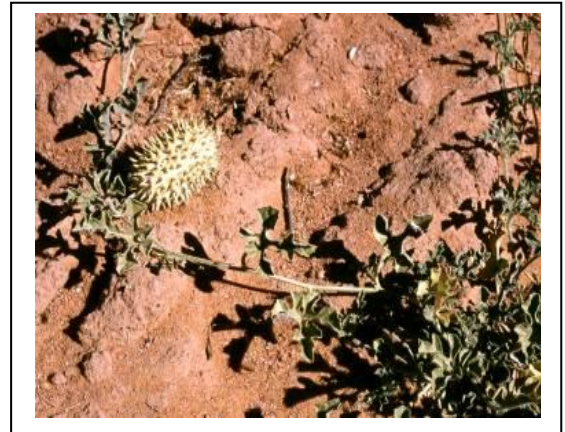
English: Horned cucumber

Local:

Scientific name: *Cucumis africanus*

Plant family: CURCURBITACEAE

Description: A pumpkin family herb. It keeps growing from year to year. It is a straggling plant with a rough surface. The leaves have 3-5 lobes. The middle lobe is largest. The tendrils are short and weak. The leaves are 8 cm long on stalks 7 cm long. The female flowers are yellow and 2 cm long. The male flowers are smaller and in clusters. The fruit are oval and 8 cm long by 4 cm across. They are yellow when ripe. The fruit are covered with stiff spines. Some fruit are bitter. Non bitter kinds have to be chosen.



Distribution: A tropical plant. It grows in deep dry sandy soils. It grows in hot arid areas with a marked dry season. It grows between 150-2,115 m above sea level. It is not common in Swaziland. It can grow in arid places.

Use: Young leaves are eaten as a potherb. The bitter fruit are occasionally eaten raw. They are also cooked and strained.

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	88.2	163	2.8	-	13	1.1	0.4
leaf	92.2	90	1.3	-	81	12.1	0.3

Image sourced from; www.plantzafrica.com/planted/cucumafric.htm

Vegetables

English: Beetroot

Local:

Scientific name: *Beta vulgaris*

Plant family: CHENOPODIACEAE

Description: Beetroot is a dark green leafed plant up to 20 cm tall. It can be grown as an annual plant. Normally it gives a thickened root in the first year then flowers in the second year. The leaves vary in shape and colour. They can be oval with an irregular wavy edge. They can be dark green or reddish. It has a round or elongated fattened root. The root is red in colour. (White varieties also occur). The flowers are small and green and have both sexes. They occur in flower arrangements with the end bud a flower bud. This forms a tall, branching, spike-like arrangement. Often 2 or more seeds are joined together in a "seedball".



Distribution: It is a temperate climate plant. It is mainly grown in the highlands from 1,150 – 2,600 m altitude in the tropics. Plants grow best at 18 - 22°C and are frost resistant. Temperatures below 10°C cause the plant to start its seeding phase. It is sensitive to acid soils but can grow in alkaline soils up to pH 10.

Use: The red tubers are eaten after cooking. The root is also dried and powdered and the flour mixed with barley or wheat. They can be pickled or fermented as beetroot juice. They are often boiled, sliced and served with vinegar. The leaves are edible and can be cooked in soups and stews.

Cultivation: Plants are grown from seed. Normally the seeds are sown in the final site because transplanting is difficult. When the small clump of seeds or seed ball are planted more than one seedling will result. Plants get a soft heart due to boron deficiency. This is treated with borax.

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 (boiled)	82.7	189	1.8	-	5	0.4	0.4
root (raw)	87.1	118	1.3	2	6	0.8	0.4
leaf (boiled)	89	113	2.6	-	25	1.9	0.5
leaf (raw)	92	80	1.8	316	30	3.3	0.4

Vegetables

English: Cardoon

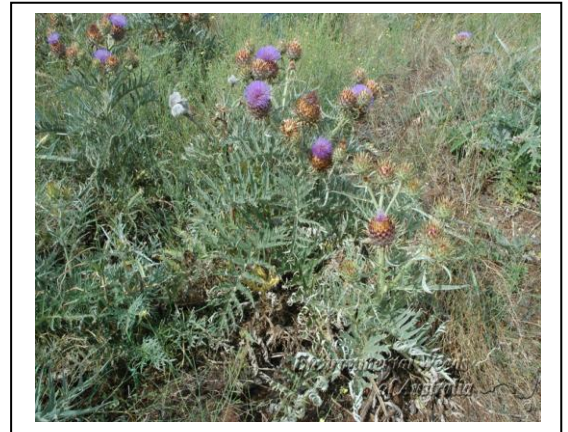
Local:

Scientific name: *Cynara cardunculus*

Plant family: ASTERACEAE

Description: A perennial herb. It grows 1.5-1.8 m high and 1.2-1.5 m across. The leaves are large and silvery green. They are woolly and white underneath. They are divided into narrow primary and secondary lobes. The secondary lobes end in a harsh spine. The flowers are thistle flower heads. They can be 8 cm across. The base of the flower head is prickly and the top is purple. There are several cultivated varieties.

Distribution: It can tolerate light frost. It suits a Mediterranean climate. It grows in full sun. It can grow in dry arid areas with a winter rainfall of 100-300 mm. It can grow in arid places. It suits hardiness zones 7-11.



Use: The leaf ribs are cooked in stews. The flower heads are eaten raw or cooked after removing the spines. They are often eaten in a sauce of olive oil. The dried flower heads are used as rennet for cheese. The young leaf stems and leaves are blanched then cooked and eaten. The roots can be eaten. They are boiled.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
heart of bud	94	84	0.7	12	2	0.7	0.2

Image sourced from www.keyserver.lucidcentral.org

Nuts, seeds, herbs and other foods

English: Cape gum

Local:

Scientific name: *Acacia karoo*

Plant family: FABACEAE

Description: An evergreen shrub or small tree. It grows to 5 m tall and 3 m wide. It can be 15 m tall. The stem is erect. It has spines. The spines are silvery white with a black tip. The spines or thorns can be 7 cm long. The bark is rough and grey-black. The bark peels off to show a rust red colour underneath. The branches are spreading. The leaves (phyllodes) are grey and divided twice. They are 10 cm long. There are 8-20 pairs of leaflets. The flowers are pale yellow. They have a sweet smell. They flowers occur in dense clusters. The pods are 12.5 cm long and narrow. The pods curve to a sickle shape. When ripe they are dark brown.



Distribution: This is a native of Southern Africa. It prefers light to medium soils. They need to be well drained. It requires a sunny protected position. It can resist drought and frost. It grows in areas with an annual rainfall between 50-1,500 mm. It grows between 3-2,400 m above sea level. It grows in coastal scrub and woodland and along streams. It can grow in arid places. It suits hardiness zones 9-11.

Use: The tree oozes a clear red-gold gum which is chewed. It is sweet and eaten by children. The seeds are roasted and ground then used as a substitute for coffee. The inner bark is chewed.

Cultivation: It is grown from seed. The seed needs to be treated to break the hard seed coat. Normally this is by putting the seeds in very hot water and letting the water cool down overnight then planting the seeds immediately. Seeds grow quickly. Seeds germinate in 3-12 days and can be transplanted when young.

Production: Plants are fast growing.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
gum	13.9	1308	6.8	-	-	16.6	-

Nuts, seeds, herbs and other foods

English: Purslane

Local:

Scientific name: *Portulaca oleracea*

Plant family: PORTULACACEAE

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



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

Use: The stems and leaves are cooked and eaten. Usually the skin is scraped off then the plant is boiled and mashed. It thickens stews and other dishes in which it is cooked. It is used as a pot herb. The fleshy stems are pickled. Sprouted seeds are eaten in salads. The seeds are ground for use in cakes and bread.

Caution: In areas where a lot of nitrogen fertiliser is used plants can cause nitrate poisoning. Plants can also have oxalates.

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

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

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	9.1	1405	19.5	-	-	-	-
root	79.0	210	3.5	-	-	-	-
plant	87.0	181	4.0	-	11	2.5	-
leaf	82.2	108	3.1	54	20	0.8	1.5

Nuts, seeds, herbs and other foods

English: Fat hen

Local:

Scientific name: *Chenopodium album*

Plant family: CHENOPODIACEAE

Description: An annual plant that grows to 1 m tall and spreads to 1 m across. The stem is erect and succulent with no hairs. They often have soft mealy lumps which can be rubbed off. The leaves are simple, with one at each node, and occurring alternately up the stem. The leaves are oval and wedge shaped with saw like edges. They are 5 - 12 cm long by 3 - 10 cm wide. The leaf stalk is usually shorter than the leaf blade. The under surface of the leaf often has a white mealy layer which can be rubbed off. The flowers occur in dense white spikes at the tip and ends of branches. The fruit is a small, roundish, papery pod that opens around the tip. The pod contains large numbers of shiny black seeds that are 1.2 - 1.8 mm across.



Distribution: A temperate plant that also grows in the tropics. It grows best on light to medium well drained soil. It suits an open sunny position but can tolerate shade. It is drought and frost resistant. It commonly occurs as a weed in old fields. In Zimbabwe, it grows from 1,100 - 1,600 m above sea level. It can grow in arid places and can tolerate temperatures of 5 - 30°C.

Use: The seeds can be ground into flour. They contain saponin which should be leached out. They are used for bread, pancakes, muffins and biscuits. The tender leaves are cooked and eaten as a vegetable. They are also used in stews. Young flowers are cooked and eaten. The sprouted seeds are edible.

Cultivation: Plants are grown from seed. Seedlings can be transplanted at a spacing of 30 cm. It does well in soils with lots of nitrogen. It is self sown and harvested from potato crops in India.

Production: The tops can be eaten before and after flowering. They are harvested after 40 days.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	-	1654	16	-	-	-	-
leaf (boiled)	88.9	134	3.2	391	37.0	0.7	0.3
leaf	87.7	113	5.3	33	108	-	-

Nuts, seeds, herbs and other foods

English: Golden timothy grass

Scientific name: *Setaria sphacelata*

Local:

Plant family: POACEAE

Description: A grass which keeps growing from year to year. It is 0.5-2 m tall. It normally forms compact tufts. Some kinds have long creeping stolons and form tillers. The flower is a slender spike-like head 7.5-25 cm long. It is often golden in colour.

Distribution: A tropical plant. It can grow in warm temperate and tropical regions. It grows in hot arid places. It grows in areas with an annual rainfall above 500 mm. It grows on a range of soils and they can be poorly waterlogged. It grows in wet grass savannah. It can grow in arid places.



Use: It is reported as being boiled then ground into a meal. It is used in *kreb* a grain mixture eaten in Chad.

Cultivation: Plants can be grown from seed.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	5.0	960	11.1	-	-	6.5	2.9

Image sourced from; www.noosanativeplants.com.au

Nuts, seeds, herbs and other foods

English: Finger millet

Scientific name: *Eleusine coracana*

Local:

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 – 1,250 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 2,400 m altitude in Africa. It is a short day length plant and does best where daylength 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	-

Nuts, seeds, herbs and other foods

English: Bullrush millet

Local:

Scientific name: *Pennisetum glaucum*

Plant family: POACEAE

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

Distribution: A tropical plant that suits regions with a short growing season. It grows in areas with less than 600 mm of rainfall. It is replaced with sorghum between 600 – 1,200 mm rainfall and then by finger millet or maize above 1,200 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	13.5	1363	12.7	-	-	3.5	-

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 cruentu</i>	purple amaranth	leaf	84.0	176	4.6	-	64	8.9	-	29
ANACARDIACEAE	<i>Rhus undulata</i>	kuni bush	fruit	13.3	1187	5.0	-	6.4	3.5	2.9	39
ARACEAE	<i>Colocasia esculenta</i>	taro	root	66.8	1231	1.96	3	5	0.68	3.2	19
ASTERACEAE	<i>Cynara cardunculus</i>	cardoon	heart of bud	94	84	0.7	12	2	0.7	0.2	45
BRASSICACEAE	<i>Capsella bursa-pastoris</i>	shepherd's purse	leaf	88.2	-	4.2	150	91	4.8	-	30
CHENOPODIACEAE	<i>Chenopodium album</i>	fat hen	leaf (boiled)	88.9	134	3.2	391	37.0	0.7	0.3	31
CHENOPODIACEAE	<i>Beta vulgaris</i>	beetroot	leaf (raw)	92	80	1.8	316	30	3.3	0.4	44
CHENOPODIACEAE	<i>Chenopodium album</i>	fat hen	leaf (boiled)	88.9	134	3.2	391	37.0	0.7	0.3	48
CLEOMACEAE	<i>Cleome monophylla</i>	single leaved cleome	leaf(cooked)	-	73	3.0	-	-	9.2	0.43	33
CONVOLVULACEAE	<i>Ipomoea batatas</i>	sweet potato	tuber (baked)	72.9	431	1.7	961	24.6	0.5	0.3	15
CUCURBITACEAE	<i>Citrullus lanatus</i>	watermelon	fruit	94.0	92	0.4	20	5	0.3	0.1	35
CUCURBITACEAE	<i>Cucurbita maxima</i>	pumpkin	seed (dry)	6.9	2264	24.5	38	1.9	14.9	7.5	41
CUCURBITACEAE	<i>Cucurbita pepo</i>	marrow	fruit (mature)	92.0	105	1.6	17	16	2.4	-	42
CUCURBITACEAE	<i>Coccinia adoensis</i>	mutkuru	fruit	92.9	445	15.7	-	19	0.6	-	37
CUCURBITACEAE	<i>Cucumis africanus</i>	horned cucumber	leaf	92.2	90	1.3	-	81	12.1	0.3	43
CYPERACEAE	<i>Cyperus rotundus</i>	nut grass	bulb	53.3	750	1.9	-	2	5.8	1.4	18
EUPHORBIACEAE	<i>Manihot esculenta</i>	cassava	tuber	62.8	625	1.4	30	15	0.23	0.48	13
FABACEAE	<i>Vigna radiata</i>	mung bean	seed	11.0	1432	22.9	55	4	7.1	-	21
FABACEAE	<i>Phaseolus acutifolius</i> var. <i>Acutifolius</i>	tepariy bean	Seed (dry)	8.6	1476	19.3	-	-	-	-	22
FABACEAE	<i>Phaseolus coccineus</i> subsp. <i>Coccineus</i>	scarlet runner bean	seed	12.0	1419	20.3	-	7	9.0	-	23
FABACEAE	<i>Cajanus cajan</i>	pigeon pea	seed (young, boiled)	71.8	464	6.0	2	28.1	1.6	0.8	24
FABACEAE	<i>Phaseolus lunatus</i>	lima bean	seed (young, cooked)	67.2	515	6.8	37	10.1	2.5	0.8	25
FABACEAE	<i>Vicia faba</i>	broad bean	seed (fresh, boiled)	83.7	259	4.8	27	20	1.5	0.5	26
FABACEAE	<i>Vigna subterranea</i>	bambara groundnut	seed	-	1572	18.4	-	-	-	-	27
FABACEAE	<i>Lablab purpureus</i>	lablab bean	seed (young)	86.9	209	3.0	14	5.1	0.8	0.4	28
FABACEAE	<i>Acacia karoo</i>	cape gum	gum	13.9	1308	6.8	-	-	16.6	-	46
MORACEAE	<i>Ficus ingens</i>	red-leafed rock fig	fruit	75.2	255	1.6	-	7.6	2.0	0.8	40
OXALIDACEAE	<i>Oxalis corniculata</i>	yellow wood-sorrel	leaf	85.5	188	5.1	60	98	5.2	-	34
POACEAE	<i>Setaria sphacelata</i>	golden timothy grass	seed	5.0	960	11.1	-	-	6.5	2.9	49
POACEAE	<i>Eleusine coracana</i>	finger millet	seed	11.7	1594	6.2	-	-	5.3	-	50
POACEAE	<i>Pennisetum glaucum</i>	bullrush millet	seed	13.5	1363	12.7	-	-	3.5	-	51
PORTULACACEAE	<i>Portulaca oleracea</i>	purslane	leaf	82.2	108	3.1	54	20	0.8	1.5	47
RHAMNACEAE	<i>Ziziphus mucronata</i>	buffalo thorn	fruit	-	1200	3.2	-	-	-	-	38
SOLANACEAE	<i>Solanum tuberosum</i>	potato	tuber (baked)	71.2	456	2.3	0	12.9	1.4	0.3	17
SOLANACEAE	<i>Solanum nigrum</i>	blackberried nightshade	leaf	87.0	160	4.3	2196	20	1.0		32
SOLANACEAE	<i>Physalis peruviana</i>	cape gooseberry	fruit (mature)	84.2	201	2.0	36	30	1.5	-	36