Potentially Important Food Plants of Laos




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

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Dedication

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

Food Plant Solutions Field Guide – Laos, Version 1, October 2017

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 Melanie Bower 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 Laos. This guide has been developed with the best intention to create interest and improve understanding of the important local food plants of Laos, 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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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 Laos. 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 of the introduced vegetables, such as ballhead cabbage. These do 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 all these plants, their food value and the pest and diseases that damage them is available in the Food Plants International database.

Getting to know plants

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

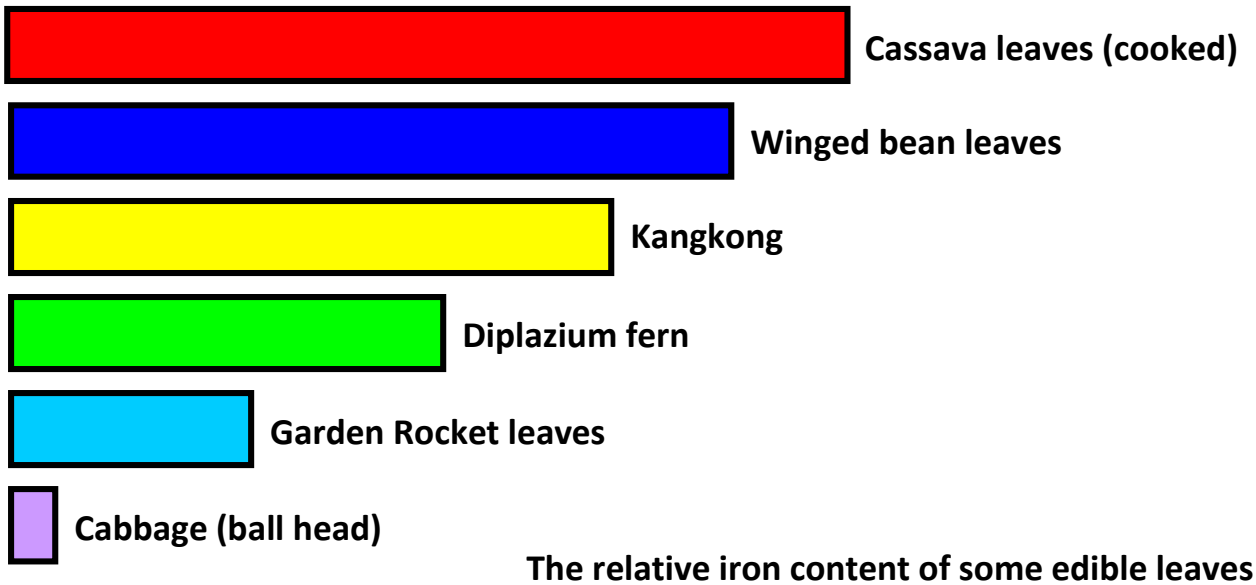
Naming of plants

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

Local food plants are often very good

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

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



The relative iron content of some edible leaves

A healthy balanced diet

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

Learning to cook well

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

Learning to grow "wild" food plants

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

Saving better types of plants

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

Growing from cuttings and suckers

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

Saving seed

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

and disease damage than those grown from imported seed. *If you can't get seeds or planting material from local gardens – it is probably not a suitable local plant!*

Growing a garden of mixed plants

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

Different types of plants for food security

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

Looking after the soil

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

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

Building up the soil

When a new garden has been cleared, it has lots of leaf mulch and other old plant material. This provides plant nutrients for new plants to grow. There is a simple rule for growing plants and improving the soil - "If it has lived once, it can live again." Any old plant material can provide nutrients for new plants to grow, but it must be allowed to rot into mulch or compost for this to happen. If this plant material is burnt, some nutrients, especially phosphorus and potassium ("potash"), get left behind in the ashes for new plants to use, although it also allows these important nutrients to be lost by being washed away by rain. But with burning other important nutrients, such as nitrogen and sulphur, get lost in the smoke and disappear from the garden and soil. These last two plant nutrients are especially important for growing green leaves and when their levels are low, plants grow small or pale green. When nitrogen is lacking, the old leaves of the plant go pale and fall off early, and when sulphur is lacking, the young leaves go pale. Wherever possible, old plant

material should be covered with some soil to allow it to rot down and not simply dry out or get burnt.

Poor soils where crops won't grow

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

Soil nutrients

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

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

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

Making compost

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

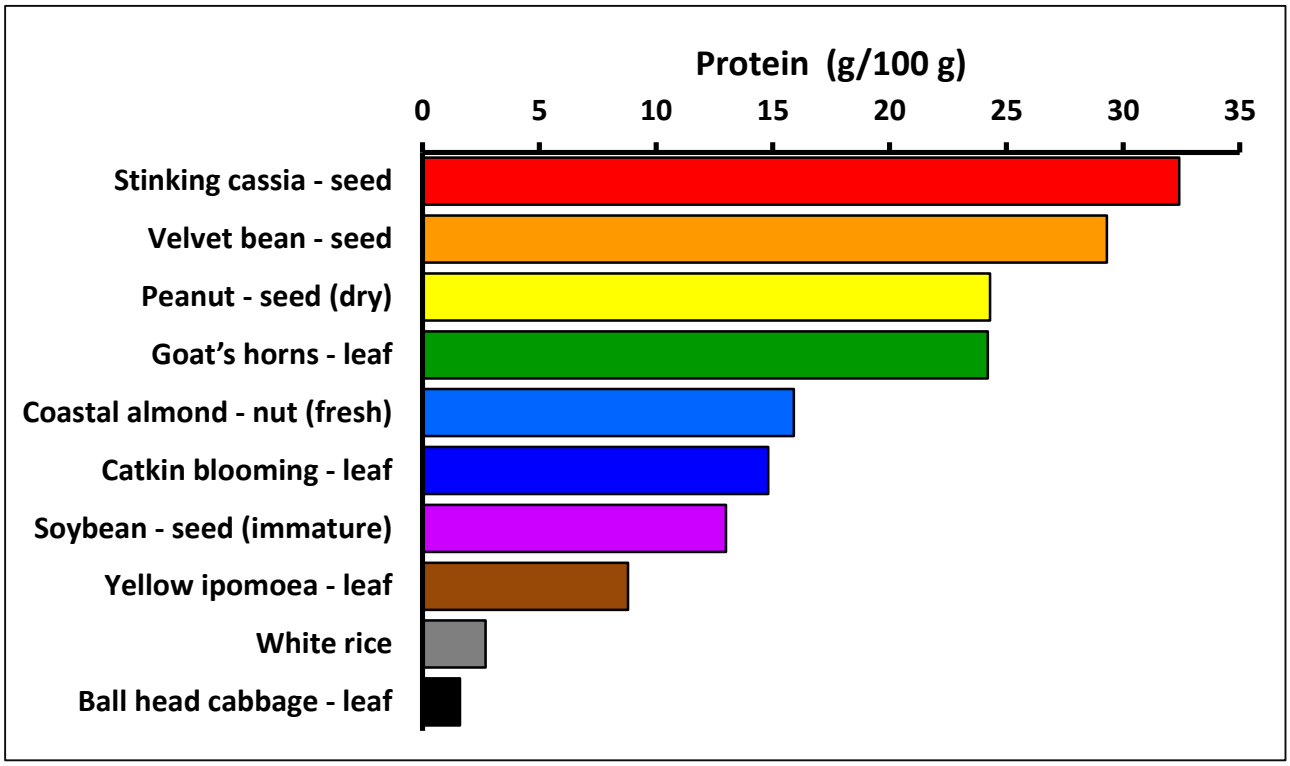
Pests

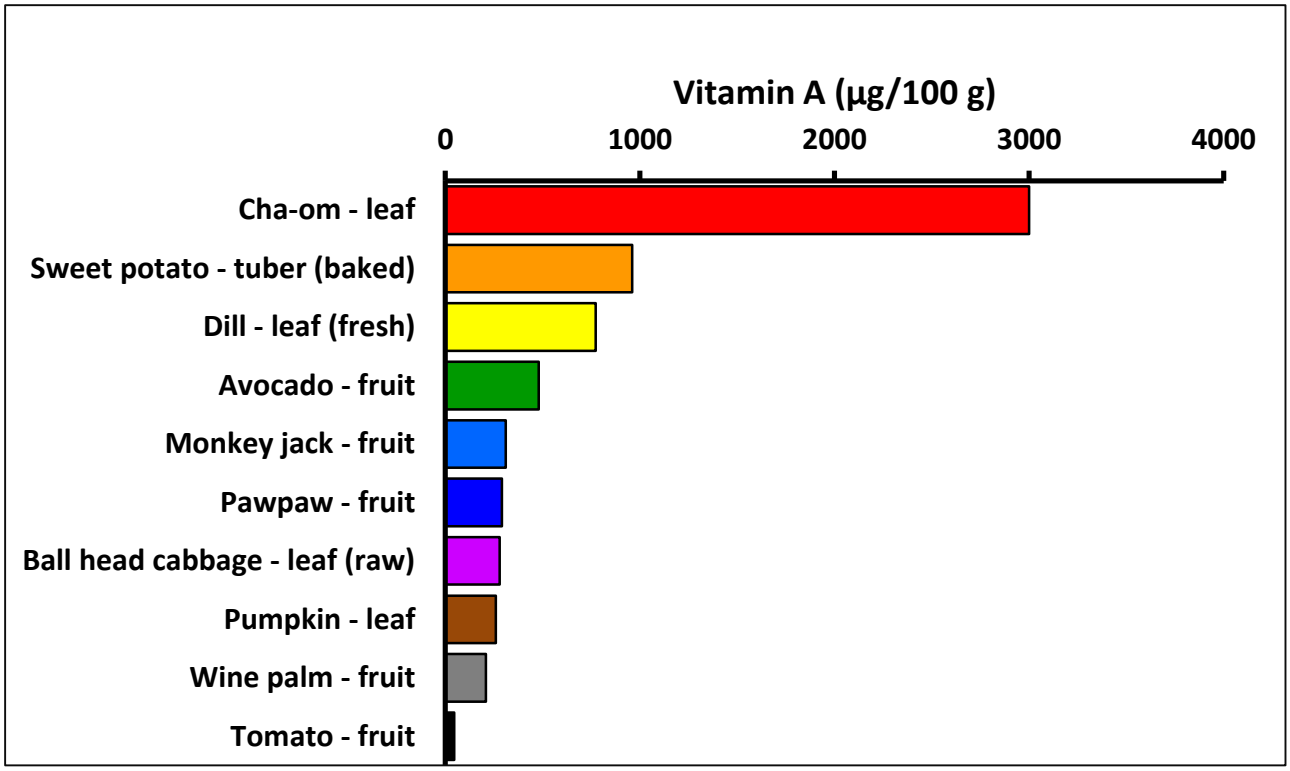
There are a large number of insects that enjoy sharing our food with us! We should not try to kill all these insects as they have an important role to play in keeping everything in nature in balance. What we need to do is to learn to manage these insects so we can all get some food to eat! Some insects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

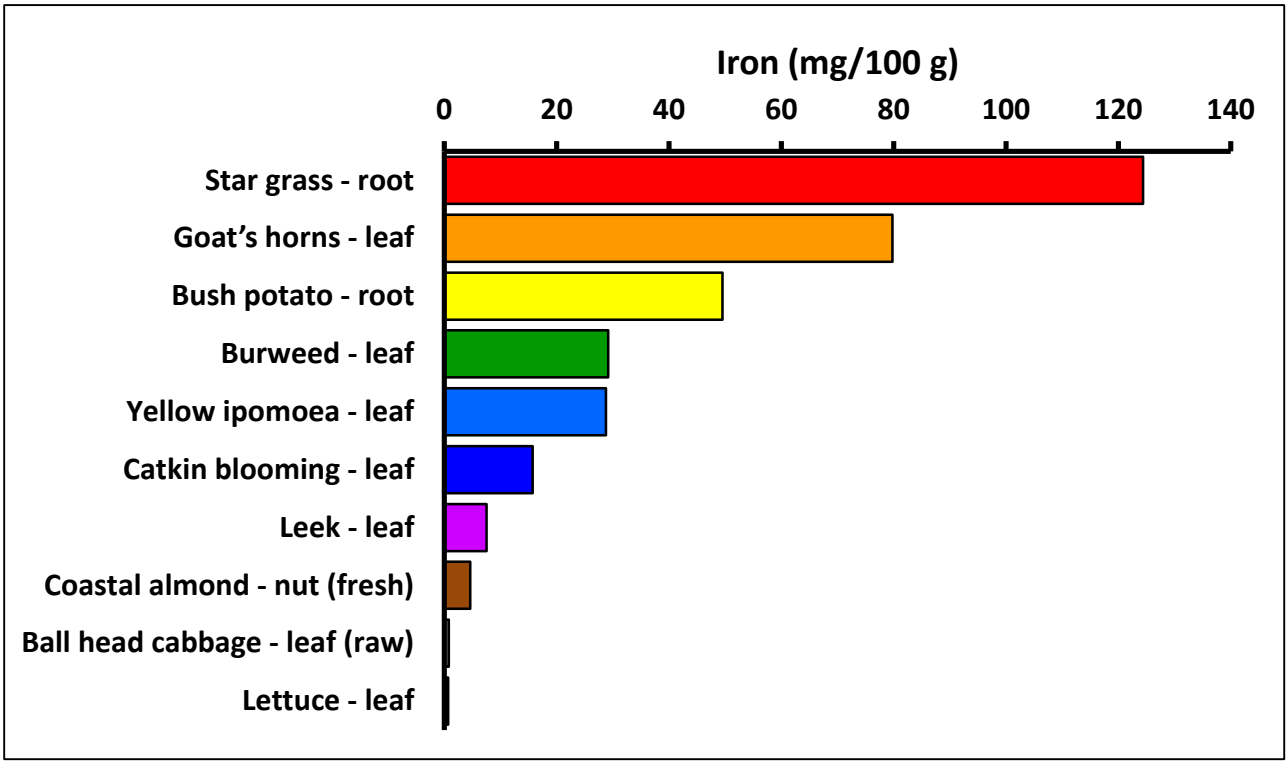
Diseases

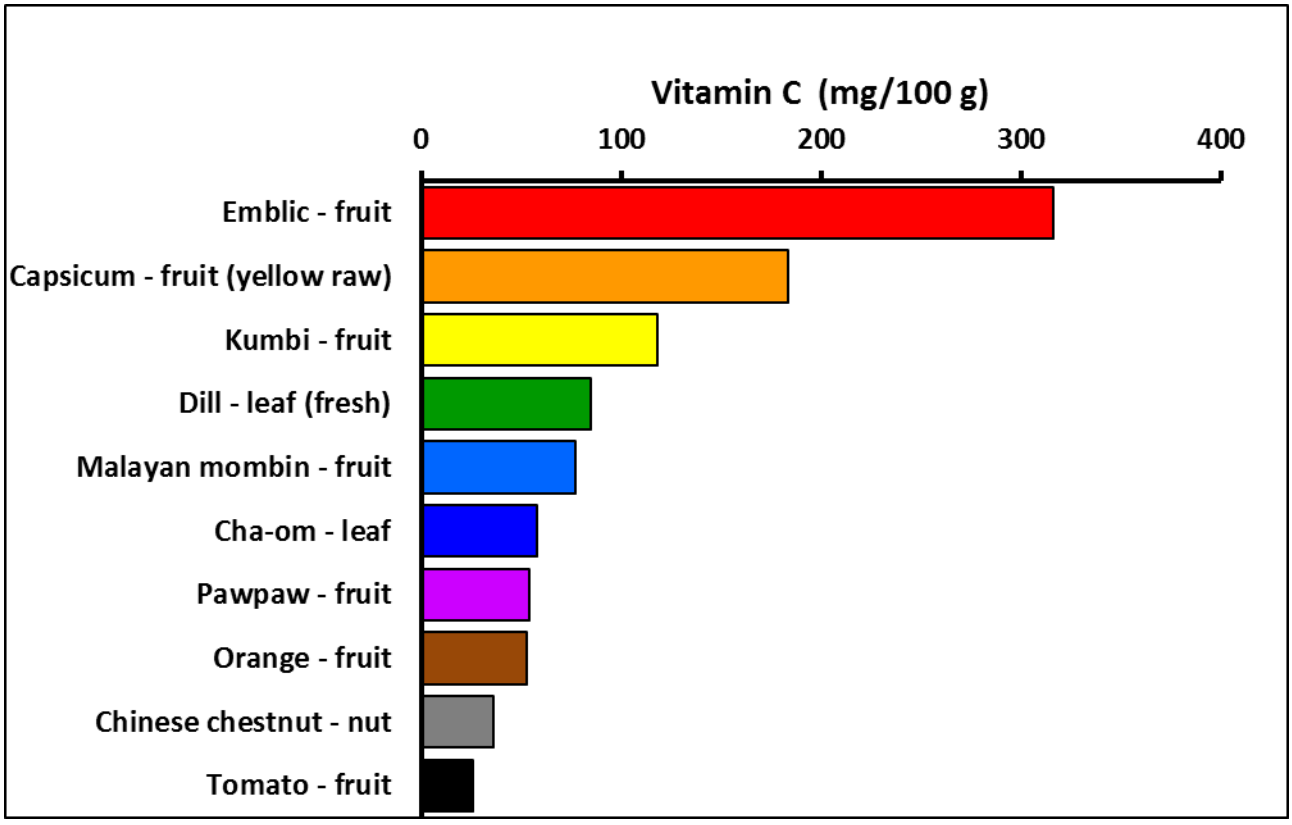
The living organisms that cause disease are much smaller than insects. These disease organisms can often only be seen with a microscope. There are three main kinds of disease organisms - fungi, bacteria and viruses. Fungi are like the mushrooms we eat, only very much smaller. They usually make distinct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

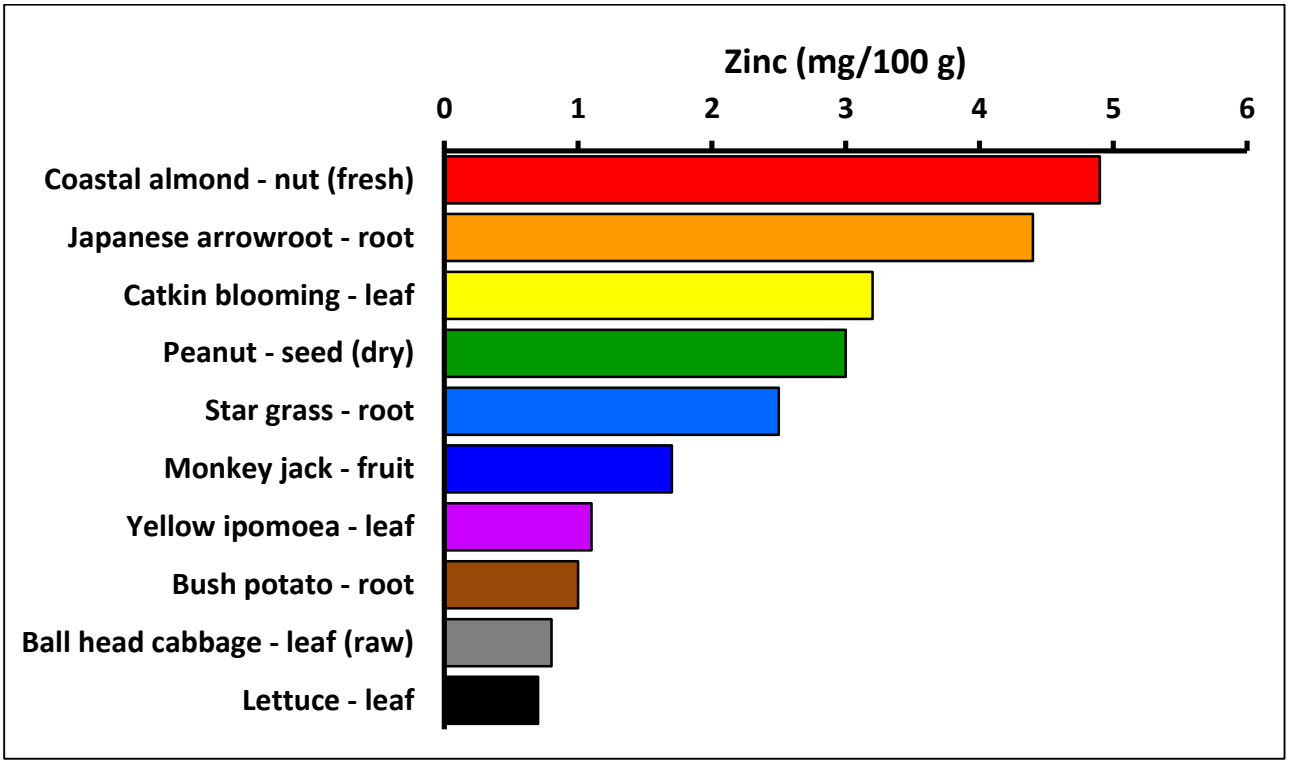
Food value charts for a selection of plants from Laos






Iron (mg/100 g)
0
20
40
60
80
100
120
140
Star grass - root
Goat's horns - leaf
Bush potato - root
Burweed - leaf
Yellow ipomoea - leaf
Catkin blooming - leaf
Leek - leaf
Coastal almond - nut (fresh)
Ball head cabbage - leaf (raw)
Lettuce - leaf


Vitamin C (mg/100 g)
0
100
200
300
400
Emblic - fruit
Capsicum - fruit (yellow raw)
Kumbi - fruit
Dill - leaf (fresh)
Malayan mombin - fruit
Cha-om - leaf
Pawpaw - fruit
Orange - fruit
Chinese chestnut - nut
Tomato - fruit



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

Starchy staples

English: Japanese arrowroot
Local:

Scientific name: *Dolichos trilobus*
Plant family: FABACEAE

Description: A bean plant. It is a twining herb that keeps growing from year to year from root tubers. The leaves are compound with 3 leaflets. The leaf stalks are 2 - 3 cm long. The leaflets are 4 sided and 2 - 6 cm long by 2 - 5 cm wide. The flowering shoots are in the axils of leaves and there are 1 - 4 flowers in a group. The fruit is a pod 6 cm long by 8 mm wide. It is slightly curved. There are 6 - 7 seeds.

Distribution: It is a tropical plant that grows in grassland and bushland.

Use: The seeds are edible. They are collected and cooked while fresh or after being dried in the sun.

Cultivation: It can be grown from fresh seed.

Production: Dried seeds can be stored for several months.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
root	72.4	1794	7.1	-	-	0.2	4.4

Image accessed from: http://www.pittwateronlinenews.com/resources/Dipogon-lignosus1.jpg?timestamp=1398817248961

Starchy staples

English: Lesser yam
Local:

Scientific name: *Dioscorea esculenta*
Plant family: DIOSCOREACEAE

Description: A prickly, climbing yam with a spiny vine. It can climb 1.2 - 2.4 m high and spread 1.8 m across. The vine twines to the left. The leaves are round with a gap where the leaf stalk joins. They are almost heart-shaped. The leaf is about 12 cm long. This yam produces a cluster (5 - 20) of tubers under the ground. The tubers are often sticky when cut. In many varieties, there are sharp thorns just under the ground. The flowers are green, 4 mm across and borne on long slender spikes. These are singly in the axils of leaves. There are many different varieties.

Distribution: It grows in many tropical countries, from sea level up to about 1500 m, but mostly below 800 m. It cannot tolerate water-logging and needs a reasonably long rainy season and a loose, fertile soil. It does poorly on sandy soils and becomes misshapen in heavy clay soils. High levels of organic matter promote growth. It suits hardiness zones 9 - 12. Lesser yam is an important root crop for the tropical humid lowlands.

Use: The tubers are cooked and eaten.

Cultivation: Normally, small tubers (50 - 75 g) are planted, but cut portions of a tuber can be used. Using either the top or the bottom section of a tuber gives better establishment and yield than middle portions. Using larger tubers gives larger individual tubers and higher yields for individual plants. With a spacing of 30 cm between plants and 100 cm between rows, about 2,000 kg of planting material are used if 70 g tubers are used. Tubers are planted 8 - 12 cm below the ground. Plants can be grown from stem cuttings where a leaf and node are propagated under mist. This method is normally only used for increasing the amount of planting material of a selected variety. Planting in mounds assists drainage, improves aeration and makes harvesting easier. A spacing of 80 - 100 cm between plants is suitable. Planting is normally adjusted to fit in with the beginning of the rainy season. The growing season of 9 - 10 months is long and an extended wet season is therefore desirable. Stakes 2 m long are required. Lesser yams compete poorly in shade. Weed control is most critical during the first 3 months. As early growth of the plant is sustained from the tuber, fertilisers can be applied after planting. Added nitrogen fertiliser is more effectively used when plants are staked. Nitrogen is of more benefit for leaf growth in the early stages of plant development. Potassium is beneficial, although phosphorus applications often do not give significant responses, as lesser yams are efficient at extracting it from the soil.

Production: High yields can be obtained. Plants take about 9 months to reach maturity. In some varieties and under some conditions, leaves do not die-off and tubers must be harvested to avoid tubers rotting as new growth commences. Tubers need to be harvested and handled carefully. They must often be cut from the vine and can be washed and dried. Tubers will store for about 3 months under ventilated conditions above 15°C. Fungal growth and rots easily occur on cut or damaged surfaces under damp conditions. Tubers need to be peeled either before or after cooking.

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	74.2	470	2.1	84	20	0.75	0.5

Starchy staples

English: Sweet potato
Local:

Scientific name: *Ipomoea batatas*
Plant family: CONVOLVULACEAE

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

Distribution: A tropical and subtropical plant. They grow from sea level up to about 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. 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, larger leaves. With increasing shade, fewer tubers are produced and these grow more slowly. Sweet potato tends to be responsive to potassium fertiliser. Cultivars are often selected for yield under low fertility conditions.

Under lowland conditions in the tropics sweet potato tubers undergo active tuber enlargement from 6 - 16 weeks. Weed control is essential especially during early stages of growth. The rate of ground coverage by foliage varies greatly with growing conditions and cultivar, but once ground coverage has occurred, weed control is less of a problem. Sweet potato tuber initiation is subject to aeration in the soil. Either heavy clay soils, waterlogged conditions or other factors reducing aeration can result in poor tuber production. For this reason, sweet potatoes are often grown on

mounded beds. In well drained or high organic matter soils, digging or mounding is not as essential. Leaf scab (*Elsinoe batatas*) can significantly reduce yield especially in sites where leaf production is low due to low soil fertility. To reduce sweet potato weevil damage, plants need to be hilled or have the tubers well covered with soil. Cracking soils can allow the weevil access to tubers.

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

Food Value: Per 100 g edible portion

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

Starchy staples

English: Soybean
Local:

Scientific name: *Glycine max*
Plant family: FABACEAE

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

Distribution: It is a temperate plant that suits lowland areas. It can be grown from sea level to 2,000 m altitude. Many varieties will not flower in the tropics (short days). It needs fertile soil. The best soil acidity is pH 5.5 - 7.0. It is damaged by frost.

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

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

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

Food Value: Per 100 g edible portion

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

Starchy staples

English: Rice
Local:

Scientific name: *Oryza sativa*
Plant family: POACEAE

Description: An annual grass with hollow stems. The stems can be 30 - 150 cm tall. (Floating varieties can be 5 m long.) The nodes are solid and swollen. The stem is protected by a skin layer which can often be high in silicon. A clump of shoots are produced as tillers from buds in the lower leaf axils. The leaves are narrow and hairy. They taper towards the tip. Each stem produces 10 -2 0 leaves and the seeds hang from the flower stalk at the top. Some varieties are glutinous and cling together when cooked.

Distribution: A tropical plant. It grows in tropical and subtropical countries. Plants are grown in both flooded and dryland sites. It will grow over a range of conditions but is normally between sea level and 900 m altitude in the tropics. Occasionally it is grown up to 1,600 m. It needs a frost free period of over 130 days.

Use: The grains are boiled and eaten after the husks are removed by pounding and winnowing. It is also made into flour, desserts, puddings, starch and noodles. Rice paper can be made from the flour. Rice bran is used for pickling vegetables. The sprouted seeds are eaten in salads. Young seedlings can be used as a vegetable. Rice can be used to make alcohol and milk like drinks.

Cultivation: Plants are grown from seed. Seed can be sown direct or in a nursery and transplanted. For dryland crops, sow 5 - 10 seeds in holes 20 - 25 cm apart. For transplanting, 2 or 3 plants as a 20 x 20 cm spacing is suitable. Weed control is a problem in the early stages. Flooding can be used for weed control.

Production: The glumes are removed to produce husked rice. Polishing removes the integument giving polished rice. Rice development takes 90 - 200 days depending on variety.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed (white)	11.4	1530	6.4	-	0	1.9	-
seed (brown)	13.5	1480	7.6	-	-	2.8	-

Starchy staples

English: Star grass
Local:

Scientific name: *Curculigo orchioides*
Plant family: HYPOXIDACEAE

Description: A small herb with grass like leaves. It grows from a tuber or corm. The leaves are large and sword shaped. They are folded like a fan. The flowers are yellow and small. They are star like. They are produced just near the ground. The fruit is a pale green berry.

Distribution: A tropical plant. It occurs in open grassland at low and medium altitudes in the Philippines. In southern China, it grows on open grassy slopes from near sea level to 1,600 m above sea level.

Use: The tubers are cooked and eaten.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
root	67.4	1534		9.6		124.4	2.5

Image accessed from http://commons.hortipedia.com/images/6/6b/Curculigo_orchioides_PDB.jpg

Starchy staples

English: Bush potato
Local:

Scientific name: *Eriosema chinense*
Plant family: FABACEAE

Description: An erect small shrub. It grows 50 - 90 cm high. The rootstock is tuberous and woody. It has a hairy covering of slightly curved grey hairs close to the plant with more brown and longer hairs spreading out. These last ones are 2.5 mm long. The leaves have one leaflet. These are narrow and oval. They are 2 - 8 cm long by 0.7 - 1.8 cm wide. There are a few hairs on the top surface of the leaf and it is very hairy underneath. The flowers are in the axils of leaves. They are 0.7 cm long. The fruit is a pod which does not have a stalk. It is oblong and about 1 cm long by 0.6 cm wide. It turns black eventually. The seeds are mottled brown and green. They are oblong and 4 - 5 mm long by 2.5 mm wide.

Distribution: A tropical plant that mostly grows in drier grassland areas. It can grow in open forest and wet locations. In Asia it grows to 2,000 m altitude.

Use: The root tubers are eaten raw or cooked.

Production: The plant flowers June to July and produces seeds from June to December.

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	66.9	401	2.2		5	49.5	1.0

Legumes

English: Winged bean
Local:

Scientific name: *Psophocarpus tetragonolobus*
Plant family: FABACEAE

Description: A climbing perennial bean up to 4 m tall. It can re-grow each year from the fattened roots. Stems twine around supports or trail over the ground. Leaves have 3 leaflets 8 - 15 cm long with long leaf stalks. Flowers are blue or white and occur on the ends of branches from within the axils of leaves. Pods have wavy wings and are roughly square in cross section. They are 6 - 36 cm long with 5 - 30 seeds. Seeds can be white, yellow, brown or black and are bedded in the solid tissues of the pod. The seeds are round and smooth with a small hilum. The root has large nodules.

Distribution: A tropical plant that grows from sea level up to about 1,850 m altitude in the tropics. It normally only produces tubers at 1,200 - 1,850 m altitude. It is a short day plant and needs a day length less than 12 hours. It will not produce flowers or pods at places far from the equator. The main areas of production are between 20°N and 10°S latitudes. It is ideally suited to the tropics including the hot humid lowlands. For maximum seed production, temperatures of 23 - 27°C are needed, and for tubers the temperatures should be 18 - 22°C. Winged beans can grow on a wide variety of soils and have been grown on soils with pH from 3.6 - 8.0. Very acid soils have soluble aluminium to which winged beans are sensitive. Soils should not be waterlogged.

Use: Young leaves, flowers, young pods, ripe seeds and root tubers are edible. The seeds can be used to extract an edible oil.

Cultivation: Seeds are sown at the beginning of the rainy season. Seeds germinate and grow slowly for the first 3 - 5 weeks. For tubers, vines are pruned off at about 1 m high (or left unstaked) and some flowers are removed. Cultivation procedures vary slightly depending on which part of the plant is to be eaten. Short podded winged bean is used for tubers and long podded ones have poor tubers. Tuber production is not as efficient in tropical lowland conditions.

Production: The first green pods are ready about 10 weeks after sowing. Tubers are ready after 4 - 8 months. Seed yields of 1.2 tons/ha and tuber yields of 4 tons/ha are possible. A single plant can produce up to 75 pods. Dry bean yields of 45 - 330 g per plant can be produced depending on variety. Tuber yields of 5,500 - 12,000 kg per hectare have been produced. Seeds can contain a trypsin inhibitor which reduces protein digestibility. This inhibitor is destroyed by soaking seeds then boiling them well. Tubers can also contain this chemical and need to be well 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
seed	8.5	1764	41.9	-	-	15.0	4.5
pod (fresh)	92.0	105	2.1	-	-	-	-
leaf	95.0	197	5.0	809	30	6.2	1.3
seed (young)	87.0	205	7.0	13.0	18.3	1.5	0.4
root	57.4	619	11.6	-	-	2.0	1.4

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: Sword bean
Local:

Scientific name: *Canavalia gladiata*
Plant family: FABACEAE

Description: A climbing or sometimes bushy and upright bean plant. Mostly it is a climber that can grow up to 4 m long. The leaves have 3 large leaflets. The leaflets are oval and 7.5 - 20 cm long by 5 - 12 cm wide. The top of the leaf can narrow abruptly to a tip while the base can be rounded or broadly wedge shaped. The leaves are slightly hairy on both surfaces. The leaf stalk is 5 - 12 cm long. The white flowers occur in a cluster 7 - 12 cm long with a stalk 4 - 20 cm long. The individual flower stalks are 2 mm long. The pods are long (20 - 40 cm) and curved. Seeds are coloured red or pink. The hilum is dark brown and almost as long as the seed.

Distribution: A tropical plant. Temperatures of 20 - 30°C suit it well and it grows from sea level to about 1,000 m altitude in equatorial zones. They are drought and salt resistant. They can grow on lowland tropical nutrient depleted soils and on soils with pH from 4.5 - 7.0. They can tolerate some shade.

Use: Young pods are cooked and eaten. Seeds can be cooked and eaten, but the water should be changed and they should be well boiled. They are also fermented. The leaves are blanched and eaten. **Caution:** The seeds can be poisonous due to hydrocyanic acid and saponin. Cooking will remove these.

Cultivation: They are grown from seeds. Seeds germinate readily and the plant is relatively fast growing. Seeds can be sown 5 cm deep. Plants should be 60 - 70 cm apart. Climbing types need support. Often natural supports such as trees, walls and fences are used in backyard production. For large scale production 25 - 40 kg/ha of seed are needed.

Production: Green seeds/pods are produced in 3 - 4 months and mature seeds in 5 - 10 months. Seed yields of 700 - 900 kg/ha are possible. Green pods are hand picked when 10 - 15 cm long before they swell and become fibrous.

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	15.0	1335	27.1	-	-	-	-
pod (fresh)	89.0	142	2.8	-	-	-	-

Legumes

English: Velvet bean
Local:

Scientific name: *Mucuna pruriens*
Plant family: FABACEAE

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

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

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

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

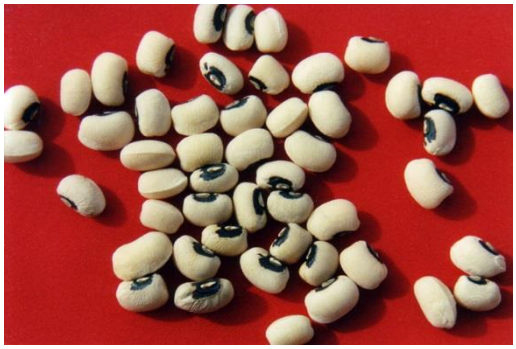
Food Value: Per 100 g edible portion

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

Legumes

English: Cowpea
Local:

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



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

Distribution: It grows in tropical and subtropical climates. It grows from sea level to 1,800 metres altitude in the tropics. Plants can stand high temperatures. Some kinds can tolerate drought. They are sensitive to cold and killed by frost. Plants germinate with a temperature between 11.5 - 15.5°C. The best growth occurs between 20 - 35°C. They can grow on a range of soils providing they are well drained. They are a short day plant. They do well in the semiarid tropics. It will not tolerate acid or alkaline soils. It grows in areas with an annual rainfall between 280 - 410 mm. It can grow in arid places.

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

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

Food Value: Per 100 g edible portion

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

Legumes

English: Stinking cassia
Local:

Scientific name: *Senna tora*
Plant family: FABACEAE

Description: An erect, branched herb or shrub growing 0.3 - 2 m high. It usually has a bad smell. It has a sparse covering of small hairs. The stems do not have hairs. The leaves are compound and alternate. They are 5 - 6 cm long. The leaflets are in 3 pairs, are oval and 2.5 - 5 cm long by 1.5 - 2.5 cm wide. They are broadly rounded at the top and can be wedge shaped at the base. The leaf stalk does not have a gland but the leaf axis has a gland between the lower two pairs of leaflets. The flowers are in the axils of leaves on branched stalks. The flower clusters are short and 2 flowered. There are 5 yellow petals. The petals are 8 - 10 mm long. The fruit are pods which are 4 angled. They are 10 - 15 cm long by 4 - 6 mm wide. They fall without splitting open to release their seeds. The seeds are dark brown and shiny. They are 5 mm long by 2.7 mm wide. The pit on the seed covers much of the seed face.

Distribution: A tropical plant. It often grows on the edges of mangrove and coconut plantations. Plants grow near sea level in the tropics. In Nepal it grows to about 1,400 m altitude. It grows in rich soil and near river banks. It Indonesia it grows up to 1,000 m above sea level. It can grow in arid places.

Use: The ripe seeds are roasted and ground and used for coffee. The seeds, roasted or cooked in the pod are eaten with rice. The young leaves are cooked and eaten as a vegetable. They are often cooked with pork or fish. The harvested leaves can be stored for 4 - 5 days. The flowers are also cooked and eaten. The young stems are cooked in curry. The seeds are used in the preparation of sweets.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	82.1	113	3.6	-	124	-	-
seed	11.64		32.4			1.4	

Image source from: http://www.cnseed.org/chinese-senna-cassia-tora.html

Legumes

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 in not spirally twisted, the pod ends more bluntly with a long thin style at the end and the hilum on the seed is longer.)

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

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

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

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

Food Value: Per 100 g edible portion

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

Leafy greens

English:
Local:

Scientific name: *Amaranthus gracilis*
Plant family: AMARANTHACEAE

Description: A herb that grows 10 - 75 cm high. The stems are branched, angular and have no hairs. The leaves are alternate and not quite rectangular in shape. The leaves are 3 - 9 cm long by 2 - 6.5 cm wide. The leaf stalk is 2.5 - 6.5 cm long. The flowers occur in a clustered flower head. These occur in the axils of leaves. The flower heads form a spike at the end of the branches. This spike is 2.5 - 12 cm long. The flowers are green with male and female flowers together. The fruit is a small almost round capsule. It is 1.2 - 1.5 mm across. The seeds are shiny black and 1 mm across.

Distribution: A tropical plant. It grows in Western Rajasthan, and in Java it grows up to 500 m above sea level.

Use: The leaves are cooked as a vegetable.

Cultivation: It grows from seeds.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	5.4	905	31.2	-	-	82.5	6.0

Image sourced from: http://mussachaleque.blogspot.com.au/2017/02/governo-analisa-prosta-de-producao-de.html

Leafy greens

English: Goat's horns
Local:

Scientific name: *Sida cordifolia*
Plant family: MALVACEAE

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

Distribution: A tropical plant that grows in open waste places in the tropics and sub-tropics. It is common and widely distributed in the Philippines. It grows in hot arid places with a marked dry season. It grows in places with an annual rainfall below 520 mm. It grows in dry sandy soils and can grow in salty soils. It grows below 1,100 m altitude. It can tolerate shade and can grow in arid places.

Use: The leaves are edible when 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
leaf	6.6	1296	24.2	-	-	79.8	-

Image accessed from
http://upload.wikimedia.org/wikipedia/commons/f/f4/Sida_cordifolia_(Bala)_in_Hyderabad,_AP_W_IMG_9420.jpg

Leafy greens

English: Burweed
Local:

Scientific name: *Triumfetta rhomboidea*
Plant family: MALVACEAE

Description: A herb or small shrub that keeps growing from year to year. Plants can be 1.5 m tall. The bark is tough and fibrous. The younger stems and leaves and flowers are densely covered with hairs. The leaves are alternate and the edges of the leaves have teeth. The lower leaves have 3 lobes. The flowers occur in small clusters opposite the axils of leaves. The stalks carrying the flowers are 20 - 40 cm long. There are 5 yellow petals. The fruit are brown and hairy and covered with hooked spines. They are round and about 5 mm across. They contain 2 - 4 seeds. The fruit cling to clothing.

Distribution: A tropical plant. It grows naturally in grassland and re-growth situations. It is more common in tropical places with seasonal rainfall. It grows in savannah woodland and in palm groves. It grows up to 1,280 m above sea level. It can grow in arid places.

Use: It is eaten as a pot-herb in times of scarcity. The roots are eaten 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
leaf	78.4	284	4.2	-	-	29.2	-

Image accessed from:
http://www.phytoimages.siu.edu/users/paraman1/2_15_10/Upload15Feb10/077TriumfettaRhomboidea.jpg

Leafy greens

English: Yellow ipomoea
Local:

Scientific name: *Ipomoea obscura*
Plant family: CONVOLVULACEAE

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

Distribution: It is a tropical plant. It grows up to 1,800 m above sea level. It grows in woodland, grassland, savannah and coastal sands. It can grow in arid places.

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

Food Value: Per 100 g edible portion

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

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

Leafy greens

English: Catkin blooming
Local:

Scientific name: *Opilia amentacea*
Plant family: OPILIACEAE

Description: A shrub or woody climber. It grows off other trees and plants. It grows to 4 - 10 m tall and has stems 20 cm across. The bark is rough and light grey. It has furrows along it and is corky. The aerial branches often hang downwards. The leaves are fairly smooth and leathery. They are 5 - 14 cm long by 2 - 5 cm wide. The midrib is prominent underneath the leaf. The leaf has a pointed tip. The leaf stalk is 0.3 - 0.7 cm long. The new leaves are bright shiny green. The base of the leaves is slightly curved backwards. The flowers are very small and yellow green. They are star shaped. They have a sweet scent. Many flowers occur together on short stalks around a central stem. These occur in the axils of leaves and are 2 - 3.5 cm long. The white-fleshed, edible fruit can occur singly or in clusters and are oval and fleshy. They are 1.5 - 3 cm long by 1.2 - 1.8 cm wide. They are pale yellow or orange when ripe. They have one seed inside. The seed is 21 mm long by 15 mm wide.

Distribution: A tropical plant that grows in tropical Asia. They occur near the beach in monsoon areas. They are often on sandy soil. They need fresh water so are often near streams. It can grow in arid places.

Use: The fruit are eaten fresh. **Caution.** If eaten in large quantities, the fruit can irritate the lips and tongue. Leaves are cooked as a vegetable.

Cultivation: It can be grown from fresh seed. The seed need to be placed on the ground surface, not buried.

Production: It fruits in the wet season. In Tanzania, leaves are collected from April to November.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	9.2	-	14.8	-	3.9	15.7	3.2

Image accessed from:
http://www.westafricanplants.senckenberg.de/images/pictures/opil_opilia_amentacea_rvbli_4_1163_e5e841.jpg

Leafy greens

English: Jute
Local:

Scientific name: *Corchorus olitorius*
Plant family: MALVACEAE

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

Distribution: A tropical plant. It is mostly coastal, below 250 m altitude. Temperatures of 22°-35°C are suitable. It can stand both drought (2 - 3 weeks) and water-logging, except when young. A well-drained soil is best. They require humus-rich soils. A soil pH of 5.5 - 7.0 is best, but they can grow in soils with pH up to 8.5. They also need adequate moisture for good leaf production. A rainfall of 1,000 mm is suitable. A high relative humidity (80 - 90%) is best. It produces seeds when day lengths are short. It grows in most African and Asian countries.

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

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

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

Food Value: Per 100 g edible portion

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

Leafy greens

English: Cha-om
Local:

Scientific name: *Acacia pennata* subsp*. insuavis*
Plant family: FABACEAE

Description: A shrub or small tree that grows to 5 m tall. There are prickles along the stem. The leaves are twice divided and there are 8 - 18 pairs of pinnae. There are up to 50 pairs of pinnules on each pinnae. The flowers are yellow. They occur in large clusters at the ends of branches. The pods are flattened.

Distribution: It is a tropical plant.

Use: The young tips are eaten with a spicy sauce. They can be eaten raw or fast boiled. They are also cooked in an omelette and used for soup.

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	-	238	-	3,000	58	4.1	-

Image sourced from: http://www.thailandplant.com/AmorphophallusAroidCrinumBulbTropicalPlant-product_detail.php?listid=287&plantSID=198hdd1nmkf0bvgde996etjso2

Leafy greens

English: Horseradish tree
Local:

Scientific name: *Moringa oleifera*
Plant family: MORINGACEAE

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

Distribution: A tropical and subtropical plant. They suit the dry lowland areas and grow up to 1,350 m altitude in the tropics. They are not hardy to frost. They cannot tolerate water-logging. A pH of 6 - 7.5 is suitable. It can grow in arid places. It suits hardiness zones 9 - 12.

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

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

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

Food Value: Per 100 g edible portion

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

Fruit

English: Wine palm
Local:

Scientific name: *Borassus flabellifer*
Plant family: ARECACEAE

Description: A small evergreen palm that usually grows 10 - 20 m tall, but can grow to 40 m. It spreads to 5 m across. The stem is stout and may be 1 m across. It is often swollen at the base. It has a crown of leaves shaped like the fingers on a hand or spreading out like a fan. There can be 30 - 40 of the fan like leaves at the crown. The leaves are large with short stout leaf stalks. There can be 80 slender leaflets which are pointed, folded and rich green. Younger trees are covered with dead leaves or leaf bases. Leaves can be 1 - 2 m across. The flowers occur in flower stalks up to 1.5 m long. The male and female flowers occur in different trees. The females spikes are larger and have a boat shaped spathe. The fruit are borne in bunches like coconuts. The fruit are 10 - 12.5 cm across and slightly flattened at the ends. They have dark, purple skin. Green bracts occur at the base. Each fruit has 3 seeds. The flesh resembles the flesh of a coconut.

Distribution: A tropical plant that prefers a well-drained soil. It needs a protected sunny position. It is drought and frost tender. Seed need to have a temperature of 24 - 29°C to grow. Trees need a temperature above 15 - 18°C. It does better in the drier tropics than the humid tropics. It grows in seasonally wet and dry areas up to 500 m above sea level. Trees are very sensitive to cold. It suits hardiness zones 11 - 12.

Use: The flesh and water of the fruit are edible. They can be eaten fresh or made into ice-cream. Edible starch can be extracted from the stem. The palm heart is edible. The palm can be tapped for sugary sap. This can be drunk, boiled and concentrated or fermented. The seeds are germinated and the young shoots eaten. The swollen storage leaf is eaten either as flour or boiled and dried. **Caution:** The palm hearts have been shown to be toxic to rats even when cooked.

Cultivation: Plants are grown from seed that take 2 - 6 months to germinate. Seedlings are difficult to transplant so seed should be sown where they are to grow.

Production: Male flower stalks give more sap than female. To extract the sap, the unopened flower stalk is tied with a string then banged with a mallet for short times over 3 days before the end is sliced off and the sap collected. A small slither is cut off the end each day to keep the sap flowing. One flower stalk can yield 2 litres per day of sap. One person can tap 30 trees per day. Each flowering stalk will yield for about 3 months. Tapping normally begins when a palm is 20 years old but then may continue for 30 years. A single palm can yield 100,000 litres of palm wine over a 40 year lifespan. The fruit matures in 120 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
sap (thickened)	5.5	1594	0.7	-	-	1.6	0.3
palm heart	69.5	431	2.7	-	-	-	-
seed (sprouts)	69.5	431	2.7	-	-	-	-
seed (immature)	82.3	297	0.9	-	-	-	-
fruit	89.4	139	0.7	208	35.1	1.7	0.3

Fruit

English: Monkey jack
Local:

Scientific name: *Artocarpus lacucha*
Plant family: MORACEAE

Description: A large tree that grows to 10 - 50 m high and loses its leaves during the year. The trunk is short and erect but it can be bent. The crown is rounded and spreading. The bark is reddish-brown, rough and scaly in old trees. The young branches are densely covered with stiff, pale brown hairs. The leaves are alternate. The leaf stalk is 2 - 3 cm long. The leaves are oblong and 20 - 30 cm long and 2 - 16 cm wide. Sometimes the leaves have lobes. They are dark green and smooth above but softly hairy underneath. Male and female flowers occur on the same tree. They are clustered together in the outer surface of rounded heads. These grow at the base of the leaves. The male flower head is yellow. They are 0.8 - 5 cm long. The fruit have a fleshy receptacle. The fruit are velvety and yellow when ripe. They are 7 - 13 cm across. The fruit contains 20 - 30 oblong seeds.

Distribution: It is a tropical plant that suits a warm, humid climate. It grows in Nepal from sea level to 900 m altitude. In China it grows in forests in limestone mountains from 100 - 700 m altitude in Yunnan. In India it grows up to 1,500 m altitude. It is sensitive to frost, but is hardier than jackfruit. It can grow in arid places.

Use: The flat broad seeds are eaten. The ripe fruit are eaten raw. They have a sweet-sour taste. The immature fruit are cooked in curry or used in chutney and pickles. The male flowers are pickled. The bark is chewed as a substitute for betel nut. The young shoots are cooked as a vegetable. The young leaves are used for a sour flavouring.

Cultivation: Plants are grown from seed. Fresh seed should be used as seed do not store well. Seedlings do not transplant well.

Production: Trees start bearing after 6 - 7 years. Yields per tree can be 80 kg. In India, fruit are available from June to August.

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	72.3	435	1.2	310	65.6	0.8	1.7

Image sourced from: https://qph.ec.quoracdn.net/main-qimg-a91b40157d20cc9b48372a6996d34c78-c

Fruit

English: Pawpaw
Local:

Scientific name: *Carica papaya*
Plant family: CARICACEAE

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

Distribution: It is a tropical plant that grows from sea level up to about 1,700 m altitude in the equatorial tropics. In cooler regions they have to be planted but in humid tropical regions are commonly self-sown. Sunlight allows germination when forest is cleared. It cannot stand frost. It needs a night temperature above 12°C and don't tolerate water-logging. Plants die after 48 hours in standing water. It needs a pH between 5 - 8 and suits hardiness zones 11 - 12.

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

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

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

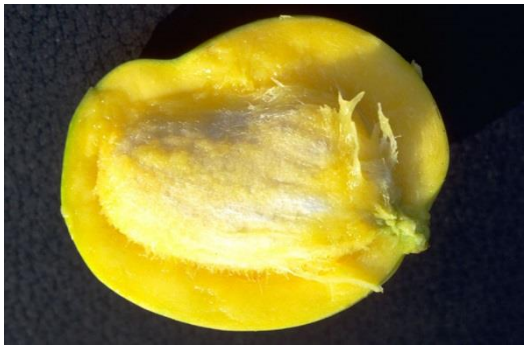
Food Value: Per 100 g edible portion

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

Fruit

English: Mango
Local:

Scientific name: *Mangifera indica*
Plant family: ANACARDIACEAE



Description: An erect, branched evergreen tree. It can grow to 10 - 40 m high and is long lived. (Trees grown by vegetative means are smaller and more compact.) Trees spread to 15 m across. It has strong deep roots. The trunk is thick. The bark is greyish-brown. The leaves are simple and shaped like a spear. Some kinds of mangoes have leaves with a wavy edge. They can be 10 - 30 cm long and 2 - 10 cm wide. They are arranged in spirals. The leaf stalk is 1 - 10 cm long and flattened. Leaves are often brightly coloured and brownish-red when young. These tender leaves which are produced in flushes become stiff and dark-green when mature. The flower stalks are at the ends of branches. They are 10 - 50 cm long and branching. Up to 6,000 flowers can occur on a stalk. Most of these are male and up to 35% have both male and female flower parts. Fruit are green, yellow or red and 2.5 - 30 cm long. The fruit hang down on long stalks. The outside layer of the seed is hard and fibrous and there is one seed inside. Several embryos can develop from one seed by asexual reproduction. The fruit shape and colour vary as well as the amount of fibre and the flavour. India has many varieties and they cannot tolerate humidity.

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

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

Cultivation: Trees are grown by planting fresh seed and they can be transplanted. Mangoes vary in their ability to breed true from seed. When more than one seedling emerges from the seed some of these are asexual and breed true. Clean seed germinate best if they are treated at 50°C for 20 minutes, then planted on their edge with the round bulge upwards and near the soil surface. The husk around the seed should be removed. Seeds germinate in 3 - 6 weeks. The strongest growing seedlings from this seed are used and the others thrown away. The seedlings from the folds of the seed are vegetative while the seedling from the centre of the seedling near the stalk end may be sexual and show variation from type. Other seeds only produce one seedling and these normally vary and can be different from the parent tree. Plants can be propagated by budding, or by grafting using in-arching. This is not easy and care is required. In wetter places, flowers need to be protected with fungicides to enable fruit to form. If organic manure is used this should not be directly in the

planting hole nor immediately against the new plant. Young transplanted seedlings need regular watering. A spacing of 6 - 12 m between plants is used. Wind protection is advisable to prevent fruit rubbing and getting damaged. Trees should only ever be lightly pruned as fruit develop on new growth and heavy pruning can reduce flowering. Flowering can be brought about by foliar sprays of potassium nitrate.

Production: Seeds germinate after about 20 days. Seedling trees produce after 4 - 6 years and increase in production up to 20 years. Trees often bear better each second year. Rain at flowering reduces fruit setting. Fruiting is at the end of the year. Fruit take 4 - 5 months to mature. Fruit vary in weight from 200 - 1,000 g. Trees can produce one million flowers but only 500 fruit. Trees last for many years.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	83.0	253	0.5	54	30	0.5	0.04
leaf	82.1	226	3.9	-	60	2.8	-

Fruit

English: Banana
Local:

Scientific name: *Musa acuminata*
Plant family: MUSACEAE

Description: The banana false stems usually have black marks on them. The canal of the leaf stalk is like an open drain. There are dry flaps where the leaf stalk joins the false stem. The leaves are paddle shaped. These are diploid bananas. They can be seeded or seedless. The flowers hang down. They are pear shaped and yellow, white or cream. The fruit are yellow. This is the small diploid variety. Many bananas are hybrids between *acuminata* and *balbisiana*.

Distribution: A tropical plant. It suits hardiness zones 10 - 12.

Use: The seedless fruit are regularly eaten raw or cooked. The seeded fruit are occasionally eaten. The shoots are cooked and eaten.

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	75.7	365	1.7	-	2	0.9	0.4

Fruit

English: Avocado
Local:

Scientific name: *Persea americana*
Plant family: LAURACEAE

Description: A small to medium sized tree that normally grows 8 - 10 m tall, but can reach 25 m. The leaf stalk is 1.5 - 5 cm long. Leaves are entire, oval and 5 - 40 cm long. Flowers are greenish, small and on the ends of branches. Clusters of flowers may contain 200 - 300 flowers. Normally only 1 - 3 fruit develop from each cluster. The fruit is round or pear shaped, and 7 - 20 cm long. The fruit are greenish-yellow with some red coloration. The fruit has greenish-yellow flesh and a large round seed. There are 3 named races - West Indian, Guatemalan and Mexican.

Distribution: A subtropical plant that grows from sea level up to 2,250 m in the tropics. It cannot stand water-logging. Branches are easily damaged by wind. It needs a frost free location or where frosts are rare. West Indian varieties thrive in humid, tropical climates, freeze at or near 0°C and can stand some salinity. Mexican types come from dry subtropical plateaus and thrive in a Mediterranean climate. They are hardy to -7° C. They are salt sensitive, have the smallest fruits and the thinnest skin. The best daytime temperature is 25 - 33°C. Guatemalan types come from cool, high-altitude tropics and are hardy to -3° C. It does best with neutral or slightly acid and well aerated soil. Growth is disrupted when soil temperature is below 13°C. It needs high humidity at flowering and fruit set. It can grow in arid places.

Use: The fruit pulp is eaten raw or cooked. It is used in salads, soups, sandwiches, spreads, ice cream, and also in tortillas and wine. The fruit is mixed with sugar and water to make a drink. Oil is extracted from the flesh and is used in salad dressing. The leaves can be used for tea sweetened with sugarcane juice. Toasted leaves are used to season stews and bean dishes. **Caution:** Some people are allergic to avocado.

Cultivation: Plants are often grown from seed. Seeds remain viable for 2 - 3 weeks. Fresh seed held at 25°C day to 15°C night will germinate in 3 weeks. It is best to propagate vegetatively. Tip cuttings, layers and grafts can be used. Because different types have pollen at different times of day, a mixture of trees which have pollen and flowers receptive at different times gives best fruit set. Although trees will grow in shade, they need sun for fruiting. The leaves do not rot easily and can accumulate under trees. Other plants cannot be grown under avocado trees.

Production: Seedlings grow quickly and continuously in warm, moist conditions. Seedlings bear after 5 - 8 years. Grafted trees can fruit in 1 - 2 years. A good tree produces 400 - 600 fruit each year. A fruit can weigh 50 g - 1 kg. In the subtropics, trees often produce 2 main flushes of fruit per year. From fruit set to maturity can take 6 - 12 months. Fruit ripen off the tree in 4 - 14 days. For the Mexican types, the fruit weigh less than 250 g and they ripen 6 - 8 months after flowering.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	74.4	805	1.8	480	11	0.7	0.4

Fruit

English: Malayan mombin
Local:

Scientific name: *Spondias pinnata*
Plant family: ANACARDIACEAE

Description: A medium sized tree that grows 15 - 40 m tall. The trunk can be 60 - 100 cm across. The leaves are 20 - 60 cm long and made up of several leaflets. The leaves and leaflets are carried alternately. The leaflets are pointed at the tip and rounded at the base. The leaflets are 7 - 14 cm long by 2.5 - 6 cm wide. There are 5 - 11 leaflets with a leaflet at the end. The flowers are in a long panicle at the ends of branches. The flowers are greenish-white. The fruit are rounded and yellow with an edible pulp around a fibrous stone. The fruit can be 4 - 7 cm long.

Distribution: A tropical plant. It grows in tropical Asia. It grows in secondary semi-deciduous forest. In Vietnam it grows below 1,000 m altitude. It needs sunlight and can tolerate drought and grow on poor soils. They are found in forests at low altitude from Luzon to Mindanao in the Philippines. In Nepal, it grows from 300 – 1,400 m altitude. It grows in areas with a maximum temperature from 38° - 45°C.

Use: The fleshy portion of the ripe fruit is eaten raw. It is sour-sweet. They are also pickled. Seeds are also eaten. The fruit are eaten as a vegetable when green. The young leaves are cooked and eaten. They are used for flavouring. The flowers are sour and eaten raw or used in curries or used as a flavouring. The unripe fruit are used in chutneys, stews, pickles, and jams.

Cultivation: Plants are grown from seed. Seedlings need to be transplanted very carefully. They can also be grown from cuttings.

Production: Plants start to fruit after 4 - 5 years. In NE India, fruit are available May to November.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	86.7	213	1.1	-	77.0	2.8	0.2

Fruit

English: Kumbi
Local:

Scientific name: *Alangium salvifolium subsp. hexapetalum*
Plant family: CORNACEAE

Description: A small tree that grows 6 - 12 m tall. It is spiny when young. It can be a climbing shrub. The leaves are 7 - 15 cm long by 3 -7 cm wide. They are simple and alternate. They are broadly oval and have an abrupt tip. The flowers are 1 - 3 cm across and pale yellow. They occur in short branched clusters of 3 - 17 flowers. The fruit are 1 - 2 cm across. They are red but turn black when ripe. There is a stone with one seed.

Distribution: It is a tropical plant.

Use: The ripe fruit are eaten.

Production: Plants fruit April to May.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	83.9	231	3.9	-	117.8	0.1	-

Image sourced from: https://c1.staticflickr.com/5/4113/4955623199_307a394743_z.jpg

Vegetables

English: Wax gourd
Local:

Scientific name: *Benincasa hispida*
Plant family: CUCURBITACEAE

Description: A climbing, pumpkin family plant. The vine can grow to 3 m long. The plant re-grows from seed each year. The vines are thick, furrowed and hairy. The leaves are heart shaped with 5 - 7 lobes. They are rough to touch. Flowers are yellow. The immature fruit can have skin of various colours depending on variety. The fruit is up to 30 cm long and 20 cm across and green with a waxy covering when mature. This waxy layer enables the fruit to be stored for a long time. Fruit shape and size can vary with variety. The flesh is firm and white. The fruit are heavy, weighing from 8 - 45 kg.

Distribution: A tropical plant. It is suited to warm, lowland, tropical conditions. It does better in dry areas or drier seasons. They are reasonably drought tolerant. The best temperature for growing is 23 - 28°C. They need a well-drained soil. They grow best with a soil pH of 6.5.

Use: The white flesh is added to stir fried dishes. The seeds can be fried and eaten. Young leaves and flower buds can be eaten. The young fruit are used as a vegetable. The mature fruit are peeled, cut in pieces and candied.

Cultivation: It is grown from seeds. There are about 1,800 seeds per kg. Seeds are sown 3 - 5 cm deep with a spacing of 60 - 80 cm between plants. Seed can be sown in nurseries and transplanted when 15 - 20 cm tall. They are usually planted in mounds and allowed to grow over a strong trellis. They can be allowed to stay on the ground. If plants are going to be allowed to trail over the ground, a spacing of about 3 m is necessary. Decayed manure or compost is used where available. Plants are responsive to sulphate of ammonia. Flowering normally starts 60 - 80 days after planting. Flowers are open in the early morning. Hand pollination may assist fruit development. This becomes more important in colder areas. Thinning of fruit gives larger fruit. The growing tips of plants can be pruned out to encourage branching or to restrict growth.

Production: Fruit are ready 3 - 5 months after planting. The fruit keeps well when fully mature. They can be stored for 6 months at 13 - 15°C in a dry atmosphere. The pulp of wax gourds can be shredded and dried for later 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
fruit	92.0	118	0.7	0	15	0.6	0.6
fruit (cooked)	96.6	54	0.4	0	10.5	0.4	0.6

Vegetables

English: Soursop
Local:

Scientific name: *Annona muricata*
Plant family: ANNONACEAE

Description: A low, bushy tree, that grows 8 - 10 m tall. The leaves are long (14 cm) and narrow (4 cm). The leaves are thick and slightly shiny on top. The flowers are large (2 - 3 cm), rounded and produced on short stems on the branches. They occur singly or in groups of three. The flowers have two layers of thick, fleshy petals. The fruit are 10 - 30 cm long. The fruit is spiny and the flesh is juicy. Many black seeds are embedded in the white flesh. Fruit are often distorted, or mis-shapened, due to only some of the ovules, or young undeveloped seeds, being fertilised. Beetles are normally thought to do the pollinating. This means fruit end up heart-shaped when unevenly pollinated. Several types occur with different sweetness, shape and juiciness.

Distribution: A tropical plant that has been taken to most tropical countries. It grows in tropical lowland areas below 1,200 m altitude. It can tolerate quite poor soils and a humid climate. It cannot tolerate frost. The trees can withstand temperatures down to freezing (0°C) for a short time but salt-laden winds from the sea can kill them. It needs a well-drained soil and cannot tolerate waterlogging. Trees continue to grow and produce satisfactorily in fairly poor, compacted soil, but improving the fertility increases the amount of fruit. It can grow well in hot humid areas, but a fungus disease called Blossom blight can cause flowers to fall off. It suits hardiness zones 10 - 12.

Use: Fruit can be eaten fresh, or used in ice-cream and for drinks. Young fruit can be cooked as a vegetable. Leaves are edible when cooked. The trees are fairly common, but the fruit may not be widely used. **Caution:** The seeds are toxic, so should be removed before processing.

Cultivation: Trees are grown either as seedling trees or grafted plants. They can be grown from cuttings or air-layering (part of the plant cut and wrapped in dirt so it produces new shoots). Trees are easy to grow and maintain. Plants can easily be grown from seeds. Seeds can be planted fresh or stored. Seeds grow in about 15 - 20 days. Trees grown from seeds vary in the quality of the fruit. Seedlings are transferred to plastic bags when 15 cm tall. Trees can also be grown from cuttings or by grafting. This allows better trees to be selected and produced. Seedlings are suitable for grafting after 6 months. Trees need to be about 5 m apart. Flowers are pollinated by insects. Hand-pollination of flowers can increase the number of fruit that are produced. Fruit are soft and fleshy, and difficult to transport.

Production: Trees grow quickly and commence bearing by the third year. It bears fruit almost continually throughout the year, but there is normally one season when more fruit are getting ripe. A tree can produce 12 - 24 fruit in a year, weighing up to 4 - 5 kg each. The fruit contain 11 - 14% sugars.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	82.4	294	0.88		16	0.3	0.1

Vegetables

English: Capsicum
Local:

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

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

Distribution: A tropical or subtropical plant. Plants grow from sea level up to about 2,400 m altitude. They are killed by frost. Soils need to be well drained and fertile. The fruit and plants can rot in the middle of the wettest seasons. They need a temperature above 4°C. A night temperature of 16 - 18°C and a day temperature of 26 - 28°C is best. A soil pH of 5.4 - 6.9 is suitable. They suit plant hardiness zones 8 - 12.

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

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

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

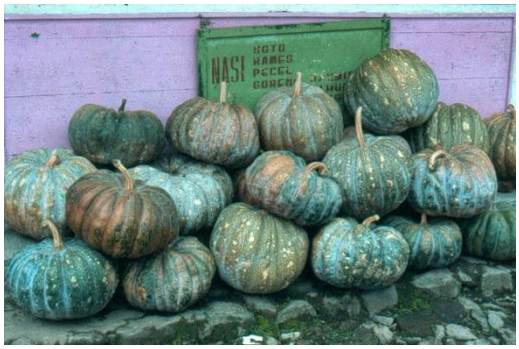
Food Value: Per 100 g edible portion

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

Vegetables

English: Pumpkin
Local:

Scientific name: *Cucurbita maxima*
Plant family: CUCURBITACEAE



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

Distribution: A subtropical plant that grows from sea level to 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: Okra
Local:

Scientific name: *Abelmoschus esculentus*
Plant family: MALVACEAE

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

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

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

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

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

Food Value: Per 100 g edible portion

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

Vegetables

English: Eggplant
Local:

Scientific name: *Solanum melongena*
Plant family: SOLANACEAE

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

Distribution: A tropical plant. Plants grow from sea level up to 2,200 m altitude in the tropics. It suits wet climates but does well in dry climates with irrigation. It needs a long warm growing period. A daily mean temperature of 20 - 30°C is most suitable. They are frost tender. They need a rich, friable, well tilled soil. In the sub-tropics they can be grown as a summer crop.

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

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

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

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	91.8	117	0.8	6	1.3	0.4	0.2
fruit (fresh)	93.4	62	0.7	50	5	0.4	0.3

Vegetables

English: Leek
Local:

Scientific name: *Allium ampeloprasum var. porrum*
Plant family: AMARYLLIDACEAE

Description: An onion-like plant without a bulb and with flat leaves. It grows one year, then flowers the next. There is one bulb and there can be bulblets. The covering is white. The leaves are flattened and vary from 40 - 100 cm long by 1.2 - 2.5 cm wide. Many flowers are produced in a large flower head where small flowers are on equal length stalks forming a ball.

Distribution: A temperate plant that does best with a day temperature below 24°C. It grows mostly over 800 m altitude in the tropics and grows up to 2,600 m. It needs a fertile soil. It is very frost resistant. The soil needs to be well drained but retain moisture.

Use: The whole plant is boiled except for the tops of the leaves. They can also be eaten raw. Sprouted seeds are eaten.

Cultivation: They can be grown from seed. Seedlings can be transplanted when 15 - 20 cm tall. The base of plants or suckers are more commonly used for planting. It is difficult to save seed in the wet tropics. If plants are planted in a hole 10 - 15 cm deep they develop long white edible stalks. The soil should be mounded up around the base of the plant. A spacing of 15 - 20 cm between plants and in rows 30 - 36 cm apart is suitable,

Production: Plants are ready for harvest after 16 - 20 weeks. A yield of 20 kg per 10 metres square is average.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	91.0	122	2.0	31	29	7.5	-

Nuts, seeds, herbs and other foods

English: Alder Agaric
Local:

Scientific name: *Schizophyllum commune*
Plant family: AGARICACEAE

Description: A mushroom with grey, fan-shaped fruiting bodies. They can be 2 - 4 cm across. The gills spread out from the point where the fruiting body attaches to logs. The edges of the gills are thick and split or like a groove.

Distribution: A tropical plant. It grows in tropical Africa. They grow in groups on dead wood.

Use: The mushroom is cooked and eaten. Dried mushrooms can be preserved. It can be tough so is boiled for 1 or 2 hours with salt added or cooked with meat in curries. It is also cooked with dried fish.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
mushroom		1318	17.0				

Nuts, seeds, herbs and other foods

English: Chinese chestnut
Local:

Scientific name: *Castanea mollissima*
Plant family: FAGACEAE

Description: A big tree that grows 20 - 25 m tall. The trunk is 1 m across. The branches have short hairs but can also have long spreading hairs. The leaf stalk is 1 - 2 cm long. The leaf blade is oval and 10 - 17 cm long. It can be slightly hairy along the veins. The base of the leaf is rounded. There are coarse teeth around the edge. The male flower is 10 - 20 cm long. The cup is densely covered with spine like bracts. There can be 2 or 3 nuts in each cup. They are 2 - 3 cm across. The nuts are edible.

Distribution: It is native to China. It requires a dry subtropical location. It occurs in North Vietnam from 500 - 2,000 m altitude. It can grow on waste land, stony soil and acidic or limestone soils. In China it grows from near sea level to about 2,800 m altitude. It suits hardiness zones 5 - 9.

Use: The seeds can be eaten. They are used both fresh and dried. They can be roasted or boiled. They are also used in cooking.

Cultivation: Two or more compatible varieties must be planted together to ensure cross pollination. Trees can be grown from seed. Seed need to be treated for 1 - 2 months with cold in a refrigerator then planted 5 - 7 cm deep. Plants can be grown by splice grafting.

Production: Seedlings usually bear in 5 - 8 years. Grafted trees can bear in 2 years.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
nut	44	937	4.2	20	36	1.4	0.9

Image sourced from: www.dendrome.ucdavis.edu

Nuts, seeds, herbs and other foods

English: Coastal almond
Local:

Scientific name: *Terminalia catappa*
Plant family: COMBRETACEAE

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

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

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

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

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

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
nut (fresh)	31	1810	15.9	-	4	4.6	4.9
nut (dry)	4.2	2987	20.0	-	2	6.3	8.8

Nuts, seeds, herbs and other foods

English: Peanut
Local:

Scientific name: *Arachis hypogea*
Plant family: FABACEAE

Description: Peanuts grow on spreading bushy plants up to about 40 cm high. The leaves are made up of 2 pairs of oppositely arranged leaflets. Flowers are produced in the axils of the leaves. Two main kinds of peanuts occur. The runner kind (Virginia peanut) has a vegetative or leafy branch between each fruiting branch and therefore produces a spreading bush. The bunch type (Spanish-Valencia peanuts) produces fruiting branches in a sequence one after the other along the branches. They grow as a more upright plant and grow more quickly. Pods are produced on long stalks which extend under the ground and they contain between 2 - 6 seeds. The stalk or peg from the flower grows down into the soil and then produces the pod and seed under the ground. The flowers need to be no more than 18 cm from the soil surface for the seed pod to develop underground.

Distribution: Peanuts grow in tropical and subtropical areas. They grow well from sea level up to about 1,650 metres in the equatorial tropics. They require temperatures of 24 - 33°C. Plants are killed by frost. They need a well-drained soil and cannot stand water-logging and often require raised garden beds. Peanuts need 300 - 500 mm of rain during the growing season. Dry weather is needed near harvest.

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

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

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

Food Value: Per 100 g edible portion

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

Nuts, seeds, herbs and other foods

English: Lemon grass
Local:

Scientific name: *Cymbopogon citratus*
Plant family: POACEAE

Description: A coarse clumpy grass about 1 m tall. It forms dense tufts and clumps. The stems are hollow and cane like. The leaves have a rough edge and are about 1 m long by 1 cm wide. They curve over and are pale blue-green. It very rarely produces flowers. When flowers are produced, they are in a loose branched panicle. These are 5 cm long. It has a lemon smell when crushed.

Distribution: It is a tropical and subtropical plant. It occurs in coastal areas up to at least 1,400 m altitude. It is a good plant for borders and erosion control. They are frost tender. It needs a temperature above 10°C to grow. It needs good drainage. It suits hardiness zones 9 – 11.

Use: It is mostly used as a flavouring in lemon grass tea and stews. The leaves can be dried and stored for use in tea. The very young fleshy white bases of the shoots are used in Asian cooking. The outer layers are peeled off.

Cultivation: It is grown from portions of the clump. A spacing of about 1 m between clumps is needed. Plants can be easily grown by putting the stem end of a shoot in water until roots form then planting out.

Production: It can be cut 4 - 8 months after planting and then every 3 - 4 months. Harvesting can continue to 3 - 4 years.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	70.3	490	1.4	3	1.8	2.8	0.6

Nuts, seeds, herbs and other foods

English: Phalsa
Local:

Scientific name: *Grewia asiatica*
Plant family: MALVACEAE

Description: A shrub or small tree that grows 4 - 8 m tall. It loses its leaves during the year. The bark is rough and grey. The branches are long, slender and drooping. Young branches are covered with hairs. The leaves are alternate and simple. The leaves are a broad oval or heart shape and taper to the tip. They can be 20 cm long by 16 cm wide. The base is at an angle. The edges have coarse teeth. There are some hairs on the top of the leaf and a covering under the leaf. The leaf stalk is 1.5 cm long. The flowering stalks are in the axils of leaves. There are 3 - 5 stalks with 2 - 8 flowers clustered in groups. The flowers are yellow. The fruit are small, round and dark blue to almost black when ripe. They are about 2 cm across. They have indistinct lobes. The flesh is soft, fibrous and greenish-white stained a purplish-red. There are 1 - 2 half round seeds. These are 5 mm across.

Distribution: A tropical plant that can grow in tropical and subtropical conditions. They can stand temperatures of 44°C and light frosts when dormant. They require a deep, well- drained soil with a pH of 5.5 - 7. They occur at low altitudes in the Philippines. It grows in dry and secondary dense forest. It can grow in humid and arid regions. It flowers and fruits best where there is a distinct wet and dry season. It needs a distinct winter and summer climate regime. It can grow on a range of soils, including limestone, but is sensitive to waterlogging.

Use: The fruit are eaten raw as a dessert. They are tart. They are also used for pickles and to make a fermented alcoholic drink. The gum from the bark is used to clarify sugarcane juice.

Cultivation: Trees are mostly grown from seed. The seeds are taken from fresh fruit. Seedlings are usually transplanted while dormant. It can be grown from cuttings using rooting hormone. It can also be grown by air-layering and budding. Seeds are sown when freshly removed from the berries and germinate in 15 - 20 days. They are best put in a seed bed and transplanted when about one year old. Plants should be pruned each year. They should be cut back to about 1 - 1.2 m above the ground. Plants in warmer climates are pruned less and grow taller. When plants are pruned hard, larger fruit develop but these are of poorer quality. Flowers develop only on the current year's growth. Plants need to be 3 - 5 m apart. Fruit are picked when ripe. The fruit are very perishable so need to be eaten immediately.

Production: It takes 45 - 55 days from flowering to fruit maturity. An average of 5 - 8 kg of fruit per tree each year is normal. The first fruit are available 13 - 15 months after planting, but it takes 3 years to achieve good fruit production. Plants can fruit for 20 years. Because fruit ripen at different times, regular pickings are needed. Fruit mature 60 days after fruit set. Ripe fruit will only keep for a few days. One plant can produce 4 kg of fruit.

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	81.3	295	1.6	0	22	3.2	-

Nuts, seeds, herbs and other foods

English: Emblic
Local:

Scientific name: *Phyllanthus emblica*
Plant family: PHYLLANTHACEAE

Description: A small deciduous tree. It grows 2 - 20 m tall. The trunk is bent and has many branches. The branches are spreading. The bark is greyish-brown and peels off in flakes. The leaves are pale green and feathery. New leaves are pinkish. The leaves have short stalks. The leaves are 1 - 1.5 cm long by 0.2 - 0.3 cm wide. The leaves are arranged on slender branches to appear like feathery compound leaves. They are like tamarind leaves. Male and female flowers occur on different trees. The flowers are small and yellow. They are densely clustered on the branches. The fruit are small and yellow to green. They are 2 cm across and edible. They have 6 - 8 faint lines along them. They are fleshy and edible. They are sour. Some improved kinds have fruit 8 - 9 cm across.

Distribution: A tropical plant. It suits the hot humid tropical lowlands. It is native to tropical Asia. It grows in arid bushy savannah. It grows to 1,500 m altitude. It often grows on poor shallow soils. It is light demanding and drought tolerant. It can tolerate forest fires. They are common in tropical deciduous forest in India. It suits the subtropics. It needs warm temperatures at time of flower bud formation. Dry times during fruiting cause fruit to drop. It can tolerate low and high temperatures once established. It can tolerate soils with a pH 6 - 10. Some varieties can tolerate saline soils.

Use: The fruit are cooked and used in preserves. The fruit are acid and can be eaten fresh or used for flavouring. They are also used as a seasoning in cooked food. They are pickled and made into jams, jellies, preserves, tarts and other foods. The dried fruit chips are seasoned with caraway seeds, salt and yoghurt and eaten. Unripe seeds and leaves are edible.

Cultivation: Plants are grown from seed. They are best grown using ring budding or veneer grafting. Trees can be pruned to form 4 - 6 branches from one trunk. They can be grown from cuttings, grafting or by air layering.

Production: Early growth is fast. Some budded trees produce fruit after 3 years. Seedling trees take 7 - 8 years. Best yields are produced after 10 - 12 years and trees can keep bearing for 70 - 75 years. In India fruit are available October to December.

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	78.4	281	0.6	-	316	0.9	0.5

Nuts, seeds, herbs and other foods

English: Dill
Local:

Scientific name: *Anethum graveolens*
Plant family: APIACEAE

Description: A fine leafy herb up to about 1 m tall. It can spread 50 cm across. It is an annual plant, re-growing each year from seeds. The root is long and wiry. The stems of the plant are smooth, dark green and with pale stripes. They are finely grooved and hollow. The leaves are bluish-green and like a feather. They can be 35 cm long. The leaves are twice divided and have a sheath wrapping around the stem at the base. The small leaflets are like threads. Flowers are yellow and in flat compound arrangements where flowers are on stalks coming from one point. These flower arrangements can be 9 cm across. The fruit are oval one seeded dry ribbed fruits. Plants have an aniseed scent. The fruit are 1.5 times as long as wide. There are several named cultivars.

Distribution: It is a temperate plant. It is suited to shady places but does best in sunny positions. It is easily damaged by wind. It is frost resistant but drought tender. It needs moist, well drained, humus rich soil. In hot weather it produces flowers quickly. It is best with temperatures of 16 - 18°C. A pH of 5.6 - 6.5 is best. It grows below 1,900 m above sea level. It can grow in arid places. It suits hardiness zones 8 - 10.

Use: The seeds are used to flavour foods. They are added to pickles. The young leaves can be eaten. They have an aniseed flavour and are used in soups, salads, sauces, and with vegetables. It is one of the main ingredients in curry powder. The leaves and seeds are used for tea.

Cultivation: Plants are grown from seed. They are not easily transplanted. Seed are therefore best sown where they are to grow. Seed should be 1 cm deep and with 25 cm between plants. (Dill and fennel can cross pollinate.)

Production: Plants are fast growing. The leaves can be cut for use at any time, but they are at their best just before flowering. Plants can be cut 6 weeks after planting. Seeds are harvested when the plants are mature and have finished flowering and the fruits are fully formed. Harvesting during the cool of morning or evening avoids seeds being shattered and lost.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	7.7	1276	16.0	5	21.0	16.3	5.2
leaf (dry)	7.3	1059	20.0	585	50.0	48.8	3.3
leaf (fresh)	86.0	180	3.5	772	85.0	6.6	0.9

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
AGARICACEAE	*Schizophyllum commune*	Alder Agaric	mushroom		1318	17.0					50
AMARANTHACEAE	*Amaranthus gracilis*	-	leaf	5.4	905	31.2	-	-	82.5	6.0	26
AMARYLLIDACEAE	*Allium ampeloprasum var. porrum*	Leek	leaf	91.0	122	2.0	31	29	7.5	-	49
ANACARDIACEAE	*Mangifera indica*	Mango	fruit	83.0	253	0.5	54	30	0.5	0.04	37
ANACARDIACEAE	*Spondias pinnata*	Malayan mombin	fruit	86.7	213	1.1	-	77.0	2.8	0.2	41
ANNONACEAE	*Annona muricata*	Soursop	fruit	82.4	294	0.88		16	0.3	0.1	44
APIACEAE	*Anethum graveolens*	Dill	leaf (fresh)	86.0	180	3.5	772	85.0	6.6	0.9	57
ARECACEAE	*Borassus flabellifer*	Wine palm	fruit	89.4	139	0.7	208	35.1	1.7	0.3	34
CARICACEAE	*Carica papaya*	Pawpaw	fruit	88.0	163	0.5	290	54	0.4	0.18	36
COMBRETACEAE	*Terminalia catappa*	Coastal almond	nut (fresh)	31	1810	15.9	-	4	4.6	4.9	52
CONVOLVULACEAE	*Ipomoea batatas*	Sweet potato	tuber (baked)	72.9	431	1.7	961	24.6	0.5	0.3	13
CONVOLVULACEAE	*Ipomoea obscura*	Yellow ipomoea	leaf	56.6	569	8.8	-	-	28.8	1.1	29
CORNACEAE	*Alangium salvifolium subsp. hexapetalum*	Kumbi	fruit	83.9	231	3.9	-	117.8	0.1	-	42
CUCURBITACEAE	*Benincasa hispida*	Wax gourd	fruit (cooked)	96.6	54	0.4	0	10.5	0.4	0.6	43
CUCURBITACEAE	*Cucurbita maxima*	Pumpkin	leaf	88.0	160	4.9	260	28	2.5	0.9	46
DIOSCOREACEAE	*Dioscorea esculenta*	Lesser yam	tuber	74.2	470	2.1	84	20	0.75	0.5	12
FABACEAE	*Dolichos trilobus*	Japanese arrowroot	root	72.4	1794	7.1	-	-	0.2	4.4	11
FABACEAE	*Glycine max*	Soybean	seed (immature)	68.0	584	13.0	16	27	3.8	0.9	15
FABACEAE	*Eriosema chinense*	Bush potato	root	66.9	401	2.2		5	49.5	1.0	18
FABACEAE	*Psophocarpus tetragonolobus*	Winged bean	seed (young)	87.0	205	7.0	13.0	18.3	1.5	0.4	19
FABACEAE	*Cajanus cajan*	Pigeon pea	seed (young, boiled)	71.8	464	6.0	2	28.1	1.6	0.8	20
FABACEAE	*Canavalia gladiata*	Sword bean	pod (fresh)	89.0	142	2.8	-	-	-	-	21
FABACEAE	*Mucuna pruriens*	Velvet bean	seed	7.3	-	29.3	-	4.8	-	-	22
FABACEAE	*Vigna unguiculata subsp. unguiculata*	Cowpea	young pod + seed (boiled)	89.5	142	2.6	45	17.0	0.7	0.2	23
FABACEAE	*Senna tora*	Stinking cassia	seed	11.64		32.4			1.4		24
FABACEAE	*Lablab purpureus*	Lablab bean	seed (young)	86.9	209	3.0	14	5.1	0.8	0.4	25
FABACEAE	*Acacia pennata* subsp. *insuavis*	Cha-om	leaf	-	238	-	3,000	58	4.1	-	32
FABACEAE	*Arachis hypogea*	Peanut	seed (dry)	4.5	2364	24.3	-	-	2.0	3.0	53
FAGACEAE	*Castanea mollissima*	Chinese chestnut	nut	44	937	4.2	20	36	1.4	0.9	51
HYPOXIDACEAE	*Curculigo orchioides*	Star grass	root	67.4	1534		9.6		124.4	2.5	17
LAURACEAE	*Persea americana*	Avocado	fruit	74.4	805	1.8	480	11	0.7	0.4	40
MALVACEAE	*Sida cordifolia*	Goat's horns	leaf	6.6	1296	24.2	-	-	79.8	-	27
MALVACEAE	*Triumfetta rhomboidea*	Burweed	leaf	78.4	284	4.2	-	-	29.2	-	28
MALVACEAE	*Corchorus olitorius*	Jute	leaf (cooked)	87.2	155	3.4	156	33.0	3.1	0.8	31
MALVACEAE	*Abelmoschus esculentus*	Okra	fruit (cooked)	90.0	134	1.9	58	16.3	0.5	0.6	47
MALVACEAE	*Grewia asiatica*	Phalsa	fruit	81.3	295	1.6	0	22	3.2	-	55
MORACEAE	*Artocarpus lacucha*	Monkey jack	fruit	72.3	435	1.2	310	65.6	0.8	1.7	35
MORINGACEAE	*Moringa oleifera*	Horseradish tree	leaf (boiled)	87	189	4.7	40	31.0	2.0	0.2	33
MUSACEAE	*Musa acuminata*	Banana	fruit	75.7	365	1.7	-	2	0.9	0.4	39
OPILIACEAE	*Opilia amentacea*	Catkin blooming	leaf	9.2	-	14.8	-	3.9	15.7	3.2	30
PHYLLANTHACEAE	*Phyllanthus emblica*	Emblic	fruit	78.4	281	0.6	-	316	0.9	0.5	56

POACEAE	*Oryza sativa*	Rice	seed (brown)	13.5	1480	7.6	-	-	2.8	-	16
POACEAE	*Cymbopogon citratus*	Lemon grass	leaf	70.3	490	1.4	3	1.8	2.8	0.6	54
SOLANACEAE	*Capsicum annuum var. annuum*	Capsicum	fruit (yellow raw)	92	113	1.0	24	183.5	0.5	0.2	45
SOLANACEAE	*Solanum melongena*	Eggplant	fruit	91.8	117	0.8	6	1.3	0.4	0.2	48

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