

# Potentially Important Food Plants of Sri Lanka



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](http://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.

## 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 Matthew Baker 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 Sri Lanka. This guide has been developed with the best intention to create interest and improve understanding of the important local food plants of Sri Lanka, 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](http://www.foodplantsolutions.org). More detailed or specific information on plants, including references to material by other authors, is available on DVD on request.

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

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

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

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## ***Introduction***

This book is designed as a simple introduction to the more common food plants of Sri Lanka. 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**

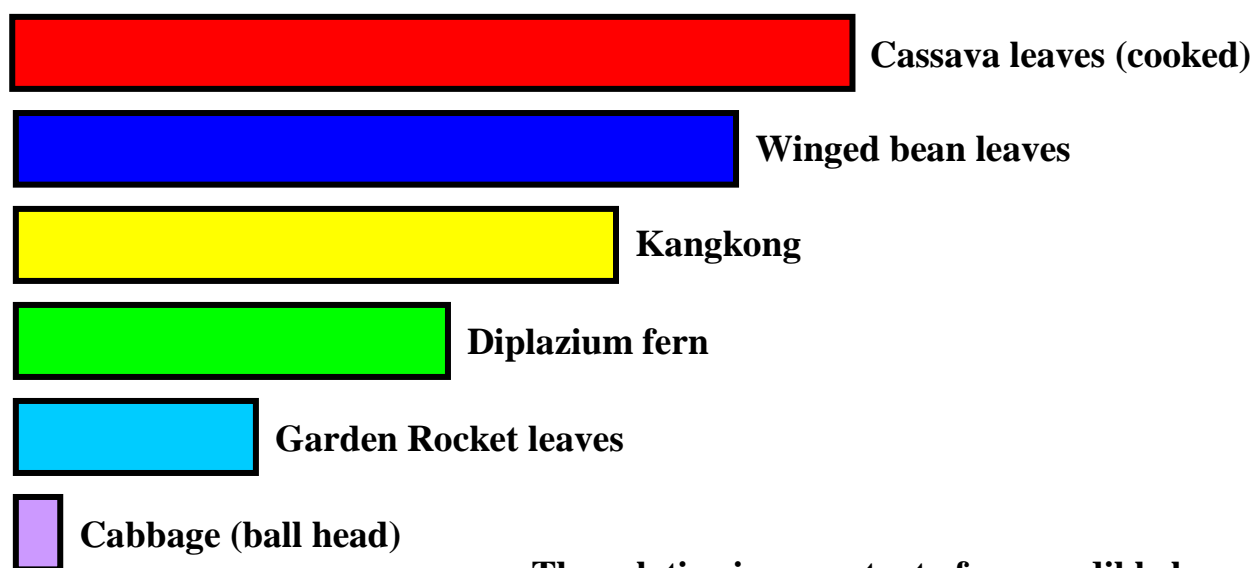
Many food plants have local names, as well as a common English name. Every type of plant also has its own scientific name. Although the scientific name might not be

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 that damages banana fruit is like this. Simply pulling off the leafy bracts over the banana fruit reduces the damage, as this lets sunlight in and the insect flies away. The best rule for reducing pest damage is to grow healthy plants, as they suffer less damage.

### **Diseases**

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

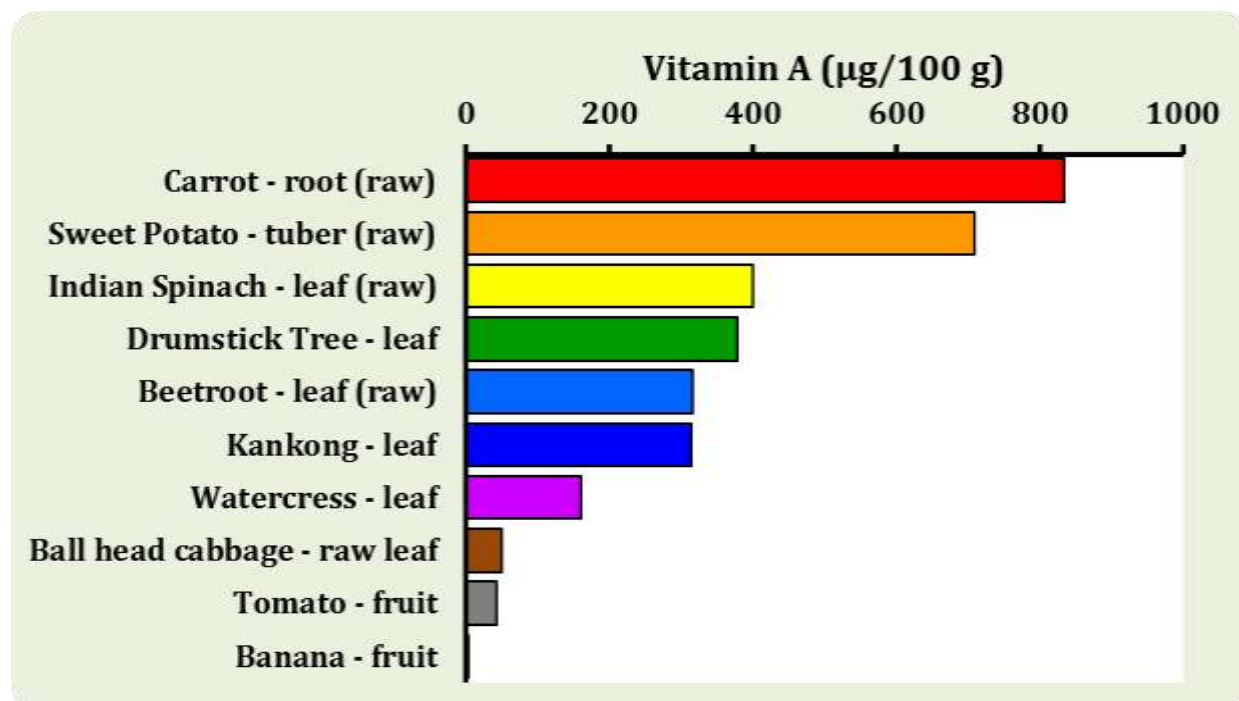
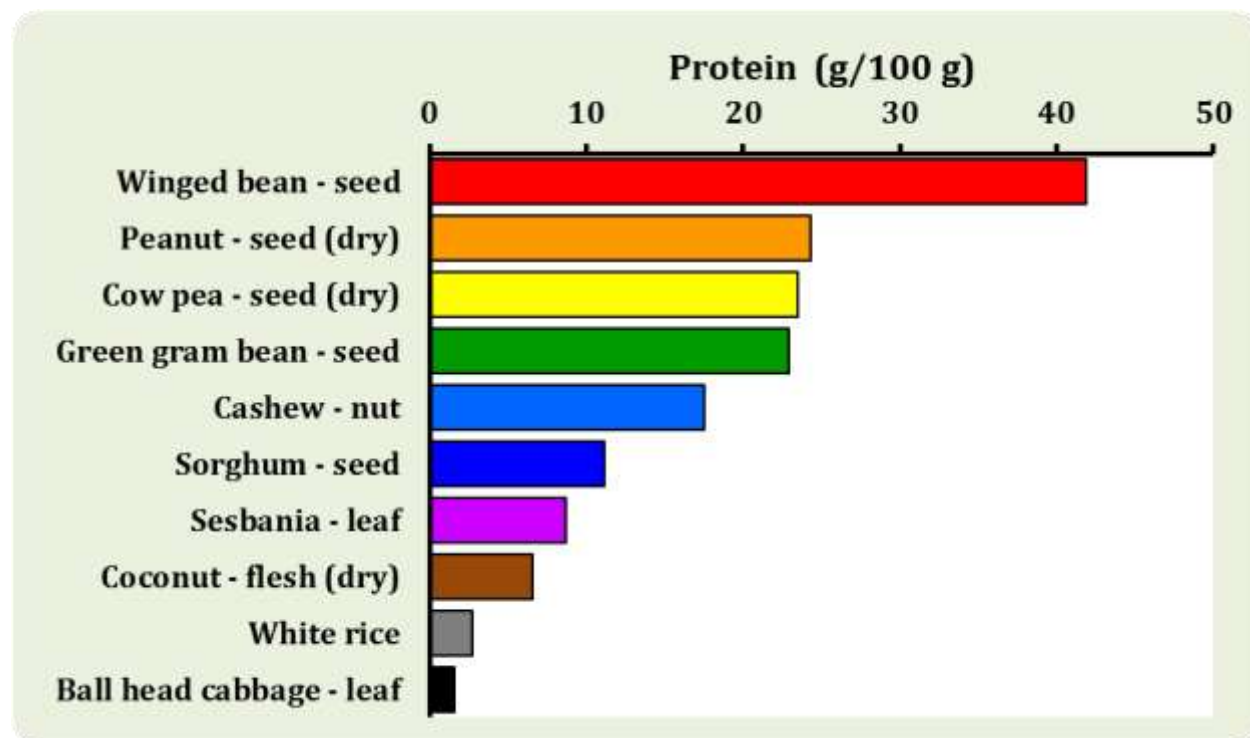
### **Climate and Habitat**

It would be rare for a country, or even a sub region of a country to have a consistent climate throughout its entirety. Instead, what is encountered are a range of climate shaped habitats across the landscape that have been formed by factors including rainfall, topography and temperature. Most plant species have specific climatic requirements, some more specific than others.

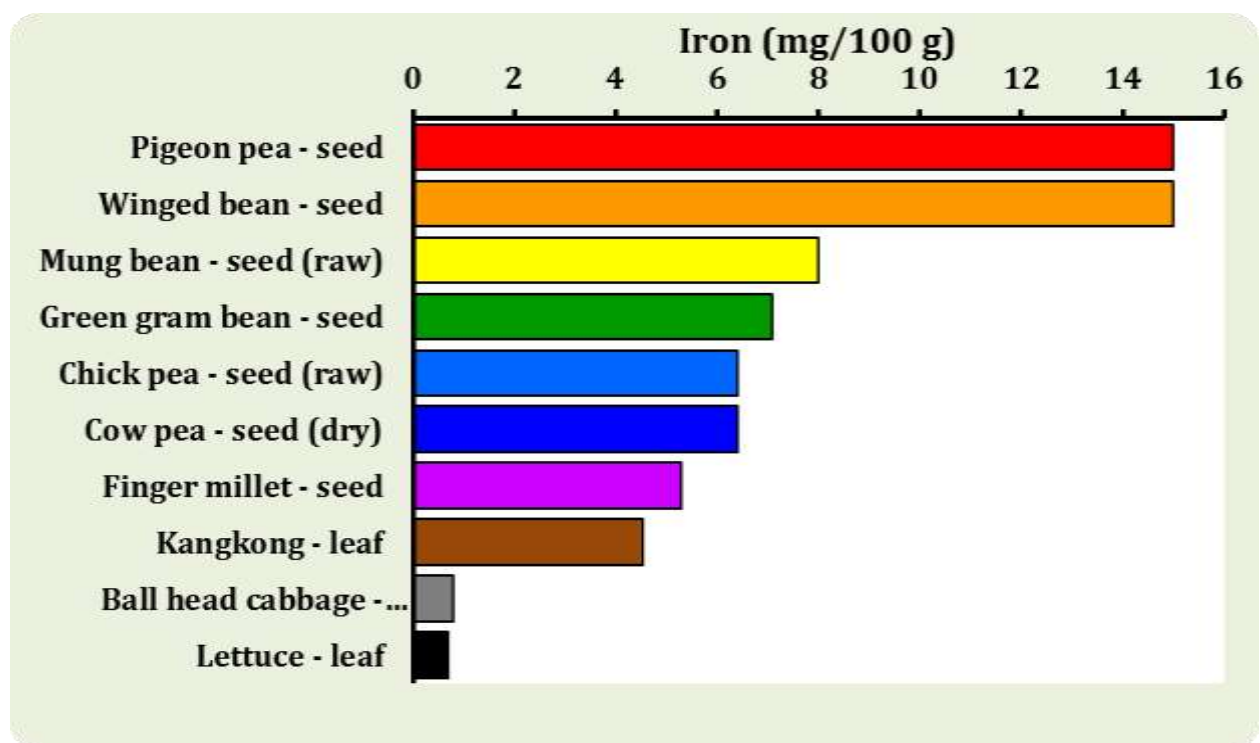
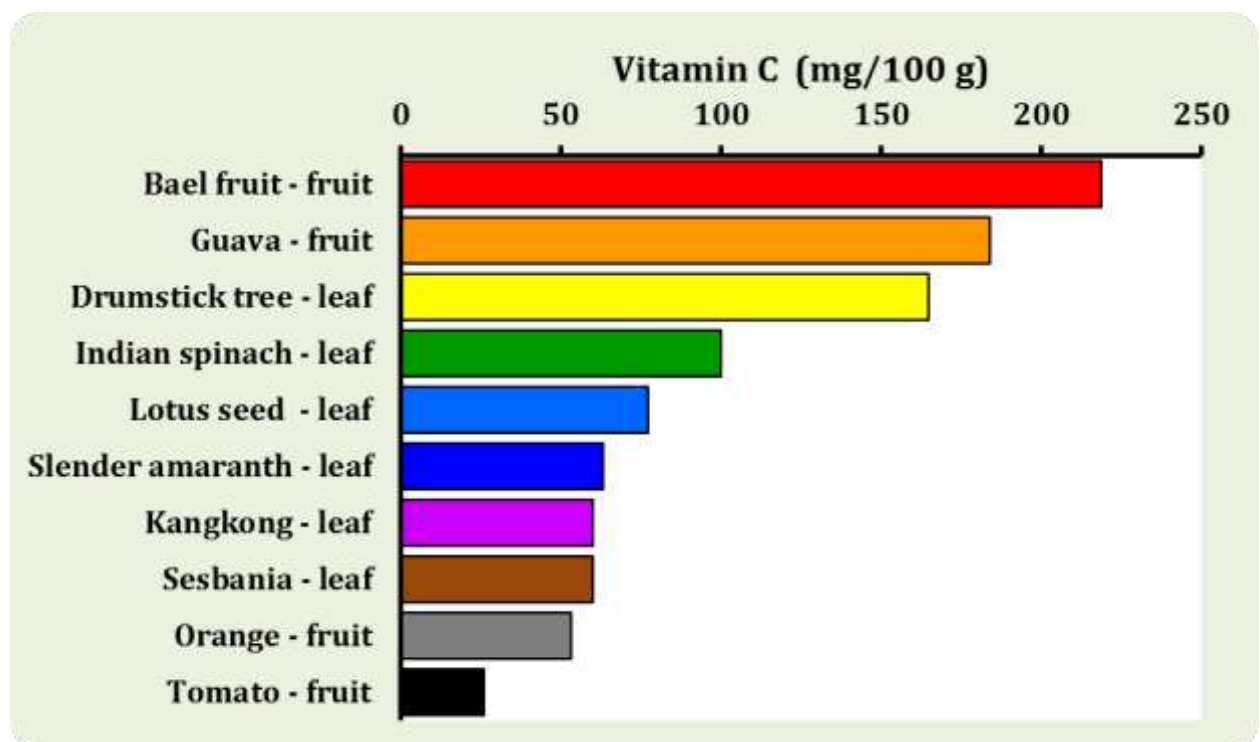
Matching the food crops with climatic requirements similar to the climate of your region will ensure high yields are achieved. If, for example, rainfall or temperatures are too low then poor growth or a failure of crops to set fruit may result.

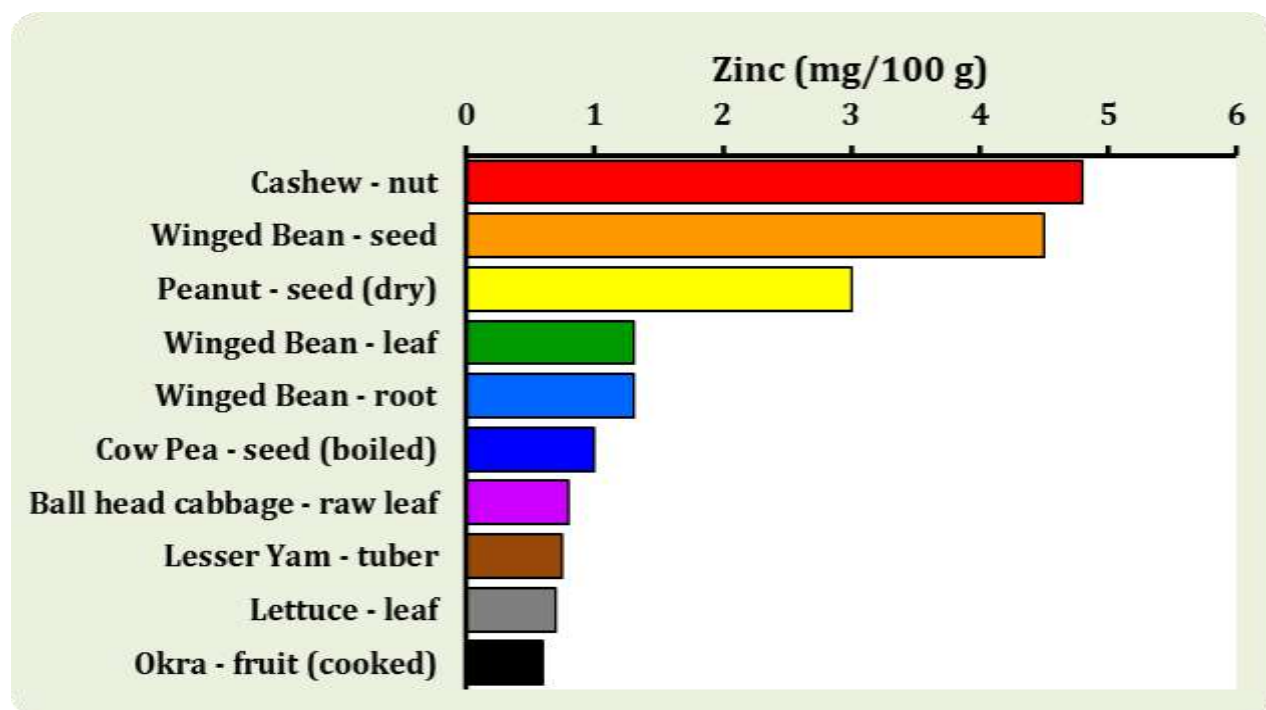
**Notes:** Where known, local names for plants in this field guide have been given in Sri Lankan and Tamil languages. These are denoted by a preceding S and T, respectively.

## Food value charts for a selection of plants from Sri Lanka









## *Starchy staples*

**English:** Coco Yam, Chinese Taro

**Local:** S: Desi-ala, Kiri-habarala, Rata-ala

**Scientific name:** *Xanthosoma sagittifolium*

**Plant family:** ARACEAE

**Description:** Coco Yam is a herb up to 2 m tall. It has a short stem and large leaves. A corm is produced at the base of the plant. It produces about 10 cormels on the underground corm. These are about 15-25 cm long and flask shaped. The leaves are 50-75 cm long stand erect on stout petioles (to 1 m long) and have a vein around the edge of the leaf. The leaf blade is oval with triangular lobes at the bottom. The flower is produced below the leaves. The large bract around the flower is pale green and about 20 cm long. The closely arranged spike of flowers is about 15 cm long. The smaller female section is at the bottom and the male section is larger and towards the top.



**Distribution:** Coco Yam is a tropical plant. It grows well in wet and humid tropical rainforest regions. It can tolerate light shade. It does well in regions with an annual average temperature of 26°C. It grows from sea level up to about 2000 m. Soils need to be well drained but should be moist. It needs a well distributed rainfall of 1,400-2,100 mm during the growing season. It does not do well in atoll soils. The best pH is 5.5-6.8.

**Use:** The cormels of Coco Yam are eaten after being roasted or boiled. Young leaves can be eaten after cooking. Main corms are often fed to pigs.

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

The crop duration is about 9 months although crops are often left for 12 months before harvesting. It has been recorded that plants increase in total dry matter production for 6 months then the percentage of dry matter in corm and cormels continues to increase while overall dry matter reduces. This effect may be due to lower rainfall near maturity.

They can be planted at any time of the year but in dry areas the middle of the dry season should be avoided. Plants are spaced at varying distances but there is often about 0.9 m x 1.5 m between plants. A closer spacing of 0.5 m x 0.6 m producing a plant density of 36,800 plants per hectare has given high yields, but variations with rainfall regime and other growth conditions undoubtedly alter this. Closer spacing increases planting requirements but reduces weeding requirements.

Soil compaction reduces yields drastically. It reduces plant size as well as the shape and number of cormels. Therefore either naturally loose soils from forest fallow or well cultivated soils are needed. The free water table must be at least 45 cm below the soil surface for satisfactory yields.

Coco Yam grows better in good soils especially ones with plenty of nitrogen. It can be grown in relatively poor soils and still give a satisfactory yield. It is best suited to alluvial soils with a well distributed rainfall. It is tolerant of shade and is therefore used in intercropping under cacao and coconuts. In such conditions yields are reduced but still satisfactory.

Plants deficient in nitrogen give stunted growth, small pale green leaves with short leaf stalks. Potassium produces dead edges around the margin of the leaf. Magnesium gives a bright orange colour between the veins.

Sometimes a crop of corms can be harvested after 7 or 8 months but often plants take up to one year to achieve a good crop. Where plants are on hillsides the corms are often harvested without actually digging out the whole plant. The soil is carefully dug away from the plant and the small corms are broken off the parent plant. The main stem is then covered with soil to produce a new crop.

Weed control is important and it is possible to use herbicides in this regard.

**Production:** Harvesting occurs after about 9 months. Cormels can be removed without moving the mother plant. The corms will store reasonably well, for a few weeks, under dry cool well ventilated conditions. The corms will also remain in good condition if they are left growing in the ground and harvested when needed.

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Root	67.1	559	1.6	0	13.6	0.4	0.5
Leaf	90.6	143	2.5	-	37	2	-
Shoot	89	139	3.1	-	82	0.3	-

## Starchy staples

**English:** Cassava

**Local:** S: Maiokka, Manyokka

**Scientific name:** *Manihot esculenta*

**Plant family:** EUPHORBIACEAE

**Description:** Cassava is a plant that can re-grow year after year from its thickened roots. It has several woody stems. Plants grow up to 2–3 metres high. Stalks have distinct scars where leaves have fallen. The leaves tend to be near the ends of branches. The leaves are divided like the fingers on a hand. The leaves have long leaf stalks. The leaves have 3–7 long lobes which can be 20 cm long. These are widest about 1/3 of the distance from the tip and taper towards the base. The colour varies. It produces several long tubers. These can be 50 cm long by 10 cm across. The flowers are on short stalks around a central stalk. They are produced near the ends of branches. The female flowers are near the base of the flower stalk and the male flowers are higher up.



**Distribution:** Cassava originates from tropical America but is cultivated widely throughout the tropical regions of the world. It grows from sea level up to about 1650 m. It can grow in poor soils and can survive drought, although rainfall above 750 mm produces the best yields.

**Use:** The tubers are eaten only after thorough cooking. They can be boiled, roasted or made into flour. The starch is used in puddings, soups and dumplings. Young leaves are also edible after cooking. They are also sometimes dried and stored. Seeds of Cassava are also eaten.

**CAUTION** Bitter kinds of Cassava contain poison but this is destroyed on heating. These types of Cassava should be cooked, sun dried, soaked and cooked again.

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

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

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

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

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

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

Spacing and plant density varies with soil, climatic conditions and variety. Plant densities from 10,000 to 30,000 plants per hectare are used. Plants from the higher density crops have been shown to have quick post harvest deterioration. Mulching has given significant yield increases in some conditions and can also reduce the incidence and damage of some root boring insects.

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

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Tuber	62.8	625	1.4	1	15	0.23	0.48
Leaf	82	382	7.1	-	275	7.6	-

## Starchy staples

**English:** Country Potato, Sudan Potato

**Local:** Innala

**Scientific name:** *Plectranthus rotundifolius*

**Plant family:** LAMIACEAE

**Description:** Country Potato is a small annual herb. It grows 15–30 cm high. Its succulent stems can lie along the ground or curve upwards. The leaves are thick and have a smell like mint. The flowers are small and pale violet. Dark brown tubers are produced in clusters at the base of the stem. The tubers can be up to 20 cm long and 2 cm wide.

**Distribution:** Country Potato is a tropical plant. It grows well in high rainfall areas with low night time temperatures. It is grown as a monsoonal crop.



**Use:** The tubers of Country Potato are commonly boiled and eaten but they can also be eaten raw. They can be added to curries, baked, or fried into chips, steamed, added to soups or stews or mashed and fried. The leaves are edible and can be used as a flavouring. The ripe fruit can also be eaten.

**Cultivation:** Country Potato is grown from suckers from germinating tubers. The tubers are put in a nursery bed about 4 cm deep and 10 cm apart. Tubers germinate in 10-15 days once watered. These produce a cluster of sprouts which are then transplanted after about 3 months. The earth is heaped up around the plants to encourage tuber growth. Plant spacings of 20 cm apart in rows 90 cm apart is used.

Plants can also be grown from cuttings. It needs a well drained, sandy loam. It cannot stand water-logging. In heavier soils, plants should be grown on ridges. Plants can not stand cold, frost or drought. The best pH for optimal growth is 6.5-7.0.

**Production:** Crops reach maturity after about 5–6 months. This may be longer in colder places. Yields of 8–15 tonnes per hectare are average. Tubers should be harvested as soon as they are mature to avoid decay.

**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	75		1.38	-			



## Starchy staples

**English:** Sweet Potato

**Local:** S: Batala T: Vel-kelengu

**Scientific name:** *Ipomoea batatas*

**Plant family:** CONVOLVULACEAE

**Description:** Sweet Potato is a root crop that is produced from long creeping vines. The leaves of the Sweet Potato vine vary considerably from divided (like fingers on a hand) to being entire. The flowers are trumpet shaped and purple. Under the ground fattened tubers are produced. There are a large number of varieties which vary greatly in leaf shape and colour, tuber shape, colour and texture and in several other ways.



**Distribution:** Sweet Potato is a tropical and subtropical plant. They grow from sea level up to some of the highest gardens at about 2700 m altitude in the tropics.

Plants can grow with a wide range of rainfall patterns and in different soils. Plants are killed by frost and can't stand water-logging. Plants grow well with temperatures between 21–26°C. It can grow with a pH between 5.2–6.8. Sweet Potato are not tolerant to shading. Under shaded conditions, both foliage growth and storage root production are decreased. Some cultivated varieties can be selected for increased production under mild shade but not heavy shade. The survival of cuttings at planting is also reduced under shaded conditions. Under shaded conditions plant become more climbing and with fewer, larger leaves. With increasing shade less tubers are produced and these grow more slowly. Sweet potato tends to be responsive to potassium fertiliser. Cultivated varieties are often selected for yield under low fertility conditions. Under lowland conditions in the tropics sweet potato tubers undergo active tuber enlargement from 6 to 16 weeks. Weed control is essential especially during early stages of growth. The rate of ground coverage by foliage varies greatly with growing conditions and cultivar but once ground coverage has occurred weed control is less of a problem. Sweet potato tuber initiation is subject to aeration in the soil. Either heavy clay soils, waterlogged conditions or other factors reducing aeration can result in poor tuber production. For this reason sweet potatoes are often grown on mounded beds. It suits hardiness zones 9–12.

**Use:** Sweet Potato tubers can be boiled, baked, steamed, fried, mashed or dried. 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 also 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.

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however larger. With increasing shade less tubers are produced and these grow more slowly. Sweet potato tends to be responsive to potassium fertiliser. Cultivars are often selected for yield under low fertility conditions.

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**Production:** The time to maturity ranges from 5 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

<b>Edible part</b>	<b>Moisture %</b>	<b>Energy kJ</b>	<b>Protein g</b>	<b>proVit A µg</b>	<b>proVit C mg</b>	<b>Iron mg</b>	<b>Zinc mg</b>
Tuber - baked	72.9	431	1.7	-	24.6	0.5	0.3
Tuber - raw	70	387	1.2	709	25	0.7	0.4
Tuber - boiled	72	363	1.1	-	15	0.6	0.3
Leaf	86.3	168	3.9	189	58	2.9	-

## Starchy staples

**English:** Finger Millet

**Local:** S: Kurakkan T: Kurukkan

**Scientific name:** *Eleusine coracana*

**Plant family:** POACEAE

**Description:** Finger Millet is an annual grass. It is robust and forms many tillers (young shoots) from the base. It grows 40–120 cm tall. The stems are somewhat flattened. The leaves are long and narrow. The flower heads are made up of 2 to 7 finger like spikes. These spikes are 1.5 cm across and 10–15 cm long. These in turn have about 70 smaller spikelets. Each one of these spikelets has 4–7 seeds. The seeds are 1–2 mm across and are rounded in shape.



**Distribution:** Finger Millet is a tropical plant. It is a very drought resistant crop. Although, for high yields it requires good soil drainage and adequate moisture. It cannot stand water-logging. It becomes important where rainfall is 900–1250 mm. It especially suits areas with long hot summers. It needs a minimum temperature above 18°C and does best where temperatures are above 27°C. It is a short day length plant and does best where daylength is less than 12 hours. It can grow in arid places.

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

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

**Production:** Finger Millet is self pollinating and pollination occurs over 8–10 days. Millet seed stores very well and can be stored without damage for 10 years. Often it is stored on the head. Yields of about 450–900 kg of dried grain per hectare are usual. This can easily be increased to 1650 kg per hectare. Crops usually take between 3 and 6 months from sowing to harvest.

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Seed	11.7	1594	6.2	-	-	5.3	-

## Starchy staples

**English:** Sorghum

**Local:** S: Karal-iringu T: Cholam

**Scientific name:** *Sorghum bicolor*

**Plant family:** POACEAE

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



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

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

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

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

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Seed	-	1459	11.1	0	-	-	-

## Starchy staples

**English:** Lesser Yam

**Scientific name:** *Dioscorea esculenta*

**Local:** S: Heen-kukulala, Java-ala, Katu-kukulala, Kukulala. T: Siru-valli

**Description:** Lesser Yam is a prickly climbing vine. It can climb 1.2–2.4 m high and spread 1.8 m across. The leaves are up to 12 cm long, round to heart shaped with a gap where the leaf stalk joins. Lesser Yam produces a cluster (5-20) of tubers under the ground. In many varieties there are sharp thorns just under the ground. Often the tubers are sticky when cut. The flowers are green, 4 mm across and are borne on long slender spikes. These spikes occur singly in the axils of leaves.



**Distribution:** Lesser Yam is a tropical plant. It grows from sea level up to about 1500 m. It can not tolerate water-logging and requires a loose fertile soil and a reasonably long rainy season. It does poorly on sandy soils and becomes misshapen in heavy clay soils. High levels of organic matter promote growth.

**Use:** The tubers are cooked and eaten. They can be used in soups and stews and can be mashed or fried. The tubers require peeling either before or after cooking.

**Cultivation:** Normally whole small tubers are planted (50–75 g) but cut portions of a tuber can be used. Using either the top section or the bottom section of a tuber gives better establishment and yield than middle portions. Tubers are planted 8–12 cm below the ground. Planting in mounds makes harvesting easier. It also assists with drainage and improves aeration. A spacing of 80–100 cm between plants is suitable. Stakes (approx. 2 m long) are required. 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 so a wet season is therefore desirable. Lesser yams compete poorly with living plants used as shade. Weed control is most crucial during the first 3 months. As early growth of the plant is sustained from the tuber, fertilisers can be applied slightly 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 but often phosphorus applications do not give significant responses as Lesser Yams are efficient at extracting it from the soil.

**Production:** 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 deteriorating as new growth commences. Tubers need to be harvested and handled carefully as fungal growth and rots easily occur on cut or damaged surfaces under damp storage conditions.. They must often be cut from the vine and can be washed and dried. Tubers can be stored for about 3 months. They need to be stored under ventilated conditions at temperatures above 15 °C.

**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	-	20	0.75	0.5

## Legumes

**English:** Mung Bean, Urd, Black Bean

**Local:** S: Bu-me, Mun, Ulundu

T: Chiruppayaru, Uluntu

**Scientific name:** *Vigna mungo*

**Plant family:** FABACEAE

**Description:** Mung Beans are erect, annual herbs that grow up to 80 cm tall. Sometimes the stems are twining. The stems have a dense covering of yellow or rusty hairs. The leaves are divided into 3 oval leaflets. Each leaflet is 3–10 cm long by 1–5.5 cm wide. The leaf stalks are long but the leaflets stalks are short. The flowers are yellow, 1-2 cm long and occur in dense clusters. The fruit is a hairy pod 4–7 cm long and 5–6 mm wide. Each pod contains 4–10 small, black seeds. The seeds are 4–4.5 mm long by 4 mm wide and have square ends.



**Distribution:** Mung Beans are grown mainly in coastal areas of the tropics but will probably grow up to 1800 m altitude. It suits dry areas. It is drought resistant. It is grown in areas with rainfall of 900 mm per year. It can not stand frost or long periods of cloud. It is not suited to the wet tropics. In Nepal they grow to 2000 m altitude. It suits hardiness zones 10-12.

**Use:** The ripe seeds can be eaten. They can be fried and roasted and eaten as a snack. The young pods and young leaves are also edible. The beans are also used for bean sprouts. The seeds can be used in lentil soup, parched and ground into flour for porridge, or baked into bread. The roasted and ground seeds are also used in a spice mixture.

**Cultivation:** Mung Beans are grown from seed. Seed collection is easy. Seed can be broadcast or sown 25 cm apart.

**Production:** Flowering of Mung Bean commences after 6 weeks. Plants are self pollinated. Pods are ready to harvest 2–4 months after planting. Pods shatter easily. It is easiest to pull the whole plant, dry them for a week then thresh out the seeds. Seed yields of 450-560 kg per hectare after 80-120 days are common.

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Seed - raw	12	981	22.0	6	Tr	8.0	-
Seed - sprouted	93.4	88	2	1	11.4	0.7	0.5



## Legumes

**English:** Green Gram Bean

**Local:** S: Bu-me, Mun, Mun-eta

**T:** Chiruppataru, Chiruppayaru, Pani-payir

**Scientific name:** *Vigna radiata*

**Plant family:** FABACEAE

**Description:** Green Gram Bean is an upright hairy bean plant which can reach up to 1 m tall. The leaves have 3 leaflets and are dark green. The leaves are on long leaf stalks. There are oval stipules at the base of the leaf. The small flowers are pale yellow and occur in bunches of 10–20 on the ends of long hairy stalks. The pods are black and straight. The pods contain 10–20 seeds which are usually green or golden yellow. The beans can be black. They have a flat white hilum. There are approximately 2,000 varieties.



**Distribution:** Green Gram Bean is a tropical and subtropical plant. The plant will grow from sea level up to probably 2000 m in the tropics. It is drought resistant and can't stand water-logging. Plants are damaged by frost. They cannot stand high salinity and rainfall at flowering is detrimental. It requires a deep soil. Both short day and long day kinds occur. It can grow where annual temperatures are from 8°C to 28°C. It can tolerate a pH from 4.3-8.1.

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

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

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

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Seed	11	1432	22.9	-	4	7.1	-
Seed - cooked		439	7	-	1	1.4	-
Seed - spouted	90.4	126	3	-	13.2	0.9	0.4

## Legumes

**English:** Cow Pea

**Scientific name:** *Vigna unguiculata* subsp. *unguiculata*

**Local:** S: Li-me, Me-karal, Mil-me,

**Plant family:** FABACEAE

Nil me, Wanduru-me T: Kodip-payam

**Description:** Cow Peas are a creeping bean type plant with straight firm pods. Both cover crop types (leafy) and grain types occur. Plants have a deep tap root and many branches occur from it at the surface of the soil. The leaves are divided into 3 leaflets. The end leaflet can be 12–16 cm long. This leaflet is larger than the side leaflets. The side leaflets are asymmetrical. The stipules at the base of the leaf are large have spurs at their bases. Flowers occur often in pairs on the end of long shoots. This stalk can be 2–30 cm long. Only 2–4 flowers in each stalk produce pods. Flowers can be white, yellow or blue and are large and showy. The standard petal is 2–3 cm across. The pods are about 15 cm long. The seeds are white except for a dark scar.



**Distribution:** Cow Peas grow from sea level to 1800 metres altitude in the tropics and subtropics. Plants can stand high temperatures and some varieties can tolerate drought. They are sensitive to cold and killed by frost. Plants germinate at temperatures between 11.5–15.5°C. The best growth is between 20–35°C. They can grow on a range of soils providing they are well drained. They are a short day plant. It will not tolerate acid or alkaline soils. They do well in the semiarid tropics. It grows in areas with an annual rainfall between 280–410 mm.

**Use:** The young leaves, young pods and ripe seeds of Cow Peas are edible. They can be cooked in a variety of ways including steaming, boiling and stir-frying. The leaves can be dried and stored. The dried seeds are used in soups and stews. The seeds can be ground into flour, fermented or sprouted. Roasted seeds can be used as a coffee substitute.

**Cultivation:** Cow Peas are grown from seeds. Seed collection is easy. 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. Cowpeas mostly inbreed giving pure lines.

**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	-
Young seed - raw	75.5	406	3.2	41	2.2	1.1	1.0
Leaf	88.4	143	4.2	36	35	4.7	0.3
Young pod + seed - raw	89.5	142	2.6	68	17	0.7	0.2
Leaf - boiled	91.3	92	4.7	-	18	1.1	0.2

## Legumes

**English:** Pigeon Pea

**Local:** S: Rata-tora T: Thavarai, Thovardy

**Scientific name:** *Cajanus cajan*

**Plant family:** FABACEAE

**Description:** Pigeon Peas are an upright perennial shrubby legume that live for 3-4 years. They can be up to about 4 m tall and 1.5 m wide. It has a strong deep taproot. The root nodules are round and sometimes lobed. Young stems are angled and hairy. Each leaf consists of 3 leaflets. Leaflets are narrow and green above and silvery green underneath. Leaflet size can be up to 10 cm long and up to 3 cm wide. The end leaflet is larger with a longer leaf stalk. The flowers are red and yellow and are carried on branched flower stalks which stick upwards from the axils of leaves. The large standard petal has red lines. The pods are 4–8 cm long, straight and narrow, slightly hairy and contain 4–8 seeds. The pods are constricted between the seeds. Many varieties of pigeon pea occur. Some are dwarf and day length neutral. Seeds vary in shape, size and colour between varieties.



**Distribution:** Pigeon Peas require a tropical or subtropical climate. Plants grow from sea level up to about 1800 m in the tropics. They can tolerate drought and heat 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. Plants suffer in waterlogged soils and are damaged by frost. They will grow on poor soils. It cannot grow on salty soils.

**Use:** Young leaves, shoots and pods of Pigeon Pea plants can be 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:** Pigeon Peas are grown from seeds. It is best to sow seeds where the plants are to grow. Seeds normally germinate easily. 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:** Pigeon Peas are fast growing plants. Pods are ready to harvest 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 $\mu$	proVit C mg	Iron mg	Zinc mg
Seed	10	1449	19.5	1	Tr	15	-
Pod - young	64.4	477	8.7	-	-	2	-
Young seed - boiled	71.8	464	6	-	28.1	1.6	0.8



## Legumes

**English:** Chick Pea

**Local:** S: Konda-kadala

**Scientific name:** *Cicer arietinum*

**Plant family:** FABACEAE

**Description:** Chick Peas are erect, annual herbs with a strong taproot. Plants grow up to 60 cm high and all parts are hairy. Plants are often bluish green in colour. The leaves are up to 5 cm long and have 9–15 pairs of leaflets along a stalk and a single leaflet at the end. The leaflets are 1–2 cm long by 0.–1.4 cm wide and are strongly pointed and with a toothed edge. The flowers are carried singly on long stalks in the axils of leaves and are white, pink or purple. The flowers normally never open and are self pollinated. The pods are inflated, 2–3 cm long and have 1 or 2 seeds. The seeds are angular and up to 1 cm across. They have a pointed beak. The seed colour can vary from brown, white, red or black. There are many named varieties.



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

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

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

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

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

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

## Legumes

**English:** Winged Bean

**Local:** S: Dara-dambala

**Scientific name:** *Psophocarpus tetragonolobus*

**Plant family:** FABACEAE

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



**Distribution:** Winged Bean grows from sea level up to about 1850 m altitude in the tropics. It normally only produces tubers between 1200 and 1850 m. Because of the effect of daylength it will not produce flowers or pods at places far removed from the equator. Photoperiodism limits pod availability in higher latitudes but this should not be significant in the equatorial latitudes. Winged bean is a short day plant. It needs a daylength less than 12 hours. Winged bean is a plant ideally suited to the tropics including the hot humid lowlands. Papua New Guinea is a centre of diversity for winged beans and they are grown in many areas of the country. They can be seen from sea level up to about 2300 m altitude although they are less common above 1850 metres and normally only produce tubers between 1200 and 1850 m altitude. For maximum seed production winged beans need temperatures between 23°C and 27°C and for tubers the temperatures should be between 18°C and 22°C. This means the main areas of production occur between 20°N and 10°S latitudes. Winged beans can grow on a wide variety of soils. Winged beans have been grown on soils with pH from 3.6 to 8.0. Soils which are very acid have soluble aluminium to which winged beans are sensitive. Soils should not be waterlogged.

**Use:** The young pods and leaves, flowers, root tubers and ripe seeds 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 or 5 weeks. For tubers, vines are pruned off at about 1 m high (or left unstaked) and some flowers are removed. The cultivation procedures vary slightly depending on which product is the preferred goal. The two main types of winged bean are short podded ones which are used for tubers and long podded ones which have poor tubers. Tuber production is not as efficient in tropical lowland conditions.

Phases of development:-

1. Germination 5-16 days;
2. Vegetative growth till flower buds 46-92 days;
3. Flowering duration ?
4. Pod development 10-13 weeks after planting;
5. Tuber development 4-5 months after planting.

Winged beans are predominantly self pollinated but limited out-crossing has been reported. Hard seed coats have been reported from dried stored seed. The amount of vegetative growth increased with increasing pH from 4.7 to 5.5. Nitrogen percentage in tissues increased with pH from 4.7 to 6.2. Winged beans have been grown in soils with pH between 3.6 and 8.0. Winged bean is

sensitive to aluminium in soil solution. Plants are intolerant of water-logging. Flowering is inhibited by low levels of solar radiation. Shading improves pod length and seed number. Root knot nematode can cause severe damage in some places.

Seeds are planted 2-3 cm deep and about 25-35 cm apart. If seeds have been dried and stored then they can suffer from hard seed coats and this delays the germination of seeds. But normally seeds start to grow in about 15 or 16 days. Plants grow slowly to start with so weeding is important but then they grow rapidly. After 46 to 92 days they are producing flowers. If fattened roots are important some of the leaves and flowers and tips are pruned off at this stage. These can be eaten. Pods develop 10 to 13 weeks after planting and tubers occur 4-5 months after planting.

For tuber production plants are planted seasonally to allow them to mature during the dry season. Winged beans need to be staked for high yields. Winged bean root nodules containing Rhizobia bacteria are very large, inoculation occurs easily and naturally and nitrogen fixation is efficient. This both enables winged beans to grow well and have a high protein content but can also help provide nitrogen in the soil for other plants.

**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 to 330 g per plant can be produced depending on the variety.. 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 before eating

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

<b>Edible part</b>	<b>Moisture %</b>	<b>Energy kJ</b>	<b>Protein g</b>	<b>proVit A µg</b>	<b>proVit C mg</b>	<b>Iron mg</b>	<b>Zinc mg</b>
Seed	8.5	1764	41.9	0	Tr	15	4.5
Root	57.4	619	11.6	0	0	2	1.4
Seed - young	87	205	7	6	18.3	1.5	0.4
Leaf	95	197	5	405	30	6.2	1.3
Fresh pod	92	105	2.1	-	-	-	-

## Leafy greens

**English:** Lotus-seed Herb, Joyweed,

**Local:** S: Mukunu-wenna T: Ponankani

**Scientific name:** *Alternanthera sessilis*

**Plant family:** AMARANTHACEAE

**Description:** *Alternanthera sessilis* is a low lying and spreading plant which has many branches. It continues to grow from year to year. The stem and branches are up to 1 m long and near the ends there are 2 lines of hairs along the stem. The oppositely arranged leaves are smooth and attached to the stem without a stalk. The leaves are up to 10 cm long and 2 cm wide. The flowers heads are white and 5–7 mm long. They grow along the plant and do not have flower stalks. Plants flower all year round. The fruits are oval and compressed laterally. The seed is about 1.5 cm across. When plants are growing in water the stems become hollow and the plants float.



**Distribution:** *Alternanthera sessilis* is a tropical plant. It occurs in most tropical places. It is common in waste land at low and medium altitudes in the Philippines. It grows in open moist places from sea level to 2,000 m in Papua New Guinea. In Fiji it grows from sea level to 500 m. In Nepal it grows to 2400 m altitude. It can grow in arid places.

**Use:** The leaves and tender tips are cooked and eaten. They are used in soups. It is also used to prepare a cool drink.

**Cultivation:** It can be grown by dividing the underground stem. It can also be grown from sections which root at the nodes. It can be grown by seed.

**Production:** The first harvest of leaves can be taken 50–60 days after planting.

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

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

## Leafy greens

**English:** Watercress,

**Local:** S: Kasthuru, Kakkutu-pala, Wataressa

**Scientific name:** *Nasturtium officinale*

**Plant family:** BRASSICACEAE

**Description:** Watercress is a member of the cabbage family. It is a small leafy plant that grows in water and lasts for several years. It grows 30 cm high and has stems up to 2.5 m long. The stems are hollow and root freely from the nodes. It branches freely. The leaves consist of 3 to 7 pairs of small leaflets then a larger leaflet at the end. The flowers are small and white and grow in a cluster. Flowers are not always produced and need days with more than 12 hours of sunlight to form. A small narrow curved seed pod about 2 cm long can develop. It grows attached to the banks of streams.



**Distribution:** This is a temperate climate crop. It is common in tropical highland creeks especially those flowing off limestone hills. (pH 6.5-7.5) It needs to be in running water. In the tropics it occurs from about 1000 m up to at least 2900 m altitude. It grows in streams, ditches, lakes, swamps, marshes from near sea level to 3700 m altitude in China.

**Use:** The leaves and stems are eaten raw or cooked and have a spicy flavour. Cooking should be used if the water in the stream is not pure and clean. The seed can be germinated to produce sprouts. The seeds can be ground to make a mustard flavouring.

**Cultivation:** Watercress is grown from cuttings planted along the edges of clear running water. Cuttings of 10-15 cm long are suitable. The plant has roots along the stem at the node and cuttings quickly form roots in water. A spacing of 30 cm is suitable. This small plant keeps living for many years once established. It can also be grown from seeds. Plants can float on the water. It will not tolerate drying out. Watercress has a high phosphate requirement.

**Production:** Harvesting can occur 4 to 6 weeks after planting. Regular picking encourages branching and increases production. Tips 5–10 cm long are harvested. This can be repeated every 4–6 weeks.

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Leaf	95	63	2.4	160	35	3.4	0.1



## Leafy greens

**English:** Indian spinach

**Local:** S: Niviti T: Pasalai

**Scientific name:** *Basella alba*

**Plant family:** BASELLACEAE

**Description:** Indian spinach is an annual or perennial climbing herb with thick fleshy leaves. The vine is smooth and juicy and can be up to 10 m long. It branches freely. The vine and leaves can be red or green. The leaves are fleshy and pointed at the tip. They can be 8-18 cm long and 8-10 cm across. They are carried alternately along the vine. Leaves can be heart shaped or oval. It has white, pink or red flowers in short spikes which are in the axils of the leaves. The fruit are round and soft. They can be red, white or black and are 6-8 mm across. The seeds are round, black and up to 3 mm diameter.



**Distribution:** Indian spinach is a tropical plant. It occurs mostly in the tropical lowlands and grows best below 500 m but will grow up to about 1600 m. in the equatorial tropics. It will grow quite well in the temperature range 15–35°C. It does not like water-logging but can survive 4–12 weeks drought once well established. It requires adequate water during the growing season. It grows well in a variety of soils. The best pH is 5.5–7.0. It cannot tolerate salty conditions. Flowering does not occur when day lengths are over 13 hours. It can grow in arid places.

**Use:** The young shoots and leaves of Indian spinach are eaten cooked. They are somewhat slimy and can be used for thickening soups and stews. The leaves can be eaten raw in salads or cooked like a vegetable and can be used to make a tea. The leaves can be dried and stored.

**Cultivation:** Indian spinach can be sown from seeds or cuttings. Seeds germinate in a few days. Normally sticks are provided for support or it is allowed to grow over fences and stumps. If seeds are used, 3 kg of seed will sow one hectare and they are best sown in a nursery and transplanted. A spacing of 1 m is suitable. Plants grown from seed are more productive than from cuttings. When cuttings are used, 20-25 cm long cuttings are suitable. Where the plant grows over light soil it can root at the nodes and continue growing continually. Partial shade, rich fertile soil and adequate moisture favour abundant leaf production. It is responsive to nitrogen fertiliser. Light shade gives bigger leaves. It requires a trellis to climb over. Frequently picking off the bud encourages branching.

**Production:** It is 4-6 weeks until the first harvest. It grows reasonably well on poor soils and is fairly resistant to pest and disease. Leaves will only store for one day at 20-30°C. Yields of 40 kg of leaves from a 10 metre square bed is possible over 75 days.

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Leaf	85	202	5	400	100	4	-

## Leafy greens

**English:** Slender Amaranth

**Local:** S: Tampala

**Scientific name:** *Amaranthus lividus*

**Plant family:** AMARANTHACEAE

**Description:** Slender Amaranth is an erect or spreading herb to 80 cm tall. The stems are angular and curve in a zigzag manner. They often branch from the base upwards. The leaves are oval, 1–3 cm long by 0.3–1.5 cm wide, wedge shaped at the base and have a sharp point at the tip. The leaf stalk is 0.3–2.5 cm long. The side veins can be clearly seen under the leaf. The leaves are without hairs but are sometimes tinged with purple. The flower spikes can be 1–10 cm long and have side clusters. The fruit are smooth and pale. Seeds are 1–1.2 mm across.



**Distribution:** Slender Amaranth is a tropical plant. It occurs world wide in the tropics. In Papua New Guinea it grows between 1,200 and 2,000 m altitude. In Nepal it grows between 1500-2300 m altitude.

**Use:** Leaves are eaten as a green vegetable, after cooking.

**Cultivation:** Mostly plants are self sown. Plants can be grown from seed.

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Leaf	84.6	84	3.4	-	63	-	-

## Leafy greens

**English:** Kangkong

**Local:** S: Kankun

**Scientific name:** *Ipomoea aquatica*

**Plant family:** CONVOLVULACEAE

**Description:** Kangkong is a creeping sweet potato like plant. It has hollow stems and can float on water. The leaves are green and are normally not divided like some sweet potato leaves, but the shape and size varies a little between different kinds. The trumpet shaped flower looks like a sweet potato flower and is normally white. The runners develop roots at the nodes and also branch. This branching increases when tips are picked off. Some variation in leaf shape can be observed. Leaf shape is less variable than in the related sweet potato, but narrow and broad leafed kinds occur. White and green stemmed kinds occur. Green stemmed kinds have more cold tolerance than white stemmed.



**Distribution:** Kangkong is a tropical plant. It grows best in short day stable high temperature, moist conditions. Temperatures need to be above 25°C for satisfactory growth. In equatorial region plants probably grow up to 1000 m altitude. Below 23°C the growth rate is too slow for economic production. So production is mainly in the lowland tropics. Optimum pH is between 5.3–6.0. It suits damp places and grows well in swamps. It can grow as a partly floating plant in swamps and lagoons behind the beach along the coast. Kangkong is grown in a number of other tropical countries including Malaysia, Indonesia, Egypt, Fiji and especially Hong Kong and Taiwan. In some of these countries they grow the dry land form in gardens. In Nepal it grows up to 500 m altitude. In Zimbabwe it grows up to 1,500 m above sea level.

**Use:** The young tips of shoots are cooked and eaten. They can be boiled, steamed, stir-fried, or added to soups, stews or curries. The young stems can be used in pickles. The young tips can be eaten raw in salads and the roots are occasionally cooked and eaten.

**Cultivation:** Dryland kangkong is normally grown from seed. Sometimes seed are pre-soaked for 12-24 hours prior to sowing. Plants can also be grown from cuttings and establishment is rapid. Top cuttings 25–40 cm long can be planted beside a pond.

**Production:** Young tips can be harvested 30 days after planting, and subsequent harvests every 7 to 10 days. Production of new shoots probably declines at flowering. Yields up to 60,000 kg/ha have been recorded.

**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	90.3	126	3.9	315	60	4.54	-
Leaf - boiled	92.9	84	2.1	-	16	1.3	0.2



## Leafy greens

**English:** Asian Pennywort, Indian Pennywort

**Local:** S: Gotukola, Heen-gotukola T: Vallarai

**Scientific name:** *Centella asiatica*

**Plant family:** APIACEAE

**Description:** Asian Pennywort is a slender perennial plant with creeping stems which root at the node. It grows to 10 cm high and spreads to 50 cm across. The stems are creeping and form roots at the nodes. Groups of leaves develop in clumps at the nodes. Leaves are round or heart shaped with a wavy edge. The edge has teeth or indentations along it. The leaves can be 8 cm across, when grown in shady places. The leaves have 7–9 forked veins. The leaf stalks are 6–15 cm long. The stems and flowers are dull red or pink. The flowers are small and occur in small clusters. The fruit is round but flattened and 2 mm diameter.



**Distribution:** Asian Pennywort is a tropical plant. It is a ground cover plant in old gardens, in light rainforest. It grows best in sunny, moist, fertile places. In Papua New Guinea it grows mostly up to about 500 m altitude but will probably grow up to 2500 m. It is drought and frost tender. In Nepal it grows to about 2800 m altitude. It needs a temperature above 10°C. It can grow in arid places. It suits hardiness zones 9-12.

**Use:** The whole plant is eaten raw or cooked. The leaves are added to tossed salads or steamed and served with rice. They can be cooked in vegetable soups or stews. The plant is also used for medicine. The leaves are made into tea. The juice of the leaves diluted with water and sweetened with sugar are used as a drink.

**Cultivation:** New plants can be produced by seeds or by runners. Mostly plants grow and spread naturally. Cuttings or runners are the easiest way to grow the plants.

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Leaf	89.3	143	1.6	-	37	3.1	-

## Leafy greens

**English:** Drumstick Tree, Horseradish tree

**Local:** S: Murunga T: Murungamaram

**Scientific name:** *Moringa oleifera*

**Plant family:** MORINGACEAE

**Description:** A small tree up to 9-12 m high. The trunk is 60 cm across. The wood is soft. It has feather-like divided leaves. The tree loses its leaves during the year. The bark is grey and thick. It is 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 flowers are pale yellow and contain both sexes. 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. They split open when dry. Some kinds are better for edible fruit than others, while some are selected for leaves. 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.

**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 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.

**Use:** The young tops and leaves are eaten cooked 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. Roots can be used as a horseradish substitute. A gum from the bark is used as seasoning. The oil expressed from the seeds is used in salads.

**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	378	165	3.6	-
Flower	84.2	205	3.3	-	-	5.2	-
Leaf - boiled	87	189	4.7	-	31.0	2.0	0.2
Pod - raw	88.2	155	2.1	4	141	0.4	0.5
Seed	6.5	-	46.6	-	-	-	-

## Leafy greens

**English:** Sesbania

**Scientific name:** *Sesbania grandiflora*

**Local:** S: Katuru-murunga T: Akatti, Agati-keerai **Plant family:** FABACEAE

**Description:** Sesbania is a shrub or small tree up to 10 m tall. The trunk has rough bark and the branches often droop. The trunk is thick. The branches are hairy when young. The leaves are made up of 41 to 61 leaflets. These are narrow and oblong. They are 2.5–4 cm long and 0.5–1.4 cm wide. They have a sharp point at the tip. The flowers are large and white or red. The flower petals can be 5–10 cm long. They are produced in groups of 2–4 on flowering branches 2–5 cm long. It has long narrow pods with up to 30–50 small brownish seeds. The seeds with their stalk can be 2.5–4.5 cm long in pods 20–25 cm long and 7–9 mm wide.



**Distribution:** Sesbania is a tropical plant. It grows in tropical and subtropical climates. It grows in places with an average rainfall of 900–1200 mm and a temperature range of 17–25°C minimum and 25–37°C maximum. It is cultivated in coastal towns. It does well in both dry and moist areas. It probably grows up to about 1500 m altitude in tropical places. It does best in rich, moist soils. It needs a sunny location. It is damaged by frost. It can grow in arid places.

**Use:** The leaves and flowers of Sesbania are used as a vegetable. The young pods are also eaten. The young leaves are stripped from the stalks and lightly boiled or steamed or served as a vegetable in curries. The white flowers that are eaten contain a considerable amount of sugar and iron and are said to taste like mushrooms. Flowers of the red-flowered variety are bitter and hence, it is only used as an ornamental. The flowers are boiled, fried or used in curries, soups and stews.

**CAUTION:** The seeds of Sesbania are toxic.

**Cultivation:** Sesbania trees are grown from seed. The seed often need treatment to break the hard seed coat. Seeds germinate best with temperatures above 19°C. It can also be grown from cuttings.

**Production:** Sesbania is a quick growing, short lived tree. Trees flower in their second year. A tree can provide 6–9 kg of leaves per year. The leaves can be harvested 120–150 days after sowing. Repeat harvests can be made every 30 days.

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Leaf	82.3	323	8.7	-	60	4	-
Flower	89	92	1.8	0	59	0.6	-
Seed	10.4	-	68.2	-	-	-	-

## **Fruit**

**English:** Mango

**Local:** S: Amba T: Ma, Manga

**Scientific name:** *Mangifera indica*

**Plant family:** ANARCARDIACEAE

**Description:** Mangoes are erect, branched evergreen trees that grow up to 40 m high and can be long lived. (Trees grown by vegetative means are smaller and more compact.) Trees spread to 15 m across and have strong deep roots. The leaves are 10–30 cm long, 2–10 cm wide, shaped like a spear and are arranged in spirals. Some kinds of mangoes have leaves with a wavy edge. 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 occur 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 between 1 and 35 % have both male and female flower parts. Fruit are green, yellow or red and 2.5–30 cm long and contain a single seed. The fruit hang down on long stalks. The outside layer of the seed is hard and fibrous. 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.



**Distribution:** Mangoes are a tropical and subtropical plant. They do best in areas below 700 m and with a dry season but they will grow up to 1300 m altitude. Rain and high humidity at flowering reduces fruit set. They thrive best where temperatures are about 25°C but will grow with temperatures between 10 and 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 to 6.5 is best. Soils with pH above 7.5 cause plants to develop iron deficiency.

**Use:** Ripe mango fruit can be eaten raw. Unripe fruit can be pickled. Seeds can be eaten after being 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 as a 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:** Mangoes are grown by planting fresh seed. They can be successfully 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. Although, this is not easy. 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:** Mango 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 every 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 g to 1 kg. Trees can produce one million flowers but only 500 fruit. Trees last for many years.

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

<b>Edible part</b>	<b>Moisture %</b>	<b>Energy kJ</b>	<b>Protein g</b>	<b>proVit A µg</b>	<b>proVit A µg</b>	<b>proVit C mg</b>	<b>Iron mg</b>	<b>Zinc mg</b>
Fruit	83	253	0.5	54	1200	30	0.5	0.04
Leaf	82.1	226	3.9	-	-	60	2.8	-

## Fruit

**English:** Butter tree, tallow tree, black mango

**Local:**

**Scientific name:** *Pentadesma butyracea*

**Plant family:** CLUSIACEAE

**Description:** An evergreen tree 25 m tall. The bark is brown and cracked into angular patches. The branches are in rings. The leaves are 10-25 cm long by 3.5-7.5 cm wide. The base is rounded and it tapers to the tip. The flowers are white or greenish-white. They can be 7.5 cm across. Flowers can be single or in groups near the ends of branches. The fruit is oval. It can be 15 cm long by 8.5 cm wide. They contain a few angular seeds in a yellow pulp.



**Distribution:** A tropical plant. It grows in forests often in swampy situations. It grows on river banks and swampy ground. It does best in deep soils and needs a rainfall above 1,000 mm per year. It grows in many African and Asian countries.

**Use:** The seeds are the source of an edible fat. The seeds are eaten when young. The pulp of ripe fruit is edible. Unripe fruit are bitter.

**Cultivation:** Plants are grown from seed. Fresh seed must be used. Trees can also be grown from root suckers.

**Production:** Trees first flower when about 8 m tall. Fruit are harvested then put together under a tree to ferment and allow the seed to be more easily removed. A mature tree can produce 500 fruit. The fruit weighs about 600 g and the seed 120 g. To produce oil, the seeds are crushed and boiled and the oil skimmed off.

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Seed - dried	5.6	2253	2.3	-	-	-	-



## Fruit

**English:** Mangosteen

**Local:** S: Mangus T: Mangus

**Scientific name:** *Garcinia mangostana*

**Plant family:** CLUSIACEAE

**Description:** Mangosteens are a medium sized tree, growing up to 20 m high. Trees keep their leaves all year. Leaves are 15-25 cm long, bright, glossy and leathery. Male and female flowers occur on separate trees. Commercial trees only have female flowers. Male trees occur but are rare. Flowers are produced on shoots near the end of branches. Female flowers have 4 cream petals and 4 sepals and a round ovary with a thick stigma composed of 4 to 8 lobes. No pollination is required because fruit develop without fertilisation. The fruit is dark blue with 4–8 white juicy segments inside the thick skin. Each segment is enclosed in fine pinkish veins. It is 8 cm across and has flower sepals attached to the stalk end. It leaks yellow sap from wounds. The fruit is produced on side branches near to the tips of the main branches. Fruit often have no seeds or up to 2. These are not true seeds but they will grow.



**Distribution:** Mangosteens are tropical plants and require a hot humid climate (25 - 35°C). Temperatures below 5°C will kill the plant and temperatures below 20°C slow growth. It grows from sea level to 1000 m altitude in the equatorial tropics although it grows very slowly at higher altitudes. It can stand light shade but does not do well with sea breezes, and needs protection from wind. It cannot tolerate drought or alkaline soils. It needs fertile soil. Good fertility enables earlier bearing. It suits high rainfall areas over 2500 mm per year. It suits hardiness zones 11-12.

**Use:** Fruit is best eaten fresh. It is the arillus or layer around the seeds which is eaten. They are also cooked and used in desserts. The seeds are eaten after boiling or roasting. They can be ground to produce a vegetable butter.

**Cultivation:** Trees breed true from seed because they are produced asexually. This means trees are very uniform. As well some seeds can produce more than one seedling. They germinate between 10 and 54 days. Seeds need to be fresh (less than 5 days after extraction) and undamaged, and cleaned of pulp. They quickly lose their viability. Transplanting is done with care after 2 years. Long tap roots make this difficult. Young trees require shade during hot weather. The slow early growth is because the original roots of the seedling are replaced by new roots from the base of the stem. A spacing of 7 - 10 m suits. Grafting onto vigorous root stocks is difficult. It has been performed on *Garcinia tinctoria*. Budding, cuttings and layering have been unsuccessful.

**Production:** Trees are slow growing and begin to bear after 8-20 years. Fruit are produced on shoots which are more than two years old so pruning is unnecessary. Fruiting is seasonal once or twice a year. Often more fruit are produced every second year. The main fruiting season is November to March. Fruit need to be harvested when mature and ripe. Fruit can only be transported with difficulty. They can be stored under refrigeration. (10°C for up to eight weeks). Between 500 to 1500 fruit are produced per tree. Fruit are best opened by cutting the skin around the middle to prevent tannins from the skin spoiling the flavour. Fruit can be stored for 3 weeks if undamaged.

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
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## Fruit

**English:** Guava

**Local:** S: Pera

**Scientific name:** *Psidium guajava*

**Plant family:** MYRTACEAE

**Description:** A small, shallow rooted, evergreen tree or shrub, with smooth mottled bark, growing 8-10 m high. The bark peels off in smooth flakes. The plant branches close to the ground. The branches are four angled. The leaves are opposite, dull green and somewhat hairy. They are 15 cm long by 2-5 cm wide and oval and somewhat pointed at both ends. The leaves have short leaf stalks. The flowers are white and showy and borne in loose irregular types of arrangements of one to three flowers. The petals are 1.5 to 2 cm long. Both self and cross pollination occurs due to insects. The flowers grow in the axils of leaves on new growth. The fruit are rounded and 4 to 5 cm long. They are green but turn yellow when ripe. The outer covering is firm and encloses a pink or nearly white sweet smelling edible pulp. This contains many seeds. In better selected varieties both the skin and the seeds are fully edible. Fruit vary from very acid to very sweet. Other edible species in Sri Lanka are *P. cattleyanum*, *P. guineense* and *P. montana*.



**Distribution:** A tropical plant native to C and S America. Guavas thrive in both humid and dry tropical climates. They do best in sunny positions. They grow wild and are also cultivated. They fruit better where there is a cooler season but it is killed by frost. Temperatures near 30°C give best production. They produce better in soils with good organic matter. They prefer a well drained soil but can stand some water-logging. A pH of 5 to 7 is suitable. It can tolerate a pH from 4.6-8.9. Trees cannot tolerate salty conditions. It can grow in arid places. It suits hardiness zones 9-12.

**Use:** The young leaves are eaten raw or cooked. The fruit are eaten raw. The fruit can be used for jams and jellies. Half ripe fruit are added to help the jelly set. The liquid from boiled guava seeds is used to flavour cheese. The seeds are the source of an edible oil.

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

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

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Fruit	77.1	238	1.1	31	184	1.4	0.2



## Fruit

**English:** Tree tomato, Tamarillo,

**Local:**

**Scientific name:** *Cyphomandra betacea*

**Plant family:** SOLANACEAE

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



**Distribution:** Subtropical, the normal range is 750 - 2200 m altitude in the equatorial tropics, but can be up to 3000 m in continental tropical regions. They suit tropical highlands. It is slightly more hardy to cold temperatures than the tomato and does best in average temperatures of 15 - 21°C. Plants don't fruit at low altitudes in the tropics and do best where temperatures are above 10°C. Trees cannot stand much frost although mature trees will survive light frosts over short periods. They can't stand water-logging or drought. Trees can grow under shade but do better in the sun unless it is too hot and dry. Deep, fertile, permeable, disease-free soil is best. Trees need sheltered sites as the brittle branches are easily damaged by wind. It suits hardiness zones 9-11.

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

**Cultivation:** They can be grown from seeds or cuttings. Seeds grow better if they are washed and dried then placed in a freezer for 24 hours before planting out. Seeds produce a high branched erect tree. Cuttings produce a lower bushier plant. Cuttings 60-90 cm long should be taken from 1 to 2 year old wood which is 1-2 cm thick. Root cuttings can also be used. It has shallow roots therefore needs careful weeding. A spacing of 3 m apart is sufficient. Because the roots are easily damaged by nematodes, plants grafted or budded onto rootstocks that are resistant to nematode will live longer. The root rot fungus can make it difficult to establish plants in old gardens. The tree is short lived (5 - 6 years). Root knot nematodes may kill trees in 3 - 4 years. High humidity can also cause stem rots. Young plants can be pruned to produce lower branches and fruiting. As fruit is produced on new branches, branches which have borne fruit can be pruned out. Flowers are self compatible so pollination can occur within the one plant by wind.

**Production:** Fruiting starts in the second year when grown from seed. Trees can bear hundreds of fruit year round, with yields up to 20 kg per plant. Fruit are ready to harvest when the red or yellow colour develops, and can be stored in a refrigerator for 10 weeks provided they are not frozen (3°C).

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Fruit	86.2	113	2	-	28	0.7	-

## Fruit

**English:** Banana

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

**Local:** S: kehel

**Plant family:** MUSACEAE

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



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

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

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

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

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Fruit - cooking	65.3	510	2	-	18.4	0.6	0.1
Fruit - sweet	70.7	337	1.1	3	10	0.4	0.2
Flower bud	91.3	109	1.6	-	-	1	-

## Fruit

**English:** Bael fruit, Bengal quince,

**Local:** S: beli T: vilvam

**Scientific name:** *Aegle marmelos*

**Plant family:** RUTACEAE

**Description:** A medium sized tree. It loses its leaves. It grows to 3-6-12 m tall and spreads 2 m across. The stem is erect and thorny. The leaves are green and with 3 leaflets and generally sword shaped. They are aromatic. The flowers are yellowish-white. They have a strong sweet smell. They contain both sexes and occur in clusters. The fruit is large and with a hard shell about 3 mm thick. It is 8-10 cm across. The fruit is yellow-green when ripe. The pulp is reddish or orange. The pulp of the fruit is edible. The fruit is made up of small cells (about 15) each with woolly seeds.



**Distribution:** A tropical plant. It prefers rich well drained soils in an open sunny position. It suits tropical or warm places. It appears to do best where there is a distinct dry season. It is drought and frost tender. It grows in Nepal to about 1100 m altitude. A hot dry summer is best. It can tolerate some alkalinity and saline soils. It can tolerate alkalinity. It can grow in arid places.

**Use:** The fruit are eaten raw. They are also used to make drinks. The fruit are often sliced and dried. Marmalade can be made from ripe pulp. They can also be pickled or used in jams and jellies. The young shoots and leaves can be eaten raw in salad. They are also used in chutneys. The flowers are used to make a drink.

**CAUTION:** There are reports that leaves make women sterile or cause abortions.

**Cultivation:** It is grown from seed. Seed are taken from freshly picked ripe fruit. Seedlings are planted out after one year. It can be grown from root offshoots. They are best grown using patch budding. Trees are spaced 6-9 m apart. Trees can be pruned to have 4-6 strong branches. Suckers should be removed. It can also be grown from root suckers or air layering.

**Production:** It is slow growing. Trees produce in 3-4 years. Full production is gained after 15 years. Fruit are produced throughout the year. Fruit should be picked and not allowed to drop. There can be 200-400 fruit per tree. Fruit ripen in the dry season. Fruit can be ripened off the tree. Trees can continue bearing for 50 years. The fruit can be stored for 2 weeks at 30°C and for 4 months at 10°C.

**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	58	-	2.3	-	219	0.55	-

## Fruit

**English:** Native Gooseberry,

**Local:** S: Heen-mottu, Lin-mottu, Mottu, Nalal-batu

**Scientific name:** *Physalis minima*

**Plant family:** SOLANACEAE

**Description:** An erect or spreading branched herb. It is an annual plant. The roots are fibrous. The leaves are alternate and entire and covered with soft downy hairs. They have irregular teeth along the edge. They are 2-3 cm long and 1-1.5 cm wide. They are pale green. The stems are round or nearly so. The flowers are yellow with the inner ring of petals bell shaped. These are sometimes purple at the base inside. The fruit is a round berry about 6 mm across. It is completely surrounded by an inflated calyx. This is 5 angled.



**Distribution:** A tropical plant. They are common in waste places at low altitudes up to 1600 m in the Babuyan Islands and from northern Luzon to Mindanao and Palawan in the Philippines. It grows in southern China on slopes between 1000-1800 m. altitude. It can grow in arid places. *Physalis peruviana* and *P. angulata* also occur in Sri Lanka and are edible and nutritious.

**Use:** The fruit are eaten. They are also preserved. The leaves are eaten cooked.

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

### Production:

Plants produce in 1 year.

### Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Fruit	84.2	264	3.2	-	1	4.2	0.5

## Fruit

**English:** Golden Apple,

**Local:** S: Amberella T: Ampallai

**Scientific name:** *Spondias cytherea*

**Plant family:** ANACARDIACEAE

**Description:** Golden apple may grow to a large tree up to 30 m tall, but is more often 15 m tall in cultivation. The trunk is 60 cm across and can have buttresses. The bark is fairly smooth. The wood is soft and not much use, and twigs break off easily. The leaf is made up of 4 - 12 pairs of leaflets which have fine teeth around the edge. The leaves are 20-30 cm long. The leaves are smooth and dark green on top and pale green underneath. The leaves are alternate. The leaves of the tree fall off for a part of the year.



The old leaves wither to a bright yellow colour. The flowers are produced near the ends of the branches and mostly the flowers develop before the new young leaves grow. The flowers occur as several flowers on long stalks. The flower panicle is 15 to 30 cm long. The flowers are small and white. They look something like a mango flower. The fruit is yellow, oval and up to 7 cm long and 4 cm across. Sometimes the outside of the fruit has a mottled black colour. There is one large stone inside divided into 5 cells with a seed in each. The stone is branched and has fibres.

**Distribution:** It is a tropical plant. They occur in well drained soils or in dry forests. It occurs in the lowland rainforest and in valleys up to about 950 m altitude in the equatorial tropics. They suit warm tropical and subtropical climates and are frost tender. Flowering is normally during the dry season. This may be important for fruit set. The trees also grow in Indonesia, the Philippines, Thailand and a number of other Pacific countries. It has also been taken to other tropical countries. This species covers a full range from being a wild un-utilised tree in some areas to a planted, pruned and highly regarded village fruit tree in other areas. It is better suited to deeper alluvial soils and rarely occurs on limestone with a thin clay soil cover. Trees often grow as a pioneer tree on landslides. The wild trees are probably spread around by birds, pigs and people.

**Use:** Fruit are eaten after peeling, either raw or pickled but can be dried and used in curries. Leaves are edible raw or cooked. The kernel of the seed may be edible. Fruits can be of a poor size and can be very sour. The fruit are also used for sweet drinks, made into jams and chutneys. Green fruit are pickled.

**Cultivation:** Mostly grown from seed and often grows wild. Flowers are bisexual and there are no apparent pollination problems. The seeds do not produce true to type so that poor and sour fruit are often produced. Seed normally germinate within one month. It is possible to grow plants from cuttings although it is difficult. Large cuttings should be used. Propagating from cuttings enable better types of fruit to be re-grown. It can also be grown using budding. Seedling trees are larger and more vigorous than budded or grafted trees. Tree spacing varies from 7.5 m to 12 m. Young trees benefit by shade during their first year. The top can be cut off trees to give a lower and more spreading tree.

**Production:** Trees may bear from 4-5 years old from seed. Cuttings take 2-3 years. Fruiting occurs seasonally from Jan. to April in the southern hemisphere. Fruit matures in about 200 days.

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Fruit	70	657	0.6	-	34	0.4	0.1



## Vegetables

**English:** Snake Gourd

**Local:** S : Pathola T: Podivilangi

**Scientific name:** *Trichosanthes cucumerina* var. *anguina*

**Plant family:** CURCURBITACEAE

**Description:** Snake Gourd is a member of the pumpkin family. It is a climber with tendrils. It grows up to 6 m high and spreads 1.5–3 m wide. The vine has furrows along the stem. The leaves have 3–7 lobes and a toothed edge. The flowers are white. The female flowers are produced singly on long stalks. The fruits tend to curve and can be 1–2 m long. When ripe they turn orange or red, but are grey and green when young.



**Distribution:** Snake Gourd is a tropical plant. It is common in the humid tropical lowlands up to 500 m. It does not tolerate dry soil and requires a good moisture reserve in the soil, but is sensitive to water-logging. The optimum temperature for growth is 30–35°C with a minimum of 20°C.

**Use:** The long immature fruit of Snake Gourd are eaten once cooked. Sometimes a bitter taste occurs but this disappears with boiling. They can be baked, stuffed or used in curries and stews. The fruits are inedible when mature. The young leaves can be eaten once cooked.

**Cultivation:** Snake Gourd is grown from seed. Seeds germinate after 10 days. Seed can be sown in a nursery and transplanted at the 2 true leaf stage. More commonly plants are sown where they are to grow. A spacing of 60–100 cm is suitable. Plants need supports to climb over. Often in home gardens plans can be trained up a house wall. Plants respond to fertiliser but excessive nitrogen can produce too much vegetative growth. Pruning can improve the female to male flower ratio.

**Production:** Flowering starts 5 weeks after planting. Male flowers appear first then female flowers appear 3 days later. Pollination is normally by insects. Harvesting of fruit starts 6–7 weeks after planting and continues for 1 or 2 months. Fruit are picked 12–20 days after fruit set when they are 30–60 cm long. Fruit do not store well but can be stored for 10–14 days at a temperature of 16–17°C and relative humidity of 85–90%. By the time the fruit turn orange they are too mature to eat.

**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	95	76	0.9	-	6	1.0	-
Seed	97	-	0.2	-	-	0.2	0.2

## Vegetables

**English:** Angled Loofah

**Scientific name:** *Luffa acutangula*

**Local:** S: Vetakolu, Dara-vetakolu T: Peypichukku **Plant family:** CURCURBITACEAE

**Description:** Angled Loofah is an annual climbing herb with square stems and branched tendrils. The leaves are pale green, hairy and shallowly 5-lobed. The leaves have an unpleasant smell when rubbed. Male and female flowers are separate. Male flowers are in clusters, female flowers singly (ratio 43 male :1 female). Flowers open late in the afternoon and stay open during the night. The flowers are yellow. The greenish-brown fruits can be up to 40 cm long, with 10 long ridges. *Luffa cylindrica* (Smooth Loofah) also occurs in Sri Lanka and is nutritious and edible.



**Distribution:** Angled Loofah grows from sea level to 500 m altitude in the hot humid tropics. It won't tolerate excessive rainfall so does best in drier areas or in the dry season in wetter areas. Day temperatures above 25 °C are suitable. Some varieties require short day length. Adding additional nitrogen fertiliser can stimulate female flower formation in short day varieties. It can grow in arid places.

**Use:** The immature fruits are cooked and eaten as a vegetable. Before cooking the ridges can be removed with a vegetable peeler. The fruit can be boiled, steamed or stir-fried. They can be added to soups, stews and curries. The leaves are edible and can be eaten in salads or cooked as a vegetable. The flower buds can be dipped in batter and sautéed. Mature seeds can be roasted, salted and eaten as a snack.

**Cultivation:** Seeds are sown direct at 40 cm x 80 cm spacing and require stakes or trellises. Because seeds can have a hard coating soaking seed in water for 24 hours before planting can increase germination time. The plant benefits from full sunlight. Good soil fertility is beneficial. The soil needs to be well drained and applications of organic matter improves yields. Pinching out the growing tips when plants are 1.5 to 2 metres long can promote fruit development. Hand pollination (best done in the evening ) once female flowers develop helps fruit set.

**Production:** Immature fruit are ready 6–10 weeks after planting. On maturity the fruit become bitter and inedible. Fruit do not store well so they should be harvested when required.

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Fruit	94.6	71	0.7	-	-	0.5	-
Leaf	89	-	5.1	21	98	11.5	-



## Vegetables

**English:** Bitter Cucumber

**Local:** S: Batu-karavila, Karavila T: Pakal, Nuti-pakal

**Scientific name:** *Momordica charantia*

**Plant family:** CURCURBITACEAE

**Description:** Bitter Cucumber is a slender annual climber with flowers of both sexes on the one plant. It has simple tendrils and vines that can reach up to 4 m long. It has bright green lobed leaves. The leaves are 5–12 cm long on thin leaf stalks that are 3–10 cm long. The flowers have 5 petals, are small, yellow and have a sweet smell. The fruits are green when young and orange when ripe and have a lumpy appearance, with ridges along its length. When fully ripe they burst open. The seeds are 10–16 mm long and 7–10 mm wide and pale brown in colour.



**Distribution:** Bitter cucumber is a tropical plant. It grows from sea level up to about 500 m and possibly to 1000 m. They require a well drained soil that is rich in organic matter. Seeds do not germinate below 15°C. Plants grow best with temperatures between 18°C and 35°C. A soil pH of 6.5 is best.

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

**Cultivation:** Bitter Cucumber plants are grown from seed. Seeds should be planted 2 cm deep in the place where they are to grow. They require a stick or trellis for support. Often plants are grown on raised beds 2 m apart. Soaking seeds for 24 hours before sowing gives a quicker more even germination. Regular watering is required.

**Production:** Bitter Cucumbers are ready to harvest 45–55 days after planting. Fruit should be harvested when young and tender. Yellow fruits are past maturity for eating. Early removal of young fruit also ensures continuous fruit setting and can allow for 6–8 successive pickings. Fruits on the plant are sometimes wrapped in paper to prevent fruit fly damage. Seed can remain viable for 4–5 years if stored well. Considerable variation in the fruit occurs between varieties.

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Seed	8.6	2020	18.6	-	-	-	-
Leaf - raw	84.7	252	5	87	170	7.1	0.3
Leaf tip - boiled	88.7	146	3.6	-	57	1	0.3
Fruit	93.6	105	1.2	-	-	0.2	-
Pod - boiled	94	79	0.8	-	33	0.4	0.8
Pod - raw	94	71	1	24	84	0.4	0.8

## Vegetables

**English:** Aubergine, Egg Plant

**Local:** S: Ela-batu T: Kattiri-kai, Vaddu

**Scientific name:** *Solanum melongena*

**Plant family:** SOLANACEAE

**Description:** Egg Plants are a perennial shrubby herb up to 1 m tall. They are 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 plants can be spiny. The leaves are large, alternate and simple. They are angular and unequal near the stalk. Leaves can be 20 cm long, wavy along the edge and are covered with hairs. The flowers are bluish red and up to 5 cm across. They are either solitary or occur in small groups opposite the leaves. They have 5 large woolly lobes which continue to surround the base of the fruit as it matures. The fruit are white, blue, green or purple and vary in shape. Sometimes the fruits can be spiny. Often the fruit are 10 to 20 cm long and 5 to 8 cm wide. There are many cultivated varieties.



**Distribution:** Egg Plants grow in warm tropical regions. Plants grow from sea level up to 2200 m altitude in the tropics. They prefer wet climates but also do well in dry climates with irrigation. They require a long warm growing period with daily mean temperature of 20–30°C being most suitable. They are frost tender. They need a rich, friable, well tilled soil. In the subtropics they can be grown as a summer crop.

**Use:** The fruits are mostly fried then eaten. They can also be grilled, baked, stuffed and stewed. They can be used in curries. The fruit are also dried and stored. The leaves although edible are hairy and do not have a good flavour.

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

**Production:** Egg Plants 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	0.83	-	1.3	0.4	0.2
Fruit - fresh	93.4	62	0.7	1	5	0.4	0.3

## Vegetables

**English:** Okra, Lady's fingers,  
**Local:** S: Bandakka T: Vandakkay

**Scientific name:** *Abelmoschus esculentus*  
**Plant family:** MALVACEAE

**Description:** A tropical annual herb. It 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. They have 5-7 ribs. They are 7.5-15 cm long. The seeds are 4-5 mm across. They are round and dark green. Many varieties exist.



**Distribution:** Okra grows well in hot, humid, tropical lowland areas but is unsuited to highland areas. It can grow in salty soils. It grows best where temperatures are between 20–36°C. It is very sensitive to frost. It can grow well in dry climates with irrigation. It cannot tolerate drought. It does best on well drained well manured soils. Soil pH of 5.5–7.0 is best.

**Use:** Okra fruits are eaten cooked. Cooked fruits have a slimy consistency. They are also less sticky if a little lemon juice is added or if they are fried. The fruits can also be pickled. Dried, powdered seeds can be used to thicken soups.. Young leaves can be eaten cooked. They can be dried and stored. Flowers can also be eaten. The seeds can be roasted and used as a coffee substitute.

**Cultivation:** Okra plants are grown from seeds. They require high temperatures for germination (over 20°C) and a sunny position. Often seeds are soaked for 24 hours before sowing to speed up germination. Seeds are sown 1.5–2.5 cm deep with 2–3 seeds per hole. Later these are thinned out to one plant. Pinching out the tops of plants when 30 cm high encourages branching. A spacing of about 90 cm x 45 cm is suitable. 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:** Okra plants maintain production for 1–2 months if the fruits are harvested regularly. Leaving pods on the plants stops new pods developing. Plants are ready to harvest 8–10 weeks after sowing. Pods develop 5–10 days after flowering.

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Seed	9.2	1721	23.7	-	-	-	-
Leaf	81	235	4.4	-	59	0.7	-
Pod - fresh	88	151	2.1	-	47	1.2	-
Fruit - cooked	90	134	1.9	14	16.3	0.5	0.6
Fruit - raw	90	71	2	36	25	1	-

## Vegetables

**English:** Carrot

**Local:** S:Val Kaerat T: Mancalmullanki

**Scientific name:** *Daucus carota* subsp. *sativus*

**Plant family:** APIACEAE

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



**Distribution:** Carrots are a temperate plant. In the tropics it is mostly grown in the highlands, but will grow from sea level to 2600 m altitude. Sometimes on the coast only leaves are produced. Carrots are frost resistant. Carrots require a deep loose soil. Seed germinate well in the temperature range 7–24°C. Plants grow well with a temperature about 15°C. It grows best with a pH of 6.0-7.0. It suits hardiness zones 3-9.

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

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

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

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Root - raw	89.9	180	1	835	6	0.6	0.4
Root - boiled	91.5	79	0.6	-	4	0.4	0.3
Leaf	87.4	-	2.2	-	-	-	-

## Vegetables

**English:** Beetroot

**Local:**

**Scientific name:** *Beta vulgaris*

**Plant family:** CHENOPODIACEAE

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



**Distribution:** It is a temperate climate plant. It is mainly in the highlands between 1150 and 2600 m altitude in the tropics. Plants grow best at 18-22°C and are frost resistant. Temperatures below 10°C cause the plant to start its seeding phase. It is sensitive to acid soils but can grow in alkaline soils up to pH 10.

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

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

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Root - boiled	82.7	189	1.8	-	5	0.4	0.4
Root - raw	87.1	118	1.3	2	6	0.8	0.4
Leaf - boiled	89	113	2.6	-	25	1.9	0.5
Leaf - raw	92	80	1.8	316	30	3.3	0.4



## Nuts, seeds, herbs and other foods

**English:** Cashew

**Local:** S: Caju T: Montin-kai

**Scientific name:** *Anacardium occidentale*

**Plant family:** ANACARDIACEAE

**Description:** Cashews grow on large spreading evergreen trees up to 7–14 m tall. The roots grow deeply and spread widely. The trunk is 15–20 cm across. The leaves are pale green, shiny, alternately arranged and are 10–15 cm long by 6–8 cm wide. They are narrow at the base. The leaf stalk is 1–2 cm long. The flowers are produced on the ends of the branches and are red in colour. About 14 % of the flowers are both male and female and the remainder are male. Many of the flowers which contain female flower parts do not form fruit. The kidney shaped cashew nut is borne below the "apple" which is really a fleshy stalk. It is about 3 cm long when mature.



**Distribution:** Cashews grow best in the lowland tropics but will grow up to 1200 m above sea level. A rainfall of 1750 mm per year is considered suitable but good yields have been obtained with rainfall of 750 mm. Blight of the flowers reduces yields in very wet areas. It needs warm frost free locations with temperatures between 22–26°C. It can grow on poor soils but requires good drainage. It is drought resistant.

**Use:** The fleshy "apple" is edible but acidic until it is very ripe. It is used for jams and drinks. It can also be candied or made into chutney and pickles. The nut is eaten after roasting. The young shoots and leaves are edible. They can be picked during the rainy season and eaten fresh with hot and spicy dishes. **CAUTION:** Resin in the cashew nut shell can damage hands and discolour the nuts. Roasting the nuts before removing the kernel avoids this.

**Cultivation:** Cashew trees are usually grown from seeds. Seeds germinate poorly and slowly. Only nuts which sink in water (or a solution of 150 g of sugar in a litre of water) should be planted. Seeds are sun dried for 2–3 days to improve germination. Seeds can be started in a nursery or be sown directly. It can also be propagated by air layering. Trees should be spaced 7–10 m apart. Wider spacing is needed in drier areas. For good production complete fertiliser or appropriate organic material should be applied. Pruning to shape the tree is often undertaken in the first 2 or 3 years. Clearing under cashew trees makes finding the nuts easier. Allowing nuts to fall before harvesting ensures only ripe nuts are collected.

**Production:** Trees commence bearing after 3 years. The fruiting season is normally October to January. Nuts take 2–3 months to mature. Yields of 80–200 kg per hectare of nuts are normal.

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Nut	4	2478	17.5	0	-	2.8	4.8
Leaf	69.9	418	5.2	-	-	-	-
Fruit	84.7	213	0.8	-	265	1	0.2

## Nuts, seeds, herbs and other foods

**English:** Peanut, Groundnut

**Local:** S: rata-kaju T: nella-kadalai

**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 types (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 1650 metres in the equatorial tropics. They require between 24°C and 33°C. Plants get killed by frost. They need a well drained soil and cannot stand water-logging and often require raised garden beds. Peanuts need 300 to 500 mm of rain during the growing season. Near harvest dry weather is needed.

**Use:** The seeds can be eaten raw or cooked. They are boiled, steamed, roasted, salted or made into peanut butter or flour. The young leaves and unripe pods are edible after cooking. Sprouted seeds can be eaten. Oil is extracted from the seeds and is edible. 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 to 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 to 5 months until maturity. Peanuts are harvested by pulling out the plant when the top of the plants die down. After harvesting they should be left to dry in the sun for 3–4 days. Virginia peanuts have a longer growing season and the seeds need to be stored for 30 days before they will start to re-grow.

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

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Seed - dry	4.5	2364	24.3	0	Tr	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:** Coconut

**Local:** S: Pol T: Tennai

**Scientific name:** *Cocos nucifera*

**Plant family:** ARECACEAE

**Description:** Coconuts are produced on palm trees. The unbranched trunk has ring-like leaf scars along it. At the base it is swollen and surrounded by a mass of roots. They grow to about 25 m tall. Dwarf varieties have been produced. The fronds are 2–6 m long and are divided along the stalk into strap shaped leaflets. The leaflets are 60-90 cm long and are narrow. Clusters of large fruit develop beneath the fronds. Male and female flowers are separate on the one stalk. Female flowers are near the base. Flowers are cream. The flowers are covered by boat shaped bracts. Fruit are up to 25 cm diam. and are fibrous on the outside. The hard shell inside is filled with coconut milk and the white copra layer.



**Distribution:** Coconuts grow mainly in tropical coastal areas (occasionally up to 1000 m). Temperatures of 27° to 32°C are best with a daily range of 5–7°C. They need a minimum temperature of over 18°C to bear fruit. They require over 1000 mm of rain/year and preferably 1500 mm. Soils need to be well drained. Plants require full sunlight. Coconuts are salt tolerant. It can tolerate soils with pH between 5-8.

**Use:** The liquid of fresh nuts can be drunk. The flesh can be eaten, as can the "apple" in sprouting nuts. The flesh is usually grated and used in cooking as "coconut" milk. The young shoots at the top of the palm (palm hearts) can be eaten. However, this kills the palm. The sap from the flower stalk can be tapped for the sugary juice and oil can be extracted from the kernel.

**Cultivation:** Seeds of coconuts should be selected from regular bearing palms that produce more than 80 nuts per year. Selected nuts should be sprouted in a nursery. Seeds that have not germinated within 3 months are usually rejected. Seedlings are ready for transplanting when they have 3–4 leaves (about 1 year). The nut should be planted in a hole 0.6 x 0.6 m. A spacing of about 7–8 m is suitable.

**Production:** Early germinating nuts, give early production in the field. They can commence production after 6-8 years (12–60 for best yields). Trees can live for 100 years. Palms can produce 15–100 nuts per year. Fruit take about 1 year to be mature. Tapping the flower stalk can give 1 kg sap/day for 6 months. For palm hearts plants are put at a close spacing of about 2 m and are ready to harvest 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
Flesh - dry	12.2	2429	6.6	0	-	-	-
Milk	84.9	1004	3.7	-	8	1.3	0.4
Apple	84	310	1.3	-	5.0	0.7	-
Flesh	80.9	119	1.1	-	-	0.2	0.2

## Nutritional values of food plants by plant Family

Plant Family	Scientific name	Common name	Edible part	Moisture %	Energy kJ	Protein g	Vit A µg	Vit C mg	Iron mg	Zinc mg	Page
Amaranthaceae	<i>Alternanthera sessilis</i>	Lotus seed	leaf	89.3	109	4.5	-	77	-	-	28
Amaranthaceae	<i>Amaranthus lividus</i>	Slender amaranth	leaf	84.6	84	3.4	-	63	-	-	31
Anacardiaceae	<i>Anacardium occidentale</i>	Cashew	nut	4	2478	17.5	0	-	2.8	4.8	53
Anacardiaceae	<i>Mangifera indica</i>	Mango	fruit	83	253	0.5	54	30	0.5	0.04	36
Anacardiaceae	<i>Spondias cytherea</i>	Golden apple	fruit	70	657	0.6	-	34	0.4	0.1	45
Apiaceae	<i>Centella asiatica</i>	Asian pennywort	leaf	89.3	143	1.6	-	37	3.1	-	33
Apiaceae	<i>Daucus carota</i> subsp. <i>sativus</i>	Carrot	root (raw)	89.9	180	1	835	6	0.6	0.4	51
Araceae	<i>Xanthosoma sagittifolium</i>	Coco yam	root	67.1	559	1.6	0	13.6	0.4	0.5	11
Arecaceae	<i>Cocos nucifera</i>	Coconut	flesh (dry)	12.2	2429	6.6	0	-	-	-	55
Basellaceae	<i>Basella alba</i>	Indian spinach	leaf	85	202	5	400	100	4	-	30
Brassicaceae	<i>Nasturtium officinale</i>	Watercress	leaf	95	63	2.4	160	35	3.4	0.1	29
Chenopodiaceae	<i>Beta vulgaris</i>	Beetroot	leaf (raw)	92	80	1.8	316	30	3.3	0.4	52
Clusiaceae	<i>Garcinia mangostana</i>	Mangosteen	Fruit (canned)	81.3	299	0.6	2	2.7	0.4	-	39
Clusiaceae	<i>Pentadesma butyracea</i>	Butter tree	seed (dry)	5.6	2253	2.3	-	-	-	-	38
Convolvulaceae	<i>Ipomoea aquatica</i>	Kangkong	leaf	90.3	126	3.9	315	60	4.54	-	32
Convolvulaceae	<i>Ipomoea batatas</i>	Sweet potato	tuber (raw)	70	387	1.2	709	25	0.7	0.4	16
Cucurbitaceae	<i>Luffa acutangula</i>	Angled loofah	Fruit (raw)	94.6	71	0.7	-	-	0.5	-	47
Cucurbitaceae	<i>Momordica charantia</i>	Bitter cucumber	fruit	93.6	105	1.2	24	-	0.2	-	48
Cucurbitaceae	<i>Trichosanthes cucumerina</i> var. <i>anguina</i>	Snake gourd	fruit	95	76	0.9	-	6	1	-	46
Dioscoreaceae	<i>Dioscorea esculenta</i>	Lesser yam	tuber	74.2	470	2.1	-	20	0.75	0.5	20
Euphorbiaceae	<i>Manihot esculenta</i>	Cassava	tuber	62.8	625	1.4	1	15	0.23	0.48	13
Fabaceae	<i>Arachis hypogea</i>	Peanut	seed (dry)	4.5	2364	24.3	0	Tr	2.0	3.0	54
Fabaceae	<i>Cajanus cajan</i>	Pigeon pea	seed	10	1449	19.5	1	Tr	15	-	24
Fabaceae	<i>Cicer arietinum</i>	Chick pea	seed (raw)	9.9	1362	20.2	3	3	6.4	-	25
Fabaceae	<i>Psophocarpus tetragonolobus</i>	Winged bean	seed	8.5	1764	41.9	6	Tr	15	4.5	26
Fabaceae	<i>Sesbania grandiflora</i>	Sesbania	flower (raw)	82.3	323	8.7	0	60	4	-	35
Fabaceae	<i>Vigna mungo</i>	Mung bean	seed (raw)	12	981	22	6	Tr	8	-	21
Fabaceae	<i>Vigna radiata</i>	Green gram bean	seed	11	1432	22.9	-	4	7.1	-	22
Fabaceae	<i>Vigna unguiculata</i> subsp. <i>unguiculata</i>	Cow pea	pod (raw)	11.2	1189	23.5	68	1.5	6.4	-	23
Lamiaceae	<i>Plectranthus rotundifolius</i>	Hausa potato	tuber	-	-	-	-	-	-	-	15
Malvaceae	<i>Abelmoschus esculentus</i>	Okra	fruit (raw)	90	134	1.9	36	16.3	0.5	0.6	50
Moringaceae	<i>Moringa oleifera</i>	Drumstick tree	leaf	76.4	302	5.0	378	165	3.6	-	34
Musaceae	<i>Musa</i> sp (A &/or B genome) cv.	Banana	fruit	70.7	337	1.1	3	10	0.4	0.2	42

Plant Family	Scientific name	Common name	Edible part	Moisture %	Energy kJ	Protein G	Vit A µg	Vit C mg	Iron mg	Zinc mg	Page
Myrtaceae	<i>Psidium guajava</i>	Guava	fruit	77.1	238	1.1	31	184	1.4	0.2	40
Poaceae	<i>Eleusine coracana</i>	Finger millet	seed	11.7	1594	6.2	-	-	5.3	-	18
Poaceae	<i>Sorghum bicolor</i>	Sorghum	seed	-	1459	11.1	0	-	-	-	19
Rutaceae	<i>Aegle marmelos</i>	Bael fruit	fruit	58	-	2.3	-	219	0.55	-	43
Solanaceae	<i>Cyphomandra betacea</i>	Tamarillo	fruit	86.2	113	2	-	28	0.7	-	41
Solanaceae	<i>Physalis minima</i>	Native gooseberry	fruit	84.2	264	3.2	-	1	4.2	0.5	44
Solanaceae	<i>Solanum melongena</i>	Aubergine	fruit	91.8	117	0.83	1	1.3	0.4	0.2	49