Potentially Important Food Plants of Democratic People's Republic of Korea

FOOD PLANT SOLUTIONS
ROTARIAN ACTION GROUP

Solutions to Malnutrition and Food Security

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

www.foodplantsolutions.org

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Dedication

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

Food Plant Solutions Field Guide – DPRK, Version I, November 2014

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 Dr H Winston Johnston 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 Democratic Peoples Republic of Korea (DPRK). This guide has been developed with the best intention to create interest and improve understanding of the important local food plants of DPRK, and on the understanding that it will be further edited and augmented by local specialists with appropriate knowledge and understanding of local food plants.

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

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

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

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

Contents

Introduction

This book is designed as a simple introduction to useful, and sometimes under-utilised, food plants of the Democratic Peoples' Republic of North Korea. 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 in favour of introduced varieties. The principle behind Food Plant Solutions is to encourage the use of these local plants.

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. While this is sometimes true, it is often not the case. Many of the newer or introduced food plants, such as lettuce, have very little food value. Many traditional green, leafy vegetables and ferns have 10 times or more food value as 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. European black currant has four times, and hardy kiwi fruit twice, the vitamin C content of oranges. This is just one example showing there are often much better choices of foods with higher levels of important nutrients.

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. Most countries have a rich variety of food plants that can be grown. 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 local regions. Others have hundreds of varieties and are the main food for people in different regions. Information on these plants, and in many cases, their food value and the pest and diseases that damage them, is available in the Food Plants International database.

Getting to know plants

People who spend time in gardens and with their food plants get to know them very well. It is a good idea to learn from someone who grows plants well. Each plant grows best in certain conditions and there are often special techniques in getting it to grow well. For example, sweet potato will not form tubers if the soil is too wet, but it

may still grow lots of green leaves. Potatoes should be grown from new seed pieces each year to prevent build up of virus diseases. Tomatoes will yield fewer but larger fruit if lower branches are pruned. 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.

An Important Note

As noted above, a guiding principle behind Food Plant Solutions is to encourage the use of local plants. It is acknowledged that some of these may be major agricultural crops that are already well known, such as:

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

There are others, but these serve as examples.

As a general principle, these types of plants are not included in a field guide, as they are well known, and in some cases are relatively high input crops. However, if they are particularly important in a country, such as rice and cabbage in DPRK, they may still be included. The main purpose of the Food Plant Solutions project is to look beyond these types of crops, and focus on plants that are less well known and, as noted above, often have superior food value and lower input requirements.

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

Nutrient Value

Our bodies need a variety of food plants to enable us to grow, stay healthy and have enough energy to work. Different foods are needed to provide energy, protein, vitamins and minerals. The graphs that appear at the end of this section highlight the differences in nutrient content of the plants described in this field guide.

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. Some plants contain cyanide, a chemical that makes them bitter and poisonous. 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) which becomes more readily 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 region. It may be that in their area they have found better types than the ones that simply grow wild.

Saving better types of plants

If we simply allow plants to grow from seed, the improvements that have been made in finding sweeter or better types may get lost. Some fruit trees are like this and the fruit produced may not be sweet at all. It is often necessary to take cuttings from a tree to be sure the new plant is exactly the same as the old one. If the plants won't easily grow from cuttings simply by sticking a piece of the branch in the ground, (and keeping it watered), there are other ways of helping these plants to form roots and start to grow. One good way is to make a small cut in the bark of a young branch and then wrap soil around the cut and cover it with plastic. With some plants, 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.

Growing from cuttings and suckers

Many food plants are grown from cuttings and suckers. This is very important, as it allows plants like sweet potato to be continually grown and ensures the varieties are preserved. Each plant has its own special propagation method. It is important to use healthy planting material, as diseases can be spread in planting material. In many cases, small tubers of potatoes etc. are stored for planting for the next crop. This is not always good practice, as the small tubers could be the result of diseases (such as

viruses) in the plant. A good rule is to take cuttings or save tubers from the best plants for re-planting.

Saving seed

Some food plants are grown from seed. Sometimes this is very easy as the seeds are large, store well, grow easily and grow the same as the original plant. It is more difficult with other plants. Some seeds do not "breed true" or do not grow into new plants that are the same as the original plants. With many of these plants, it may be necessary to find ways of growing them from cuttings or other methods such as grafting. Some plants "inbreed" and get smaller or poorer. This happens when a plant self-pollinates or receives pollen from a close relative. Corn grown in small plots normally does this and the plants grown from seed grown in this situation get smaller and smaller each year. The seed needs to be saved from several different plants with different history and then mixed together before sowing. All the seeds on one cob are related and will inbreed. Some seeds develop a hard seed coat and need to be scratched, soaked in water, or even put into hot water, before they will start to grow. Saving seeds is often a good idea if the plant is already adapted to local conditions. This is not to say that imported varieties might not be better, but it is worth checking that the new plant will perform as well as, or better than, those currently grown, before going to the trouble of importing seed.

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. 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 tubers will store well for a few months in the right conditions.

Crop rotation

Crop rotation involves planting different crops in succession to improve soil fertility and reduce the impact of insect pests and diseases. The crops in the rotation should

be selected to reduce the risk of carry-over pests and diseases from one crop to the next. A three-year rotation would normally involve growing a legume to increase soil nitrogen levels, and then two different crops before a legume is planted again. Maximum suppression of diseases and insects should be achieved if the non-legume crops are alternated between grass and broad-leafed plant families. Crops planted in a mixture of two or more species will provide greater diversity, and hence reduce losses due to pests and diseases.

Control of soil erosion

Erosion, or loss of soil, occurs when wind or running water carries soil away from cultivated areas. If erosion continues year after year, the land will become unproductive. Trees and shrubs can be planted in strips across the direction of the dominant wind to reduce wind erosion, or across the slope to help slow water that flows over cultivated soils. Growing crops with good leaf cover, or leaving crop residues to cover the soil surface, will significantly reduce soil loss during windy or wet seasons. When possible, any soil disturbance, such as tillage, should occur after the risk of windy weather or wet weather run-off has passed. In steep areas, tillage should be on the contours around hills, rather than up and down the slope. Various techniques can be used to leave ridges or terraces in the tilled soil to help slow water, or reduce the effects of wind, and hence reduce soil loss. Always reduce tillage to the minimum amount possible while still achieving a successful crop.

Building up the soil

There is a simple rule for growing plants and improving the soil - "If it has lived once, it can live again." Any old plant material can provide nutrients for new plants to grow, but it must be allowed to rot into mulch or compost for this to happen. If this plant material is burnt, some nutrients, especially phosphorus and potassium ("potash"), get left behind in the ashes for new plants to use, although it also allows these important nutrients to be lost by being washed away by rain. But with burning, other important nutrients, such as nitrogen and sulphur, get lost in the smoke and disappear from the garden and soil. These last two plant nutrients are especially important for growing green leaves and when their levels are low, plants grow small or pale green. When nitrogen is lacking, the old leaves of the plant go pale and fall off early, and when sulphur is lacking, the young leaves go pale. Wherever possible, old plant material should be covered with some soil to allow it to rot down and not simply dry out or get burnt. Cutting it into small pieces will help it break down more quickly into usable compost.

Poor soils where crops won't grow

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

Soil nutrients

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

One of the most common and important nutrients for plant growth is nitrogen, which actually comes from the air, but gets into plants through the soil. When plants are short of nitrogen, their older leaves often become yellow or pale. When grass family plants, like 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. 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 an efficient way to increase the level of nitrogen in the soil.

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

Making compost

Compost is old plant material that has been allowed to rot down into a fine, sweet smelling mulch that is full of nutrients that can be put back on the soil to grow new plants. Compost returns nutrients to the soil, improves the soil's ability to retain moisture and also helps improve soils that are acid or saline.

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

The composting process is carried out by small bacteria that live in the soil and feed on decaying plants. They break down old plant material into compost. These bacteria are living, so they need air, water and food. A good compost heap must have air, so don't cover it with plastic or put it in a container. This makes a foul smelling compost, as different bacteria that don't need air turn it into an acid mixture that preserves it. Good compost must have moisture, so keep the heap damp, but not too wet. The compost bacteria like a balanced diet, which means that both green material and dried material is needed to balance the carbon and nitrogen in the compost pile.

If the compost material gets too dry and brown, it will not break down, and if it gets too green, it will go slimy. Using a little bit of compost from an old heap will make sure the right bacteria are there to start the whole process off.

As soon as the plant material is broken down to a fine mulch it can be put onto the garden. It is best if it is dug in, but if it is regularly put onto the surface of the garden, worms will mix it into the soil. A handful of compost placed at the base of each plant can be beneficial.

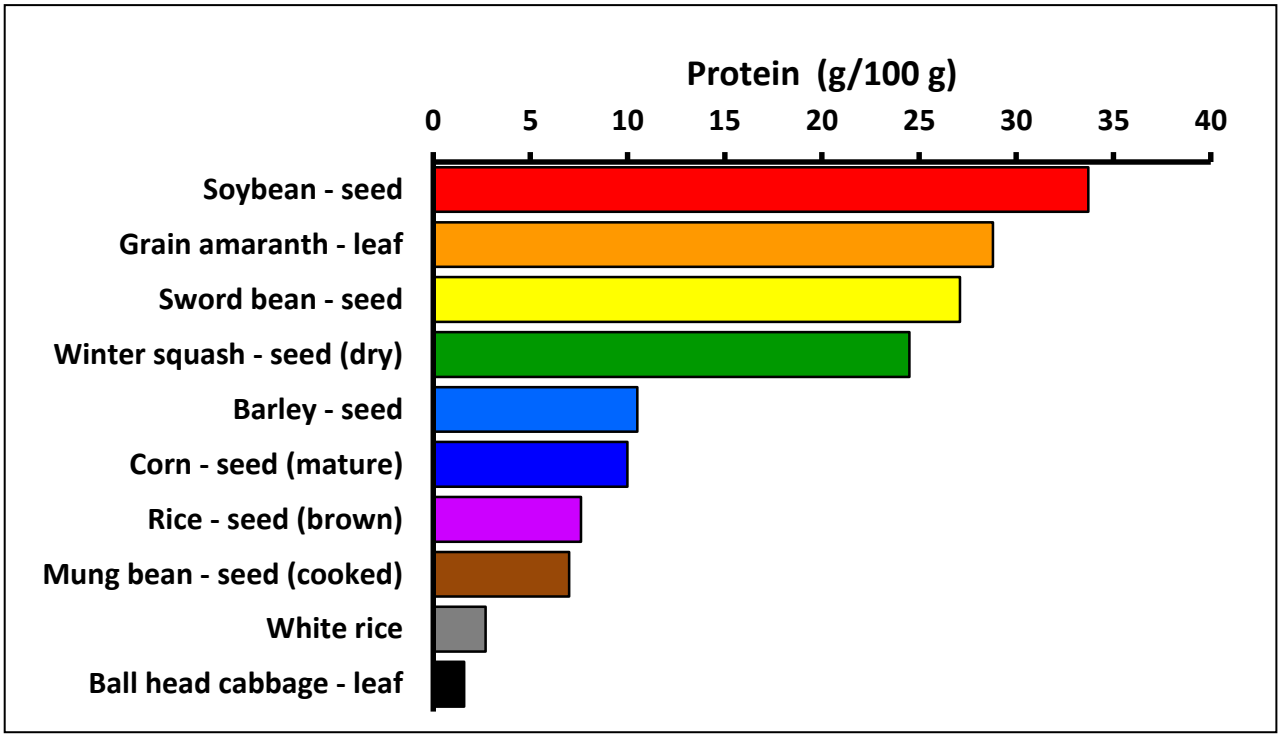
Pests

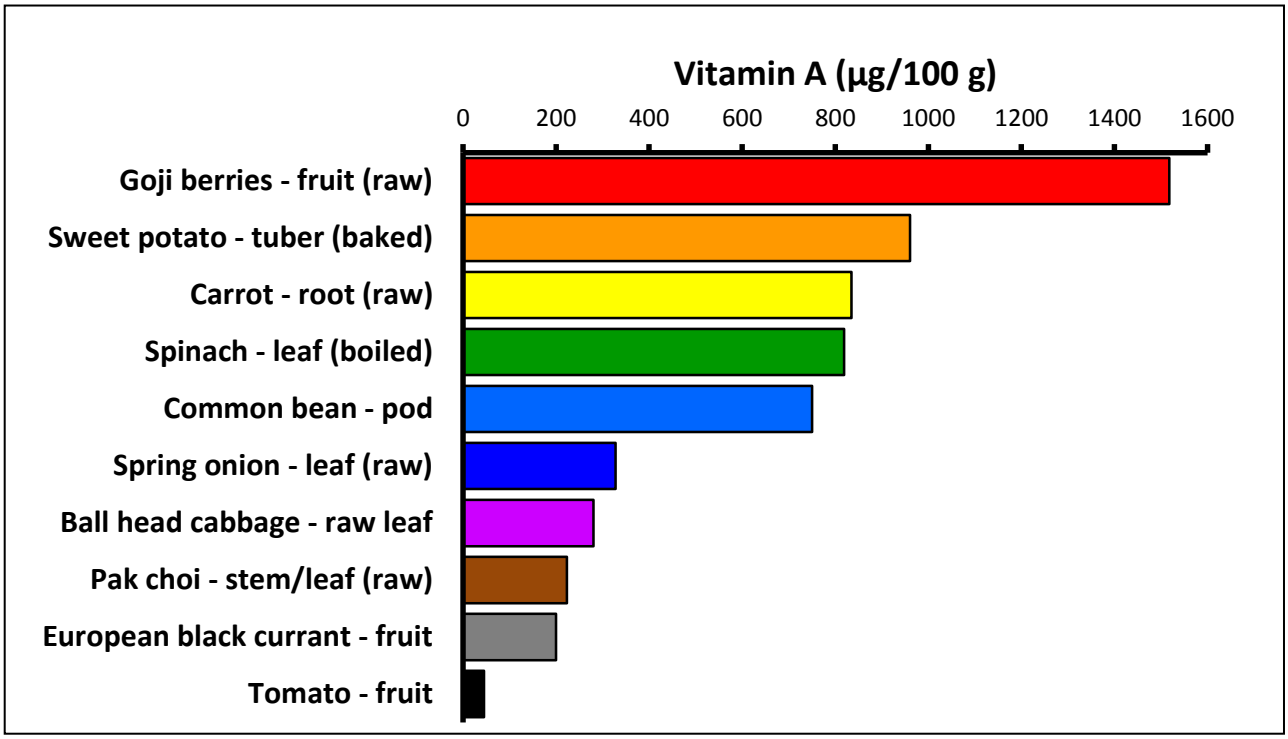
There are a large number of insects that enjoy sharing our food with us! We should not try to kill all these insects as they have an important role to play in keeping everything in nature in balance. What we need to do is to learn to manage these insects so we can all get some food to eat! Some insects 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. The best rule for reducing pest damage is to grow healthy plants, as they suffer less damage. Spiders, ladybirds, hover flies and many other insects also feed off the insect pests that attack our crops and should be encouraged.

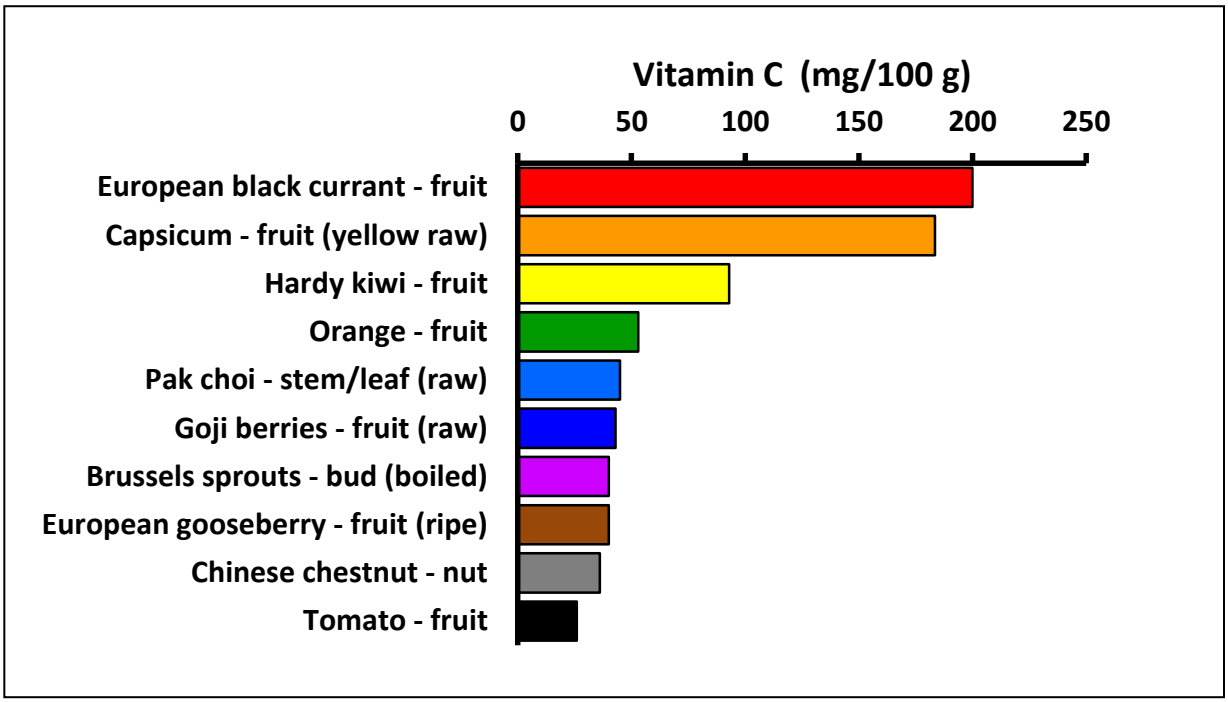
Diseases

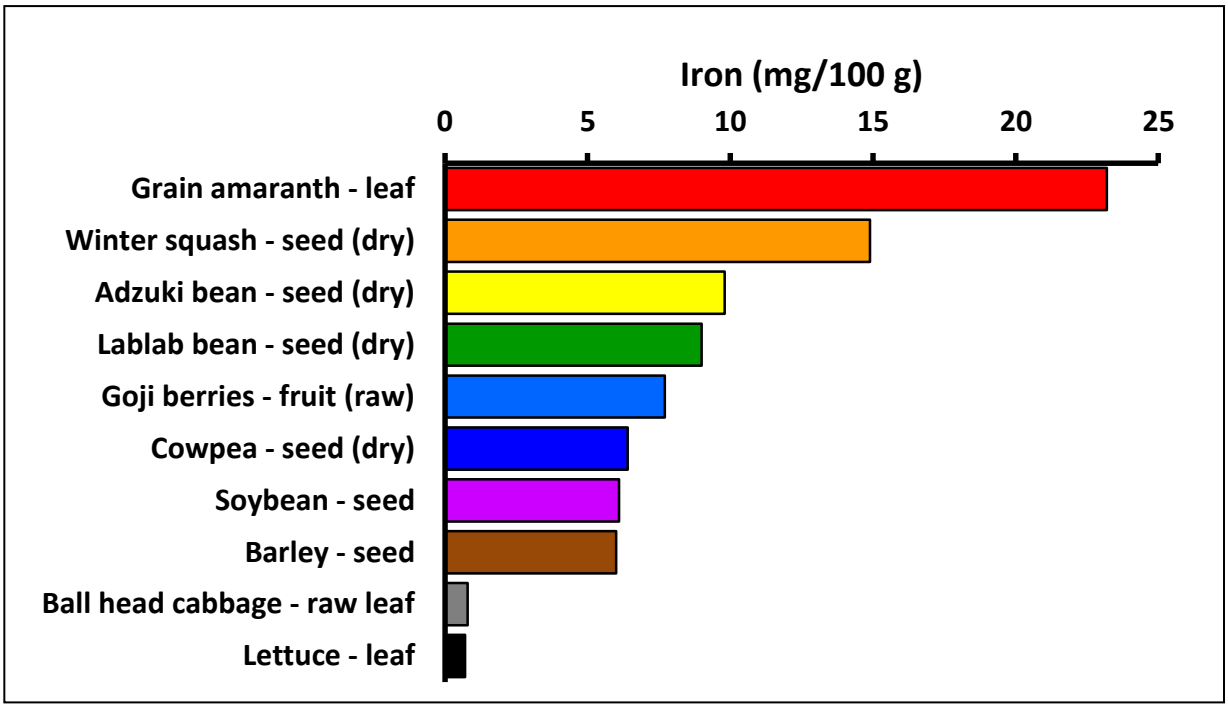
The living organisms that cause disease are much smaller than insects. These disease organisms can often only be seen with a microscope. There are three main kinds of disease organisms - fungi, bacteria and viruses. Fungi are like the mushrooms we eat, only very much smaller. They usually make distinct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

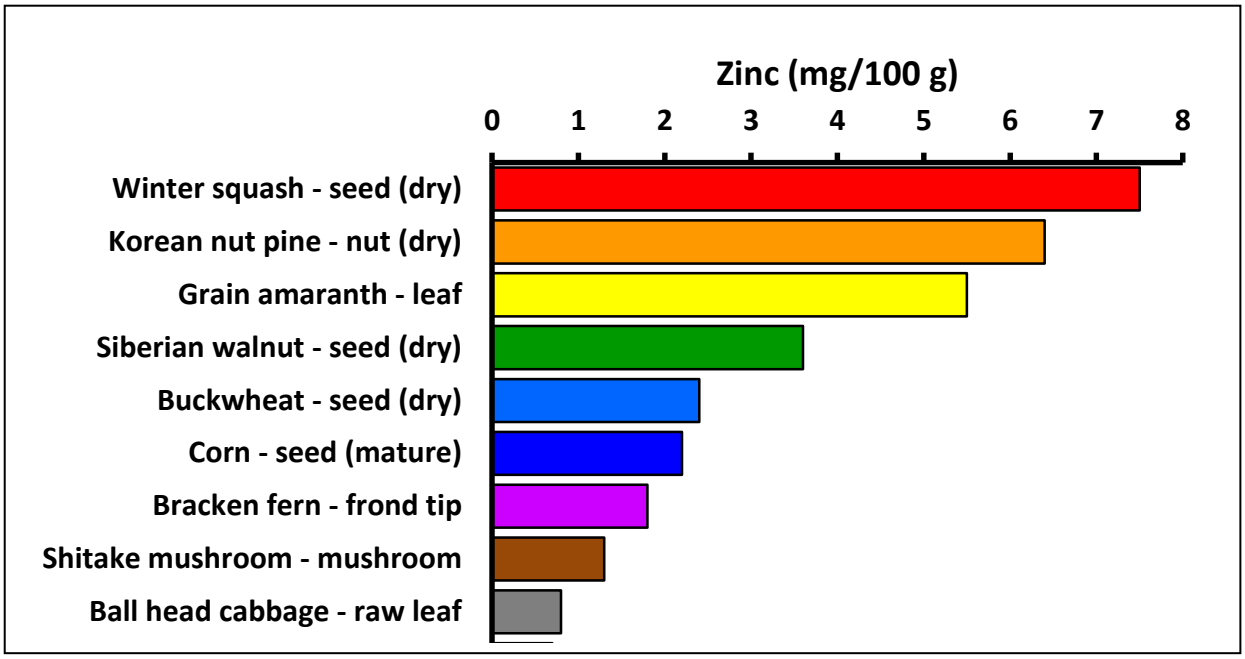
Food value charts for a selection of plants from DPRK






Vitamin C (mg/100 g)
0
50
100
150
200
250
European black currant - fruit
Capsicum - fruit (yellow raw)
Hardy kiwi - fruit
Orange - fruit
Pak choi - stem/leaf (raw)
Goji berries - fruit (raw)
Brussels sprouts - bud (boiled)
European gooseberry - fruit (ripe)
Chinese chestnut - nut
Tomato - fruit


Iron (mg/100 g)
0
5
10
15
20
25
Grain amaranth - leaf
Winter squash - seed (dry)
Adzuki bean - seed (dry)
Lablab bean - seed (dry)
Goji berries - fruit (raw)
Cowpea - seed (dry)
Soybean - seed
Barley - seed
Ball head cabbage - raw leaf
Lettuce - leaf



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

Starchy staples

English: Rice
Local:

Scientific name: *Oryza sativa*
Plant family: POACEAE

Description: An annual grass with hollow stems. The stems can be 30 - 150 cm tall. (Floating varieties can be 5 m long.) The nodes are solid and swollen. The stem is protected by a skin layer which can often be high in silicon. A clump of shoots are produced as tillers from buds in the lower leaf axils. The leaves are narrow and hairy. They taper towards the tip. Each stem produces 10 - 20 leaves and the seeds hang from the flower stalk at the top. Some varieties are glutinous and cling together when cooked.

Distribution: A tropical plant which grows well in tropical and subtropical countries. Plants are grown in both flooded and dryland sites. It will grow over a range of conditions. It needs a frost free period of over 130 days.

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

Cultivation: Plants are grown from seed. Seed can be sown direct or in a nursery and transplanted. For dryland crops, sow 5 - 10 seeds in holes 20 - 25 cm apart. For transplanting, 2 or 3 plants as a 20 x 20 cm spacing is suitable. Planting spaced individual rice seedlings has been shown to increase production efficiency and harvested seed yield compared to planting spaced clumps of multiple plants[1]. Weed control is a problem in the early stages. Flooding can be used for weed control.

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

Food Value: Per 100 g edible portion

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

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Starchy staples

English: Barley
Local:

Scientific name: *Hordeum vulgare*
Plant family: POACEAE

Description: An erect annual grass. It grows 80 - 120 cm tall. The nodes are solid and the internodes are hollow. The leaves are narrow. There are 5 - 10 leaves. They are produced alternately on opposite sides of the stem at the nodes. The leaves are narrowly sword shaped and 5 - 40 cm long by 0.5 - 1.5 cm wide. The flowers are greenish. Flowers have long awns. The fruit is a grain. It is oval and narrow. There are a range of named cultivated varieties.

Distribution: A temperate plant. It requires full sun and well-drained soil. It can tolerate saline conditions. Barley can be produced at altitudes up to 4,000 m above sea level. In DPRK this crop has been found suitable for production in double cropping areas.

Use: The grains are eaten. They are also used in soups. They are also used for bread and breakfast cereals. They have a low gluten content. The seeds are also soaked until they sprout and produce malt. The sprouted seeds are eaten in salads. Barley water is made by soaking the barley in water and flavouring with lemon. The young seedlings are dried and powdered and marketed as *barleygreen.* Roasted seeds are added to coffee.

Cultivation: Plants are grown from seed. Seed can be planted 2 - 6 cm deep. Often 200 - 250 plants are grown per square metre.

Production: It has a relatively short growing season and matures quickly.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed (boiled)	69.6	510	2.7	-	-	0.2	0.2
seed	13.7	1367	10.5	-	-	6.0	-

Starchy staples

English: Bullrush millet
Local:

Scientific name: *Pennisetum glaucum*
Plant family: POACEAE

Description: An annual grass that grows to 3 m tall. The leaf blades are 20 - 100 cm long by 2 - 5 cm wide. The flower is dense and 40 -5 0 cm long by 1.2 - 1.5 cm wide. They also vary in shape and size. Plants that tiller produce smaller heads. The species varies a lot. There are 13 cultivated, 15 weed and 6 wild races of this grass. It has a cylindrical ear like a bullrush. The grains are small and round and have a shiny grey colour like pearls. There are thousands of cultivated varieties.

Distribution: A plant in arid regions and suits areas with a short growing season. It grows in areas with less than 600 mm of rainfall. It is replaced with sorghum when rainfall is between 600 – 1,200 mm rainfall and then by finger millet above 1,200 mm rainfall.

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

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

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

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	13.5	1363	12.7	-	-	3.5	-

Starchy staples

English: Sorghum
Local:

Scientific name: *Sorghum bicolor*
Plant family: POACEAE

Description: Sorghum is a millet grass. A mature sorghum plant resembles maize in its stature. Plants vary in height from 45 cm to 4 m. It is an annual grass with erect solid stems. The stems can be 3 cm across at the base. Prop roots occur at the base of the plant. There are numerous sorghum varieties. Some have one main stem while others produce multiple tillers. More tillers are produced when plants are widely spaced. The nodes on the stem are slightly thickened. Short types have up to 7 leaves while tall late varieties may have up to 24 leaves. The leaf blade can be 30 - 135 cm long. Leaves are bluish green and waxy. They have a prominent midrib. The large flower panicle can be 20 - 40 cm long. The flower occurs at the top of the plant. It can stick upright or bend over. The flower can be open or compact. Over 1,000 cultivated varieties occur in China.

Distribution: Sorghum is a plant of tropical origin 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: Buckwheat
Local:

Scientific name: *Fagopyrum esculentum*
Plant family: POLYGONACEAE

Description: An upright annual plant up to 1 m high. It spreads to 1 m across. It has angular hollow stems. These are erect and branching. Leaves are heart shaped or triangular and small. It has groups of white or pink flowers. These have a smell. They occur in clusters at the ends of branches. Fruit are small and 3 angled. The plants are not grasses but the seeds are normally grouped with other grain crops.

Distribution: It is a temperate plant. It will grow on poor soils but prefers rich soils and a protected sunny position. It is resistant to frost but damaged by drought. It can grow up to 4,400 m altitude.

Use: The seeds are eaten in porridge and biscuits etc. The seeds can be made into flour and eaten in pancakes, noodles and breads or for thickening soups and gravies. Seeds can be soaked overnight then sprouted and eaten. The tender leaves and shoots are cooked and eaten. The young leaves can be stored for 4 - 5 days after harvest. The seeds are used mainly for flour and stock feed. In DPRK, buckwheat is traditionally used to make noodles, usually consumed cold in the dish called naengmyeon.
Caution: Seeds are bitter. If they are eaten in large amounts they can produce an unpleasant skin disorder.

Cultivation: Plants are grown from seed.

Production: Seeds usually germinate in 5 days. It has a very short growing period from sowing to maturity. It can produce a crop of leaves in 8 weeks and seeds in 12 weeks. Seed ripen irregularly over several weeks making harvesting difficult. Under cool conditions plants flower in 7 - 9 months.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed (dry)	10	1435	13	0	0	2.2	2.4

Starchy staples

English: Sweet potato
Local:

Scientific name: *Ipomoea batatas*
Plant family: CONVOLVULACEAE

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

Distribution: 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. It suits hardiness zones 9 - 12.

Use: Tubers are boiled or baked. They can be 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 edible. Orange fleshed varieties are better sources of Vitamin A than white fleshed varieties.

Cultivation: Vine cuttings are used for planting. In grassland soils it is grown in mounds, ridges or 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. Excess nitrogen restricts storage root initiation and therefore excess leaves are produced without significant tuber yield. Dry matter percentage increases with increasing age of the crop. Higher dry matter tubers are normally preferred.

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

Weed control is essential especially during early stages of growth. The rate of ground coverage by foliage varies greatly with growing conditions and cultivar but once ground coverage has occurred weed control is less of a problem. Sweet potato tuber initiation is subject to aeration in the soil. Either heavy clay soils, waterlogged conditions or other factors reducing aeration can result in poor tuber production. For this reason sweet potatoes are often grown on mounded beds. In well drained or high organic matter soils digging or mounding is not as essential.

Leaf scab (*Elsinoe batatas*) can significantly reduce yield especially in sites where leaf production is low due to low soil fertility. To reduce sweet potato weevil damage, plants need to be hilled or have the tubers well covered with soil. Cracking soils can allow the weevil to access the tubers.

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

Food Value: Per 100 g edible portion

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

Starchy staples

English: Potato
Local:

Scientific name: *Solanum tuberosum*
Plant family: SOLANACEAE

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

Distribution: Tubers form best when soil temperatures are 15.5°C. Tuber formation stops with a soil temperature of 30°C and decreases with temperatures above 20°C. Potatoes should have a mean temperature below 18°C. They are damaged by frost but slightly more frost tolerant than sweet potato. Short daylength helps tuber production. They can grow with a soil pH of 5.2 - 6.6. It suits hardiness zones 7 - 11.

Use: The tubers are cooked and eaten. They are also fried, canned and made into starch. The tubers are boiled, baked, roasted, mashed and used in soups, stews, dumplings, pancakes and potato salads. The tender leaves are also occasionally eaten. **Caution:** The green tubers and leaves contain a poisonous alkaloid solanine which can be removed by cooking in boiling water.

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

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

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
tuber (baked)	71.2	456	2.3	0	12.9	1.4	0.3
tuber	77.0	344	2.0	25	21	0.8	0.27
leaf	86.1	-	-	3.4	-	-	-

Starchy staples

English: Corn
Local:

Scientific name: *Zea mays*
Plant family: POACEAE

Description: It is single stemmed annual plant that grows 2 - 3 m tall. The stem is solid and can be 2 - 3 cm across. It is a large grass family plant with prop roots near the base. Some forms produce tillers near the base. Seed roots feed the plant initially then casual side roots develop from the lowest node on the plant and continue supplying the plants nutrients. Roots can go sideways for 1 m or downwards for 2 - 3 m. Leaves are produced one after another along opposite sides of the stem and there are between 8 and 21 leaves. The leaf sheath wraps around the stem but opens towards the top of the sheath. The leaf blade is 30 - 150 cm long and 5 - 15 cm wide. The leaf blade has a pronounced midrib and is often wavy along the edge. The male flower or tassel is at the top. The female flower is called the ear. It is on a short stalk in the axils of one of the largest leaves about half way down the stem. It produces a large cob wrapped in leaves. Cobs commonly have 300 - 1,000 grains. Normally only one or two cobs develop per plant.

Distribution: A warm temperate plant. Seeds need a soil temperature of more than 10°C to germinate. It is grown in most areas of Asia. Plants have been grown from sea level to 3,300 m in some countries. It tends to be grown in areas too dry for rice but wetter than for millets. Maize must have over 120 days frost free.

Use: The cobs are eaten cooked. The dried grains can be crushed and the meal can be used for breads, cake, soups, stews etc. Maize is cooked and prepared in many different ways - boiled, roasted, dried, steamed and other ways. Corn oil is used in salads and cooking. Young tassels are cooked and eaten. The pollen is used in soups. The fresh silks are used in tortillas. The pith of the stem can be chewed or made into syrup. Sprouted seeds can be eaten.

Cultivation: It is grown from seeds. It is normal to plant one seed per hole at 1 - 2 cm depth. A spacing of about 30 cm between plants is suitable. Seed should be saved from gardens of over 200 plants and the seed from several cobs mixed to avoid inbreeding depression. Corn in DPRK is frequently produced in double cropping areas. In order to allow adequate maturation times in a double cropping system, seedlings are produced and transplanted.

Production: In warm, moist soil, seeds germinate in 2 - 3 days after planting. Cobs are harvested when the grains are full and the tassel is just starting to turn brown. This is normally about 50 days after fertilization. It is sweetest eaten soon after harvesting. Drought and unfavorable weather can result in the silks of the female flowers emerging after the pollen has been shed. This results in poorly pollinated cobs.

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 (mature)	10.4	1528	10.0	100	4	4.9	2.2

Legumes

English: Soybean
Local:

Scientific name: *Glycine max*
Plant family: FABACEAE

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

Distribution: It is a temperate plant that suits lowland areas. It can be grown from sea level to 2,000 m altitude. It needs fertile soil. The best soil acidity is pH 5.5 - 7.0. It is damaged by frost.

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

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

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

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	9.0	1701	33.7	55	-	6.1	-

Legumes

English: Adzuki bean
Local:

Scientific name: *Vigna angularis*
Plant family: FABACEAE

Description: An erect bushy bean plant that re-grows from seed each year. Plants grow up to 60 cm tall. The flowers occur as clusters of bright yellow flowers. The fruit are pods 6 - 12 cm long and contain up to 12 small oblong seeds. These can vary between red, brown and black. They are 0.5 cm long. There are several named cultivated varieties.

Distribution: A plant of tropical origin that cannot stand frost but can tolerate some cold. They are short day plants, forming flowers and pods when daylengths or hours of sunlight are getting shorter.

Use: The young pods are eaten cooked. The seeds can be eaten cooked. They are added to soups, stews and salads. They are boiled, mashed and sweetened. The seeds are germinated for sprouts. They can be popped liked corn or used as a coffee substitute.

Cultivation: Seed can be pre-germinated on wet paper to get it growing more quickly. The soil temperature needs to be above 15°C. A spacing of 15 cm is suitable.

Production: For green pods, these should be picked regularly. For dry beans, plants can be allowed to go to maturity, then pulled up and dried.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed (dry)	10.8	1780	19.9	-	-	9.8	-
whole bean (fresh)	69.6	396	6.6	-	-	2.5	2.5

Legumes

English: Mung bean
Local:

Scientific name: *Vigna radiata*
Plant family: FABACEAE

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

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

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

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

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

Food Value: Per 100 g edible portion

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

Legumes

English: Lablab bean
Local:

Scientific name: *Lablab purpureus*
Plant family: FABACEAE

Description: A climbing bean which can have vines 1 - 5 m long. It keeps growing from year to year. The stems can be smooth or hairy. Leaves are made up of 3 almost triangular leaflets. The leaflets are 5 - 15 cm long and 3 - 14 cm wide. The side leaflets are somewhat asymmetrical. Often the plants are flushed purple. The flowering clusters are 5 - 20 cm long. Flowers are often white but can vary from red to blue. The pods are flattened, pointed and up to 12 cm long and 2 cm wide. They can be green, purple or white. Inside there are 3 - 5 white or dark seeds. Seed pods have a wavy margin. The seeds are 0.5 - 1.5 cm long.

Distribution: It is drought resistant and can grow in quite low rainfall areas. Some varieties are short day and some are long day kinds. It suits hardiness zones 9 - 12.

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

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

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

Food Value: Per 100 g edible portion

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

Legumes

English: Sword bean
Local:

Scientific name: *Canavalia gladiata*
Plant family: FABACEAE

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

Distribution: A plant of tropical origin. Temperatures of 20 - 30°C suit it well. They are drought and salt resistant. They can grow on nutrient depleted soils and on soils with pH from 4.5 - 7.0. They can tolerate some shade.

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

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

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

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	15.0	1335	27.1	-	-	-	-
pod (fresh)	89.0	142	2.8	-	-	-	-

Legumes

English: Cowpea
Local:

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

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

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

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

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

Food Value: Per 100 g edible portion

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

Legumes

English: Common bean
Local:

Scientific name: *Phaseolus vulgaris*
Plant family: FABACEAE

Description: There are many bush and climbing varieties of this bean. Climbing forms can be 2 - 3 m tall. Bush types are 20 - 60 cm tall. The leaves have three leaflets, one after another along the stem. The leaf stalk has a groove on the top. The side leaflets are unequal in shape, and can be 8 - 15 cm by 5 - 10 cm. The flowers are in the axils of leaves (where the leaves join the stem) and occur in a loose form. Flowers are white to purple. Pods are smooth, slender and 8 - 20 cm long by 1 - 1.5 cm wide. They are straight or slightly curved with a beak at the end and often have 10 - 12 coloured, kidney-shaped seeds.

Distribution: It is a temperate plant that grows well in a range of conditions. It is shallow-rooted and damaged by excess moisture near the roots. A crop lifecycle needs about 350 mm of water. It is sensitive to frost and high temperatures. Flowers will not form below 9.5°C. Night temperatures above 37°C cause flowers to drop. The best temperature range is 15 - 21°C. It does not suit very acid soils. It suits hardiness zones 8 - 11.

Use: The young pods, leaves and mature seeds are edible. Dry seeds are soaked in water and boiled until soft.

Cultivation: Plants are grown from seed, preferably sown in raised beds. Seeds remain viable for 2 years. Germination is normally good if seed has been well stored. Climbing types need stakes. Plants are self-fertilised. These beans are intercropped with other plants in many places. If grown on their own, bush types can be spaced at 25 cm x 25 cm. They can be sown closer together in rows wider apart to make weeding and harvesting easier. For dried beans, once the pods are mature and turning yellow, the whole plants are pulled, then dried and threshed. About 50 - 75 kg of seed will sow a hectare. Flowering in most varieties is not affected by day length.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed (dry)	10.0	1386	25.0	10	1	8.0	2.8
seed (young)	92.0	142	3.0		20	0.8	0.2
pod	88.0	151	2.5	750	27	1.4	0.2
sprout	90.7	121	4.2	0	38.7	0.8	0.4

Legumes

English: Pigeon pea
Local:

Scientific name: *Cajanus cajan*
Plant family: FABACEAE

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

Distribution: They can tolerate drought and are suited to a drier climate. They can grow in places with less than 600 mm rainfall per year. They suffer in waterlogged soils and are damaged by frost. It can also tolerate heat. It will grow on poor soils but cannot grow on salty soils. It can grow in arid places and suits hardiness zones 10 - 12.

Use: Young leaves, shoots and pods are eaten. The pods can be used in curries. The leaves and shoots are used 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.

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

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

Food Value: Per 100 g edible portion

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

Leafy greens

English: Cabbage
Local:

Scientific name: *Brassica oleracea* var. *capitata*
Plant family: BRASSICACEAE

Description: A short, leafy plant with a thick stalk. In cold areas, it forms a thick, tightly-packed ball of leaves called a "head". If the plant is left growing in the ground, it will later produce a flower stalk. The flowers are yellow. There are 3 main types - the white cabbage, a purple kind and one with wrinkled leaves.

Distribution: It is grown in most temperate countries and in many tropical countries as well. It is a temperate crop. Seeds germinate when soil temperature is between 13 - 16°C. It does not grow well when temperatures are above 26°C. New varieties grow in warmer places. They are frost-resistant. It suits hardiness zones 8 - 11.

Use: The leaves can be eaten raw or cooked. The national dish of DPRK is kimchi, made from fermented cabbage, heavily spiced and including other vegetables and sometimes sea foods.

Cultivation: Plants are normally first grown from seeds, but in most places they are re-grown from cuttings or sprouts that develop on the cut stalk.

Production: Cabbages take 5 - 7 months to be ready for 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
leaf	93.6	92	1.0	6.6	20	0.2	0.1

Leafy greens

English: Chinese broccoli/Chinese Kale
Local:

Scientific name: *Brassica oleracea var. alboglabra*
Plant family: BRASSICACEAE

Description: A cabbage plant with a single fleshy stem. Although it keeps growing from year to year it is normally grown as an annual. It grows 45 cm high and spreads 40 cm across. The leaves are dark green and rounded on long stems. Plants start to flower when 10 leaves are present. Flowers are white but there are varieties with yellow flowers. There are several named cultivars.

Distribution: It does best in a fertile soil. The soil needs to be well drained. It prefers a soil pH of 6 - 7. Temperatures during the day of 18 - 28°C are best. It can tolerate frost. Cool temperatures are necessary for flowering.

Use: The flower stalk, flower heads, buds and tender leaves are all eaten. The stems are steamed or braised. They are also used in soups.

Cultivation: Plants are grown from seed. Seed can be sown direct or put in a nursery then transplanted. Seed is sown about 0.5 cm deep and germinate in 3 - 10 days. A spacing of 15 cm is suitable. Wide spacing causes stems to become thick and tough. Because plants are shallow rooted, they need regular watering.

Production: Chinese broccoli is fast growing. Flower heads are harvested after about 9 weeks. Heads are harvested individually to allow others to form. Harvesting is done before buds start to open.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
flower (cooked)	93.5	92	1.1	164	28.2	0.6	0.4

Picture sourced from http://thedahliafarm.blogspot.com.au/2010/06/gai-lohn-or-chinese-broccoli-or-chinese.html

Leafy greens

English: Spinach
Local:

Scientific name: *Spinacia oleracea*
Plant family: AMARANTHACEAE

Description: An annual leafy vegetable. It grows 60 - 90 cm high and spreads 30 - 45 cm wide. The broad leaves are produced in a clump on short stalks. The leaves at the base are large and leaves on the stalk are smaller. Plants are separately male and female. (So both types are needed if seed is to be produced.) Flowers are greenish in spikes.

Distribution: It is a temperate plant. It grows best where the temperature varies between 10°C and 20°C. The kind with very prickly seeds is frost resistant. Plants need a deep well drained soil. It is a cool season, short day plant. It suits hardiness zones 6 - 9.

Use: Leaves are cooked in a small amount of water. They are also used in soups and salads. Young leaves are eaten raw and older leaves are cooked. The sprouted seeds can be used in salads.
Caution: Spinach can contain oxalates which affects calcium absorption.

Cultivation: It is normally sown directly from seeds. Plants need to be 25 cm apart.

Production: The older leaves are picked off. They can be harvested starting at 8 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	91.6	61	2.9	32	52	2.71	0.5
leaf (boiled)	92.9	57	2.4	819	29	2.9	0.8

Leafy greens

English: Grain amaranth
Local:

Scientific name: *Amaranthus caudatus*
Plant family: AMARANTHACEAE

Description: An annual plant which can be 2 m high and 45 cm across. The stems are angular and it can have a single stem or be branched. It is often limp in the upper parts. Plants are hairy at first but become smooth. Often they are tinged purple. Leaves are 2 - 4 cm long by 0.7 - 1.6 cm wide on a leaf stalk 0.5 - 1.5 cm long. Leaves can taper to a tip at the end. They can also thin towards the base. The veins are pale underneath. The flower clusters are in spikes on the side or top branches. The flowers are sometimes branched and can droop over. They can be 45 cm long. The fruit is oval. Seed are 1 - 1.3 mm across.

Distribution: A plant of tropical origin that can grow in warm temperate places. It cannot tolerate frost. Plants do best under high light, warm and dry conditions. They need a well drained soil. Some varieties can tolerate pH up to 8.5 and there is some salt tolerance. It can grow in arid places. It suits hardiness zones 8 - 11.

Use: The leaves and young plant are eaten cooked. They are also used in stir fries and added to soups. The seeds are ground into flour and used to make bread.
Caution: This plant can accumulate nitrates if grown with high nitrogen inorganic fertilisers and these are poisonous.

Cultivation: Plants can be grown from seed if the soil is warm. Seeds are small and grow easily. Cuttings of growing plants root easily. Amaranths are mostly grown from seeds. The seeds are collected from a mature dry seed head of an old plant. These dry flower stalks are stored and then the flowers rubbed between the hands over the garden site. Collecting the seeds is fairly easy by banging flower heads on a mat or piece of cloth then the rubbish can be blown out of this mixture by dropping it and blowing gently as it falls. The very small seeds of these plants are scattered over the ashes or fine soil in fertile ground. Some types are self sown.

Amaranthus seeds are very small. A thousand seeds weigh about 0.3 g. It is very difficult to sow such small seeds evenly over the ground. So there are a few different methods you can use to try and get the plants well spaced. One way is to mix the seeds with some sand and then when you sprinkle this along a row it will contain only a few seeds among the sand. The other way is to throw the seeds over a small plot of ground which will be a nursery. After 2 or 3 weeks the seedlings can be transplanted into the garden bed where they are to grow. If the seeds are just scattered over the garden, the small seedlings can be thinned out and either eaten or transplanted to a different spot. Seedlings are transplanted when about 5 - 7 cm tall. Plants can be harvested when small by thinning out and either transplanted or eaten cooked. Plants can be harvested whole or have top leaves harvested several times. Harvesting begins after 4 - 7 weeks and can continue over 2 months.

A spacing of about 8 cm x 8 cm is used if the plants are to be harvested by pulling up the whole plant. If the harvesting is to be done by picking off the top leaves, a wider spacing is normally used. When the tops are picked out 3 or 4 times over the life of the one plant, a spacing about 30 cm x 30 cm is used.

As far as producing a large amount of food is concerned, the spacing is not very important. Having between 200 and 1,000 plants per square metre gives about the same total amount of food. The

main thing that varies is the size of the leaves. Mostly people like larger leaves so a wider spacing of 8 cm to 10 cm for plants to be pulled out is suitable. For plants to be harvested by picking out the tops, they can be picked down to about 15 cm high. Picking lower makes the plant flower later, but it also recovers more slowly from picking.

Amaranths grow quickly. Seedlings come up above the ground in 3 - 5 days. They are 5 - 7 cm high and big enough for transplanting after about 20 days. The plants can be pulled out and used after 6 weeks. If they are harvested by picking out the tops, this can be started at 5 - 7 weeks and continued 3 or 4 times over the next 2 months.

Amaranths eventually stop producing leaves and grow flowers. Flowering occurs after about 3 months and seed can be collected about a month later. Amaranths are called day-length neutral plants because they still produce flowers at about the same stage, irrespective of whether there are many or few hours of daylight. Because flowering stops harvesting of leaves, it is a problem, but there does not seem to be any easy way of slowing down flowering. Flowering can be delayed a little by picking out the tops down to a lower level. Also it is made a little later if plants are grown in the shade. But lower picking and growing in the shade mean the plants produce less food, so there is no point. Plants need to be harvested and used when they are ready. If plants are left growing the amount of harvestable leaf gets less and the quality gets poorer.

Nitrogen deficiency shows as the oldest leaves near the bottom of the plant going yellow. This is because the plant needs more nitrogen to grow more new leaves at the top and there is not enough nitrogen in the soil for it to get it from there, so it reuses the nitrogen it used in the oldest leaves. These leaves therefore go yellow. Potassium deficiency shows as the edges of the oldest leaves going yellow. These shortages of nutrients could be corrected by adding some nitrogen or potash fertiliser but it is most likely too late for the current crop.

Production: Plants take 4 - 6 months from sowing to harvesting the seed, but up to 10 months in some Andean highland regions. Seed yields from 1 - 5 tonnes per hectare are common. Yields of up to one kilogram of edible leaves have been harvested by pulling out plants from an area of one square metre. The young leaves or whole plants are eaten cooked. If plants are picked 3 or 4 times over 6 - 8 weeks then two kilograms of edible leaves can be harvested. From a plant that grows so quickly and is such good quality food this is a very high production.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	6.0	1034	28.8	33	-	23.2	5.5
seed	-	-	13	-	-	-	-

Leafy greens

English: Broccoli
Local:

Scientific name: *Brassica oleracea var. italica*
Plant family: BRASSICACEAE

Description: A cabbage family plant with a thickened green or blue flower at the centre. The flower is often in several small heads. They are surrounded by broad leaves attached to a thick stalk.

Distribution: It is frost resistant. The ideal temperature is 20 - 25°C. It forms heads best with temperatures of 14 - 21°C. A soil pH of 5.0 - 6.0 is suitable. It suits hardiness zones 8 - 11.

Use: The central flower is cooked and eaten. The leaves are edible. The sprouted seeds are eaten.

Cultivation: It is normally grown from imported seed. The seeds are planted in a nursery then transplanted. They are transplanted after 4 - 6 weeks. A spacing of 60 cm x 60 cm is suitable.

Production: Plants are ready for harvest about 3 months after transplanting.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf (raw)	90.7	117	3.0	800	93.2	0.9	0.4
flower (raw)	89.0	96	3.3	150	110	1.5	0.6
flower (boiled)	89.9	78	3.1	150	34	1.0	0.4

Leafy greens

English: Bok/pak choi
Local:

Scientific name: *Brassica rapa* subsp. *chinensis*
Plant family: BRASSICACEAE

Description: A leafy cabbage grown as an annual. It grows 40 - 60 cm high. The taproot is not fleshy. The stem is short. The leaves are arranged in spirals. They are simple and broadly oval. They can be 30 cm long by 10 cm wide. The leaves form a rosette. They do not form a head. The leaf stalk is thickened. It forms a half cylinder in cross section and does not have wings. The leaf blade is entire and can have a wavy edge. Flowers are small and yellow with 4 petals. The fruit is a pod 3.5 cm long. The seeds are black and 2 mm long. Several different kinds occur.

Distribution: A plant of tropical origin. It suits cool seasons but will not tolerate frost.

Use: The stems and leaves are cooked, most often as a stir-fry, and consumed whole.

Cultivation: Plants are grown from seed and often transplanted. A spacing of 40 cm x 40 cm is suitable. Seeds are sown direct. They are sown 1 cm deep. They germinate in about 7 days with soil temperature of 21°C. Plants are thinned to about 20 cm between plants.

Production: The whole plant is harvested after 2 - 3 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
stem/leaf (raw)	95	55	1.5	223	45	0.8	0.2

Leafy greens

English: Bracken fern
Local:

Scientific name: *Pteridium esculentum*
Plant family: DENNSTAEDTIACEAE

Description: A fern. It grows 0.8 - 1.5 m tall. The frond is rigid and greatly divided. The leaflets are small and narrow. They are dark green and leathery. The edges of the leaves tends to turn under. There are long rhizomes (underground stems) covered with fine brown hairs. The spores are beneath the fronds. These are very small.

Distribution: It is a temperate plant. It does best in moist places. It suits hardiness zones 8 - 11.

Use: The young unfurled fonds are eaten as a vegetable. They should be soaked in water for 24 hours and dried before being cooked and eaten. The young underground rhizomes are also eaten. It is ground to a paste and can be mixed with wheat or barley flour.
Caution: Bracken has been linked with stomach cancer.

Cultivation: Bracken is not cultivated but harvested from forested shady areas.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
frond tip	80.9	205	6.4	-	-	0.8	1.8

Image sourced from http://www.anbg.gov.au/images/photo_cd/9J18G146043/065.html

Fruit

English: Apple
Local:

Scientific name: *Malus domestica*
Plant family: ROSEACAE

Description: A small to medium sized deciduous tree. It grows 5 - 10 m tall. It has a single trunk and branches freely. There can be long shoots and short spurs. Young stems and twigs have a covering. The leaves are oval and 4 - 13 cm long by 3 - 7 cm wide. They are rounded at the base. The edges have irregular teeth. The flowers are usually near the ends of branches on spurs. Several flowers occur together. There are 5 white to pink petals. The fruit is usually almost round and over 5 cm across. There are two brown seeds in each cell.

Distribution: It requires mild temperatures throughout the year and in the range 16 - 27°C during the growing season. A rainfall of 1,600 – 3,200 mm and a relative humidity of 75 - 85% is best. The growing season should have good sunlight while the off season should be overcaste and cool. Most apple varieties require 1,000 hours of chilling at temperatures below 7°C during the dormant season. Low chilling varities occur. It suits hardiness zones 3 - 9.

Use: The fruit are eaten fresh. They are also cooked and used to make juice. The fruit can be sliced and dried.
Caution: Apples seeds contain amygdalin a cyanogenic glucoside.

Cultivation: Plants are grown by seed and by grafting. To produce consistent fruiting, branches are bent horizontal and tied down. Sometimes leaves are picked off. Apples are normally produced by budding using shoots of good clones. The dormancy of seeds is broken by putting them in a freezer for 30 - 150 days.

Production: The fruit ripen 3.5 - 5 months after flowering. Fruit thinning is sometimes necessary to manage fruit size.

Food Value: Per 100 g edible portion

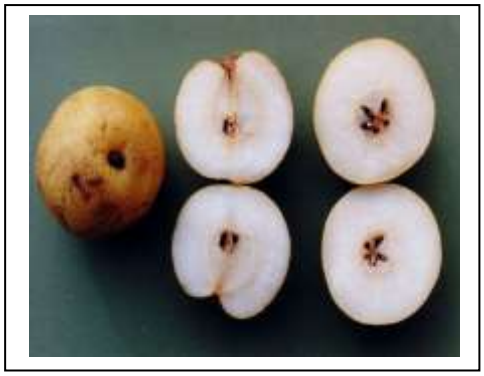
Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	85	235	0.3	-	10	-	-

Fruit

English: Asian pear
Local:

Scientific name: *Pyrus pyrifolia*
Plant family: ROSEACAE

Description: A medium sized tree. It grows 15 m high and spreads 9 m wide. The leaves are oblong and have teeth along the edge. The leaves turn orange and bronze in the autumn. The flowers are small and white. They appear almost the same time as the leaves. The fruit is round and the size of an apple. The skin is thin. They can be green, yellow or bronze. They have a gritty texture. Some forms have larger, softer fruit. These cultivated forms may be crosses between *Pyrus pyrifolia* and *Pyrus ussuriensis*. These are oval and yellow with a crisp texture.



Distribution: It needs 300 - 800 hours of cold below 7°C each year. They are hardy to frost. They will grow on most soils. It suits hardiness zones 4 - 9.

Use: The fruit are eaten raw. They are also poached, baked or coated with honey. They are canned and processed into fruit nectar and preserves.

Cultivation: Plants are grown by grafting. Plants can be grown from seed.

Production: Trees bear in 3 - 4 years.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	88.3	176	0.5	-	3.8	-	-

Fruit

English: Hardy kiwi
Local:

Scientific name: *Actinidia arguta*
Plant family: ACTINIDIACEAE

Description: A vine up to 15 - 20 m long. It loses its leaves during the year. Leaves are elongated or heart-shaped and 5 - 13 cm long. They are light green and have toothed edges. They are attached to the stem by red petioles. The leaves turn rich golden colour in autumn. The fruit are green and 2 - 3 cm long. The skin is green. It has few hairs. Male and female plants are borne on separate plants. Both are needed for fruit production. Flowers are about 1 cm across. Fruit are dull green and lime-green flesh. They are edible.

Distribution: A temperate plant. It needs 150 frost free days. During the dormant period it can withstand heavy frosts. All selections need a chilling requirement to flower and fruit. They prefer a sunny position. It needs protection from strong winds. They need a well drained somewhat acid (pH 5 - 6.5) soil. The plants will not tolerate salty soils. They need plenty of water during the growing season. It occurs naturally climbing up trees in woodland at elevations of 100 – 2,000 metres in China and Japan. It suits hardiness zones 4 - 9.

Use: The sap of the vine can be tapped and drunk in the spring. The fruit are eaten raw or cooked. The dried leaves are used for seasoning vegetable dishes.

Cultivation: The plants need a trellis to climb over. Plants benefit from being well mulched but mulch should not touch the vine. Winter pruning is important. Cuttings can be used. Soft wood cuttings are used.

Production: Fruit are produced on second year wood and on fruit spurs on older wood. Plants produce fruit after 4 years on grafted vines.

Food Value: Per 100 g edible portion[1]

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
Fruit		322	1.2		93		

1. H W Johnston, Pers Comm

Fruit

English: Korean mulberry
Local:

Scientific name: *Morus australis*
Plant family: MORACEAE

Description: A shrub. It grows 3 - 6 m tall. It loses its leaves during the year. The bark is greyish brown. The winter buds are large. In cultivation plants are 1 - 2 m high. The leaves have stalks. The stalks are 1 - 1.5 cm long. The leaves are oval to sword shaped. They taper to the tip. They are 5 - 14 cm long by 3.5 - 12 cm wide. They have 3 - 5 lobes. There are teeth around the edge. Flowers are of one sex. They are yellow. The fruit are red but turn almost black near maturity. They are about 1 cm across. Some varieties are described which vary on the shape of the leaves.

Distribution: It is native to temperate SE Asia. In China it grows in limestone areas and near the edges of forests on mountain slopes between 500 – 2,000 m altitude.

Use: The ripe fruit are eaten fresh. They are also used for wine.

Cultivation: Plants can be grown from seed or root offshoots.

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	-	-	-	-	-	-	-

Image sourced from http://www.eol.org/pages/2872508/media

Fruit

English: Chinese haw
Local:

Scientific name: *Crateagus pinnatifida*
Plant family: ROSACEAE

Description: A small tree. It grows 6 m high and spreads 6 m wide. The leaves are bright green and have lobes. There can be 9 lobes and they have teeth. The leaves are pale green underneath and they turn yellow in autumn. The flowers are white. The fruit occur in clusters and are bright red. There are several named cultivated varieties.

Distribution: It grows in temperate regions. It will grow in most soils. It needs an open sunny position. It is resistant to drought and frost. It suits hardiness zones 6 - 9.

Use: The fruit are cooked and made into jellies, drinks and candied. The fruit are toffee coated and sold threaded in slivers of bamboo. Fruit are used for wine.

Cultivation: Plants can be grown from seed. The seed need cold treatment. Plants can also be grafted. This is used where varieties selected for their fruit are used.

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	73.9	385	0.4	-	-	2.1	-

Image sourced from http://www.henriettesherbal.com

Fruit

English: Jujube
Local:

Scientific name: *Ziziphus jujuba*
Plant family: RHAMNACEAE

Description: A small deciduous tree that can grow to 13 m tall. It has drooping branches with thorns on the branches. The plant sends up thorny suckers often at a distance from the tree. These need to be cut off. The leaves are small and oval. They are 2 - 5 cm long and bright shiny green. The leaves turn bright yellow before falling. During the growing season, each node of a woody branch produces one to 10 small branches. These fall off later. The flowers are small and 0.5 cm across. They are white to green and produced in large numbers in the angles of leaves. The fruit are round of long and vary from cherry to plum size. They are 2 - 3 cm long. They have a single hard stone with two seeds. The fruit changes from green to yellow with red spots as it ripens. When fully red and ripe it softens and wrinkles. There are many named varieties.

Distribution: A plant of subtropical origin. It can stand high temperatures in summer then due to winter dormancy can tolerate very cold temperatures. It only requires a small winter chill to enable it to fruit. They do best in warm sunny positions. They cannot grow in shade. They do best in sandy well drained soils. They can grow in soils with high salinity or alkalinity. It can tolerate drought but fruits best with adequate rainfall. It suits hardiness zones 7 - 10.

Use: The fruit are eaten fresh, dried or preserved in sugar. They can be stewed, baked, pickled, or used in puddings, cakes, breads, jellies, soups and sweetmeats. The ripe fruit are powdered and cooked with millet or rice. The kernels are edible.

Cultivation: Plants can be grown from seed but these do not breed true. Grafting, budding or cuttings can be used. Root suckers can be used. Although cross pollination is not required for fruit production it is needed for producing viable seed. A spacing of 3 - 4 m is suitable.

Production: Fruit are produced 4 - 5 years after planting. Fruit do not ripen at the same time so fruit can be picked from the one tree over several weeks. Fruit need to be picked when ripe. Ripe fruit can be stored at room temperature for about one week. Tree dried fruit stores for a long time.

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 (dried)	19.7	1201	3.7	-	13	1.8	0.2
fruit (raw)	77.9	331	1.2	2	69	0.5	0.05

Fruit

English: European red raspberry
Local:

Scientific name: *Rubus idaeus*
Plant family: ROSACEAE

Description: A small cane-like shrub. It grows 1.5 - 2 m tall. The branches are red or brown. They have a few prickles. The leaves are often divided into 5 - 7 leaflets. The flowers are white. They can be in the axils of leaves or at the ends of branches. The fruit are red or orange and half round. They are 1 - 1.4 cm across. There are many named varieties.

Distribution: It is a cold temperate climate plant. It needs deep well drained soil. The soil should be rich in humus. It needs shelter from wind and can grow in part shade. A mild summer and cool to cold winter is best. It needs about 600 hours of cold below 7°C each year. It suits hardiness zones 3 - 9.

Use: The fruit are eaten raw. They are also used in jams, drinks and for sweets. Young leaves can be cooked and eaten as a vegetable. Dried leaves are used as a substitute for tea.

Cultivation: Rooted cuttings are used. Soft wood cuttings can be used. Fruit are usually produced on one year old canes. After harvesting the fruit bearing canes are cut at ground level and removed.

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 (stewed)	94.6	110	0.9	85	23	1.3	-
fruit (raw)	83.2	105	0.9	80	25	1.2	0.5

Fruit

English: European gooseberry
Local:

Scientific name: *Ribes uva-crispa*
Plant family: **GROSSULARIACEAE**

Description: A small thorny shrub that loses its leaves during the year. It grows 1 - 2 m tall and spreads 1 m wide. The leaves are small and heart shaped with 3 - 5 lobes and teeth along the edges. The flowers are green. The fruit has a tough skin covered with spiky hairs. The fruit can be green or red.

Distribution: It is a temperate plant that grows on many different soil types. It can tolerate frost and fruits well in cooler climates. They do well in medium to heavy well-drained soils. It suits hardiness zones 5 - 9.

Use: The fruit can be eaten raw, stewed or made into jam. The unripe fruit are often used for pies and tarts.

Cultivation: They can be grown from seed but are best grown from cuttings.
Caution: Gooseberries are an alternate host for the fungal pathogen causing white pine blister rust and thus these plants should not be grown in close proximity to pine plantations in areas where the pathogen occurs.

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 (ripe)	83.7	157	0.6	180	40	0.6	0.1
fruit (green raw)	89.9	73	1.1	180	40	0.3	0.1
fruit (green stewed)	91.4	62	0.9	150	31	0.3	0.1

Fruit

English: European black currant
Local:

Scientific name: *Ribes nigrum*
Plant family: **GROSSULARIACEAE**

Description: A small shrub. It grows 2 m high and spreads 1.8 m wide. It loses its leaves during the year. It grows as a group of canes. The young stems are downy. The leaves have 3 - 5 lobes. These are downy underneath. The flowers are yellow-green with red centres. They hang down and are downy. The fruit hang in loose bunches.

Distribution: It needs a cool temperate climate. It can stand moderate frosts. It requires constant moisture. It suits hardiness zones 5 - 9.

Use: Fruit are used for jam and drinks. They can also be used in sauces and pies. The buds are used for flavouring. The fresh leaves are eaten in soups. They are also used as a spice in sauerkraut. The fruit are used to make wine. The flowers are used in ice cream and liqueurs. The seeds are the source of high omega-6 oil used in salad dressings. It is mostly used as a food supplement.

Cultivation: Plants are easily grown from cuttings of 2 year old canes. The 3 year old canes are cut off at two buds above soil level.

Production: Plants fruit 2 years 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
fruit	77.4	121	0.9	200	200	1.3	0.3
fruit (stewed)	80.7	103	0.8	170	150	1.1	-

Fruit

English: Goji berries
Local:

Scientific name: *Lycium barbarum*
Plant family: SOLANACEAE

Description: A deciduous, woody perennial shrub/vine. It can be erect or spreading. It grows 3 m high. The branches are weak and arching. The side branches end in short leafless spines. It forms suckers freely. The leaves are oval and grey-green. They are 2 - 5 cm long and 1 cm wide. The flowers are lilac-purple and shaped like tubes. They are in clusters of 1 - 4. The fruit are oval and orange red berries. These are 25 mm across.

Distribution: It grows best in full sun. It can with stand cold temperatures. It can also tolerate hot summers. It can grow on a wide range of soils. It cannot tolerate water-logging. It suits hardiness zones 6 - 10.

Use: The dried red fruit are eaten in soups and stew. The leaves and fruit are used for making tea. The fruit can be eaten fresh or dried for later use. They are used for juice, jams, pies, desserts and sauces.

Cultivation: The can be grown from seed. Plants can also be grown from young shoot cuttings. The stems can be pegged down and roots allowed to form by layering. These can then be separated and planted. Plants should be spaced 1 m apart.

Production: It is fast growing. Plants start fruiting in the second year. Plants live for 5 - 10 years.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit (raw)[1]	-	467	3.6	1518[2]	43	7.7	-

Notes:
1. http://caloriecount.about.com/calories-eatraw-tibetan-goji-berries-i119927
2. 8500 IU, based on conversion factor of 0.05 for beta-carotene (http://ods.od.nih.gov/factsheets/VitaminA-HealthProfessional/)

Fruit

English: Sea buckthorn
Local:

Scientific name: *Hippophae rhamnoides*
Plant family: ELAEAGNACEAE

Description: A shrub or small tree which loses its leaves. It grows to 6 m high. It has a bushy arching habit. The twigs often become thorns. The leaves are alternate and without teeth. The leaves are very narrow and grey-green. They are paler underneath. They are 7.5 cm long. They have short stalks and droop from spiny twigs. Male and female flowers grow on separate bushes. The flowers are small and yellow or green. They grow in clusters. They appear before the leaves. The fruit are bright orange berries. They occur in dense clusters on the shoots of female plants. Both male and female plants must be grown together to get fruit. The fruit are edible.

Distribution: It is a temperate plant that is native to Asia and Europe. It grows near the coast and along riverbanks and in sandy woods. A cool climate plant. They are salt resistant. It needs plenty of light. It grows by the sea. It can tolerate drought. It can grow up to 3,300 – 4,000m, above sea level, in some regions. It suits hardiness zones 2 - 9.

Use: The fruit are made into preserves and pickles. They are acid tasting. They are also eaten with milk and cheese or made into sauces, jams, marmalade, syrup and jelly. They are also eaten raw.

Cultivation: They can be grown from seed or cuttings. It forms suckers and can spread by these. One male plant is put to every 6 female 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	-	372	1.4	-	-	-	-

Image sourced from http://www.en.wikipedia.org/wiki/Hippophae

Vegetables

English: Carrot
Local:

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

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

Distribution: A temperate plant. Carrots are frost resistant. It needs a deep loose soil. Seed germinate well in the temperature range 7 - 24°C. Plants grow well with a temperature about 15°C. It grows best with a pH of 6 - 7. It suits hardiness zones 3 - 9.

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

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

Food Value: Per 100 g edible portion

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

Vegetables

English: Cucumber
Local:

Scientific name: *Cucumis sativus*
Plant family: CUCURBITACEAE

Description: A hairy annual climber with tendrils and yellow flowers. It grows to 0.5 m high and spreads to 2 m wide. The stem is trailing and has bristles. The leaves are heart-shaped and the lobes taper. Leaf-shape varies with different varieties. The tendrils are not branched. The flowers are yellow and funnel-shaped. They occur in clusters in the axils of leaves. Male and female flowers are separate, but on the same plant. Male flowers are normally in groups of 2 - 3 and develop first, and female flowers are borne singly and open later. Fruit are long and often have a slightly lumpy skin. The flesh inside is greenish-white. The fruit are edible and contain many seeds. Fruit 20 - 100 cm long are called cucumbers, and fruit which are much smaller and darker green are called gherkins.

Distribution: Protection from wind is needed. It is killed by frost. It suits hardiness zones 9 - 11.

Use: Unripe fruit are usually eaten raw. Young stem tops, leaves and the kernels of the seeds are edible. Cucumbers are normally eaten fresh, while gherkins are pickled in vinegar. It is a popular vegetable.

Cultivation: Batches of 2 - 3 seeds are normally sown together in new gardens during the dry season. A spacing of 1 m apart per plant is suitable.

Production: Harvesting can commence 6 - 8 weeks after sowing. Up to 10 fruit per plant can be produced.

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	96.4	43	0.6		8	0.3	0.1

Vegetables

English: Pumpkin
Local:

Scientific name: *Cucurbita pepo*
Plant family: CUCURBITACEAE

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

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

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

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

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

Food Value: Per 100 g edible portion

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

Vegetables

English: Turnip
Local:

Scientific name: *Brassica rapa*
Plant family: BRASSICACEAE

Description: A cabbage family herb. It is an erect annual plant. It has a round white fleshed taproot. It is often tinged purple. The leaves are divided and have hairs. Where the leaves join the root it is not raised into a "neck". These will produce seed in warmer places. The wild form is a thin plant with leaves that clasp the stem. The pods are 4 - 6.5 cm long and have seedless beaks 2 - 3.2 cm long.

Distribution: It is frost resistant. A temperature of 9 - 16°C is best. Also short daylength and cool weather are important. It suits hardiness zones 9 - 11.

Use: The swollen root is cooked and eaten. The leaves can be eaten. The seeds can be ground to a powder and used as a seasoning.

Cultivation: It is grown from imported seed. In the lowlands they are best grown in the shade. Plants are spaced 10 - 15 cm apart. This can be achieved by thinning out plants.

Production: The roots are ready after 8 - 10 weeks. They need to be harvested when young to avoid becoming hard and fibrous.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	90	117	3	46	139	1.9	-
root	90	113	0.9	-	21	0.3	-

Image sourced from http://en.wikipedia.org/wiki/Turnip

Vegetables

English: Winter squash
Local:

Scientific name: *Cucurbita maxima*
Plant family: CUCURBITACEAE

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

Distribution: They need a fertile soil. *C. moschata* is better suited to coastal areas. They are frost sensitive but better suited to cooler areas than *C. moschata.* It can grow in arid places. It suits hardiness zones 8 - 11.

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

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

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

Food Value: Per 100 g edible portion

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

Vegetables

English: Eggplant
Local:

Scientific name: *Solanum melongena*
Plant family: SOLANACEAE

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

Distribution: A plant of tropical origin. It suits wet climates but does well in dry climates with irrigation. It needs a long warm growing period. A daily mean temperature of 20 - 30°C is most suitable. They are frost tender. They need a rich, friable, well tilled soil.

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

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

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

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	91.8	117	0.83	6	1.3	0.4	0.2
fruit (fresh)	93.4	62	0.7	50	5	0.4	0.3

Vegetables

English: Tomato
Local:

Scientific name: *Lycopersicon esculentum*
Plant family: SOLANACEAE

Description: A short-lived, perennial plant. It is upright, but has weak stems. It can grow to 2 m tall with support for the stems. The stems have long hairs. It has a strong smell. The leaves are deeply lobed with an odd number of leaflets. They have irregular teeth around the edge. There are up to 12, star-shaped flowers on each raceme (flower cluster). Flowers are yellow. The fruit are round and red when ripe. Yellow coloured fruit also occur. There are many varieties.

Distribution: It is grown in most warm, temperate countries. It needs to be grown in fertile soil. A soil pH of 6.0 - 7.9 is best. For best production, it requires much water, plenty of sunshine and low night temperatures. For germination, it does best between 20 - 30°C. It is frost-susceptible and suits hardiness zones 9 - 12.

Use: The fruit are eaten raw or cooked.
Caution: Leaves and green fruit are poisonous.

Cultivation: Plants are sown from seeds. These are normally sown in a nursery and transplanted. They are transplanted when 40 - 45 days old or 15 cm high. They are spaced about 60 - 90 cm apart. Seeds can also be sown directly in the field. They can also be grown from cuttings. The side branches of upright types are removed to give fewer and larger fruit. Upright plant types need to be tied to stakes. Plants are often grafted into stronger rootstocks.

Production: Harvesting commences after about 14 weeks. Yields can be 3 - 4 kg of fruit per plant.

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	93.0	88	1.0	45	26	0.6	0.1

Vegetables

English: Spring onion
Local:

Scientific name: *Allium fistulosum*
Plant family: AMARYLLIDACEAE

Description: An onion family plant with an indistinct bulb. It grows to 60 cm high and 20 cm wide and has fibrous side roots. They grow in large clumps. The leaves are rounded in cross section and hollow. They grow 15 - 30 cm long by 5 - 20 mm wide. The bulbs are very small, 4 - 8 cm long but only 5 - 25 mm across. The plant produces many side buds which develop as offshoots. Flowers grow on a stalk which comes from underground and there are many flowers on stalks around one head. This hollow stalk is 40 - 80 cm long. The flowers are yellow and they open from the top of the flower head downwards. There can sometimes be bulbils on the flower head.

Distribution: A temperate plant that prefers a sunny position and a light, well drained soil. It prefers a soil pH in the range 6.5 - 7.5, but it tolerates a pH in the range 4.9 - 7.5. A hardy plant which produces leaves throughout the winter. They are also tolerant of high temperatures but temperatures above 25°C reduce production.

Use: The bulbs and leaves are eaten raw or cooked. The flowers are used raw to flavour salads.

Cultivation: It can be grown from seed or division of the bulbs. Bulbs should be planted fairly deeply. These multiply, producing more bulbs. Seedlings are transplanted when 10 cm high. A spacing of 7 - 10 cm is suitable. In China, soil is heaped up around the bulb to make it elongated.

Production: Plants are ready for harvest 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
leaf (raw)	90.1	147	1.9	328	19	1.5	0.4

Vegetables

English: Bulb onion
Local:

Scientific name: *Allium cepa var cepa*
Plant family: AMARYLLIDACEAE

Description: An onion family plant with a two year life cycle. Normally it develops fattened bulbs at the base. It has a shallow fibrous root system. The actual stem in very short and condensed. Leaves are produced in an alternate fashion one after the other from the top of this stem. Successive leaves grow up inside, then burst through the leaf sheath of the previous leaf. Leaves are thin and long. They are slightly to markedly flattened on the upper surface. Long day lengths and warm temperatures help the leaf bases become swollen and store food reserves. Flowers are greenish white in colour. Flowers develop on a rounded head with stalks all coming from the centre. Flowers in the rounded head open irregularly. There are no bulbils on the flower-head.

Distribution: A temperate plant that grows best at temperatures of 12 - 21°C. The bulb forms best at 15 - 25°C. It grows best with a pH 5.7 - 6.6. It suits hardiness zones 5 - 10.

Use: The bulbs and leaves are used as flavouring raw or cooked, or the bulbs eaten whole.

Cultivation: They are grown from imported seed. Bulbing is normally better in cooler climates. Cultivars which form flowers early need to be avoided. Seedlings can be transplanted.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
bulb(boiled)	96.6	53	0.6	-	6	0.3	0.1
bulb (raw)	92.8	99	0.9	-	-	0.3	0.1
leaf	90	-	1.4	49	-	0.5	0.5

Vegetables

English: Shallot
Local:

Scientific name: *Allium cepa var. aggregatum*
Plant family: AMARYLLIDACEAE

Description: These onion like plants produce a cluster of narrow, oval bulbs. The plant grows to 1.2 m tall. The leaves are round and hollow. This is a genuinely perennial form of *Allium cepa*. The bulb grows deeper in the soil and divides to produce a number of underground bulbs each year in much the same way as shallots. Large bulbs divide to form 5 - 15 bulbs whilst smaller bulbs grow into one large bulb. They do not produce bulbils in the flower-head.

Distribution: A temperate plant that does best in cooler, higher places. They need a fertile well drained soil. They are frost resistant. They tolerate a soil pH of 4.5 - 8.3 and suit hardiness zones 5 - 10.

Use: The bulbs are eaten raw or cooked. The leaves are eaten raw or cooked. The flowers are used raw or to flavour salads.

Cultivation: Normally plants are grown by planting one bulb. It is best to plant them on slightly raised beds. Plants should be about 20 cm apart.

Production:

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
bulb	81	281	1.9	-	2	0.8	-
leaf	91.0	126	1.8	945	19	3.7	-

Vegetables

English: Capsicum
Local:

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

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

Distribution: Soils need to be well drained and fertile. The fruit and plants can rot in the middle of the wettest seasons. They need a temperature above 4°C and do not tolerate frost. A night temperature of 16 - 18°C and a day temperature of 26 - 28°C is best. A soil pH of 5.4 - 6.9 is suitable. They suit plant hardiness zones 8 - 12.

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

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

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

Food Value: Per 100 g edible portion

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

Vegetables

English: Brussels sprouts
Local:

Scientific name: *Brassica oleracea var gemmifera*
Plant family: BRASSICACEAE

Description: A cabbage family plant. It has a single stem with small sprouts of compact leaves up the stem. It grows up to about 1 m high. The leaves are stalked and the edges are wavy. They are slightly lobed. The flowers are yellowish.

Distribution: It suits places with cool nights. It is frost tolerant. It grows in areas with temperatures between 14 - 26°C. It needs a pH between 6 - 6.9. It suits hardiness zones 8 - 11.

Use: The sprouts are cooked and eaten. The leafy tops can also be eaten.

Cultivation: It is normally grown from imported seed. Seedlings are transplanted after 5 or 6 weeks. The spacing needs to be about 60 cm x 60 cm.

Production: The sprouts can be harvested about 4 months after transplanting.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
bud (boiled)	91.5	175	2.8	72	40	1.2	0.4
bud (raw)	88.1	111	4.0	400	90	0.7	0.2

Vegetables

English: Jerusalem artichoke
Local:

Scientific name: *Helianthus tuberosus*
Plant family: ASTERACEAE

Description: An upright perennial plant up to 1 - 2 m high and a spread of 1 m. The stem is erect and unbranched. The leaves are dull green and sword shaped. The flowers are yellow and daisy like. It produces fleshy underground stem tubers of irregular shape. The skin of these tubers is very thin and often coloured yellow or red. The flesh is white. Tubers can be 10 cm long and 6 cm wide. There are several cultivated varieties.

Distribution: A temperate plant. Plants grow best when the temperature is 18 - 26°C and frost free. It needs light to medium well drained soils. Plants should be grown in an open sunny position. It is drought and frost resistant. It suits hardiness zones 7 - 9.

Use: The tubers are eaten boiled or baked. They can be steamed, fried, pickled, pureed, or used in soups and casseroles. They can be eaten raw in salads. (They are suitable for people with diabetes.) Roasted tubers are used as a coffee substitute.

Cultivation Plants are grown from vegetative setts. These can be dormant for 7 months before they will grow. The flowers on the plants are removed to increase the yield. Plants can be grown from seed. Tubers are often sweetest after a frost.

Production: Harvesting can start after 3 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
tuber	79.0	281	2.0	-	4	0.4	-

Nuts, seeds, herbs and other foods

English: Chinese cork oak
Local:

Scientific name: *Quercus variablis*
Plant family: FAGACEAE

Description: A large deciduous tree. It grows 15 - 25 m tall. The trunk can be 50 - 60 cm across or larger. The leaf stalk is 1 - 3 cm long. The leaf blade is oval or sword shaped and 8 - 15 cm long by 2 - 6 cm wide. The base is rounded and there are teeth along the edge. It tapers to the tip. There are 13 - 18 secondary veins on each side of the main vein. The cup encloses about 2/3 of the nut. The fruit is a nut 1.6 - 1.9 cm long by 1.3 - 1.5 cm wide.

Distribution: It is native to China, Japan and Korea. It grows in areas with a temperature range of 15.9 - 18.5°C and rainfall 1,400 - 1,500 mm per year. It can grow on a range of soils with pH from 4 - 8. It does best on fertile well drained soils. In China it grows in evergreen and deciduous forest below 3,000 m altitude. It suits hardiness zone 5.

Use: The seed is edible. The nuts are ground and used to make soy sauce and also for preparing cold pudding. Roasted acorns can be used as acoffee substitute.[1]

Production: Trees do not fruit well every year. Fruit occur most on trees 40 - 100 years old.

Food Value: Per 100 g edible portion[1]

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
nut	2	-	4	-	-	0.3	0.2

Image sourced from: www.terrain.net.nz

1. H W Johnston, Pers comm

Nuts, seeds, herbs and other foods

English: Korean nut pine
Local:

Scientific name: *Pinus koraiensis*
Plant family: PINACEAE

Description: A tree. It grows to 50 m tall. The trunk is 1 m across. The bark is grey-brown. It is cracked along its length into irregular plates. The young branches are red-brown. There are 5 needles per bundle. They are dark green and straight. They are triangle shape in cross section. They are 6 - 12 cm long. The seed cones can occur singly or as several clustered together near the end of a first year branch. They are erect and have a stalk 1 - 1.5 cm long. The cone is oval to oblong and 9 - 14 cm long by 6 - 8 cm wide. The seeds are exposed but not shed at maturity. The seeds are oval or triangle shaped and 1.2 - 1.6 cm across. They do not have wings.

Distribution: It is a temperate plant. It grows in the mountains in N China between 200 – 1,800 m altitude. It grows naturally in river valleys and on low mountain slopes. It is very hardy. It suits hardiness zones 3 - 9.

Use: The seeds are eaten raw or roasted. They are used in candies, sweet cakes, rice desserts, and savoury dishes. The pollen is used in cookies. The green cones are used for making wine. The seeds are finely ground and the powder sprinkled on food.

Cultivation: Grown from seed germinated in a nursery and then planted out.[1]

Production: It is fast growing.

Food Value: Per 100 g edible portion[1]

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
nut (dry)	2.0	2815	13.7	-	0.8	5.5	6.4

1. H W Johnston, Pers comm

Nuts, seeds, herbs and other foods

English: Chinese chestnut
Local:

Scientific name: *Castanea mollissima*
Plant family: FAGACEAE

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

Distribution: It is native to China. It can grow on waste land, stony soil and acidic or limestone soils. In China it grows from near sea level to about 2,800 m altitude. It suits hardiness zones 5 - 9.

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

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

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

Food Value: Per 100 g edible portion

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

Image sourced from: www.dendrome.ucdavis.edu

Nuts, seeds, herbs and other foods

English: Siberian walnut
Local:

Scientific name: *Jugulans mandshurica*
Plant family: JUGULANDACEAE

Description: A shrub or tree. It can grow to 25 m tall. The leaves are 40 - 90 cm long. The leaf stalk is 5 - 23 cm long. There are 9 - 19 leaflets. They are 6 - 17 cm long by 2 -7 .5 cm wide. The male spike is 9 - 40 cm long. The female spike has 8 - 10 nuts. The nuts are round or oval and 3 - 7.5 cm long by 3 - 5 cm wide. The husk has dense glands or hairs. The shell is thick and rough. There are 6 - 8 prominent ridges. The fruit are in clusters of 6 - 10.

Distribution: It is a cold temperate plant. It grows in mixed forests on mountain slopes or in valleys between 500 – 2,800 m altitude in China. It suits hardiness zones 4 - 9. It will grow in very cold climates.

Use: The seeds are eaten raw or roasted. The seeds yield an edible oil.

Cultivation: Grown from seed and is realitively fast growing [1]

Food Value: Per 100 g edible portion[1]

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed (dry)	5	2700	17	-	-	3.4	3.6

1. H W Johnston, Pers comm

Nuts, seeds, herbs and other foods

English: Meadow mushroom
Local:

Scientific name: *Agaricus bisporus*
Plant family: AGARICACEAE

Description: A mushroom.

Distribution: It grows in most temperate regions.

Use: The fruiting bodies are eaten. They are used in salads, sauces, stews, and gravies. They are sauteed, stuffed, marinated and fried.

Cultivation: This mushroom is usually produced on compost in a darkened environment.

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	91.5	53	1.8	30	3	1.0	1.0

Nuts, seeds, herbs and other foods

English: Shitake mushroom
Local:

Scientific name: *Lentinus edodes*
Plant family: POLYPORACEAE

Description: A mushroom. An earthy smelling fungus. The caps are golden to deep brown. They have a slight bloom and creamy gills.

Distribution: It grows in many temperate regions. It grows on and rots wood.

Use: The fresh stems can be eaten but older ones are tough. The mushroom is boiled or cooked and eaten. It is often eaten with other vegetables. It can be dried and stored. The flavour is better once dried. It can be added to soups, fried, boiled or oil-roasted. It is used in omelettes, sauces, gravies, pasta dishes and it is used in *sushi* in Japan.

Cultivation: Grown on logs or packed sawdust.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
mushroom (dried)	83.5	230	1.6	-	0.3	0.4	1.3

Nutritional information sourced from:
http://ndb.nal.usda.gov/ndb/foods/show/3051?qlookup=11268&format=Full&max=25&man=&lfacet=&new=1

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
Actinidiaceae	*Actinidia arguta*	Hardy kiwi	fruit	-	322	1.2	-	93	-	-	38
Agaricaceae	*Agaricus bisporus*	Meadow mushroom	flesh	91.5	53	1.8	30	3	1.0	1.0	64
Amaranthaceae	*Spinacia oleracea*	Spinach	leaf (boiled)	92.9	57	2.4	819	29	2.9	0.8	30
Amaranthaceae	*Amaranthus caudatus*	Grain amaranth	leaf	6.0	1034	28.8	33	-	23.2	5.5	31
Amaryllidaceae	*Allium fistulosum*	Spring onion	leaf (raw)	90.1	147	1.9	328	19	1.5	0.4	54
Amaryllidaceae	*Allium cepa var cepa*	Bulb onion	bulb(boiled)	96.6	53	0.6	-	6	0.3	0.1	55
Amaryllidaceae	*Allium cepa var aggregatum*	Shallots	bulb	81	281	1.9	-	2	0.8	-	56
Apiaceae	*Daucus carota* subsp. *sativus*	Carrot	root (raw)	89.9	180	1.0	835	6	0.6	0.4	47
Asteraceae	*Helianthus tuberosus*	Jerusalem artichoke	tuber	79.0	281	2.0	-	4	0.4	-	59
Brassicaceae	*Brassica oleracea* var. *capitata*	Cabbage	leaf	93.6	92	1.0	6.6	20	0.2	0.1	28
Brassicaceae	*Brassica oleracea var. alboglabra*	Chinese broccoli	flower (cooked)	93.5	92	1.1	164	28.2	0.6	0.4	29
Brassicaceae	*Brassica oleracea var. italica*	Broccoli	flower (boiled)	89.9	78	3.1	150	34	1.0	0.4	33
Brassicaceae	*Brassica rapa* subsp. *chinensis*	Pak choi	stem/leaf (raw)	95	55	1.5	223	45	0.8	0.2	34
Brassicaceae	*Brassica rapa*	Turnip	root	90	113	0.9	-	21	0.3	-	50
Brassicaceae	*Brassica oleracea var gemmifera*	Brussels sprouts	bud (boiled)	91.5	175	2.8	72	40	1.2	0.4	58
Convolvulaceae	*Ipomoea batatas*	Sweet potato	tuber (baked)	72.9	431	1.7	961	24.6	0.5	0.3	16
Cucurbitaceae	*Cucumis sativus*	Cucumber	fruit	96.4	43	0.6	-	8	0.3	0.1	48
Cucurbitaceae	*Cucurbita pepo*	Pumpkin	fruit	91.3	102	1.1	-	12	0.8	0.2	49
Cucurbitaceae	*Cucurbita maxima*	Winter squash	seed (dry)	6.9	2264	24.5	38	1.9	14.9	7.5	51
Dennstaedtiaceae	*Pteridium esculentum*	Bracken fern	frond tip	80.9	205	6.4	-	-	0.8	1.8	35
Elaeagnaceae	*Hippophae rhamnoides*	Sea buckthorn	fruit	-	372	1.4	-	-	-	-	46
Fabaceae	*Glycine max*	Soybean	seed	9.0	1701	33.7	55	-	6.1	-	20
Fabaceae	*Vigna angularis*	Adzuki bean	seed (dry)	10.8	1780	19.9	-	-	9.8	-	21
Fabaceae	*Vigna radiata*	Mung bean	seed (cooked)	-	439	7.0	2.4	1.0	1.4	-	22
Fabaceae	*Lablab purpureus*	Lablab bean	seed (dry)	10.0	1428	22.8	-	-	9.0	-	23
Fabaceae	*Canavalia gladiata*	Sword bean	seed	15.0	1335	27.1	-	-	-	-	24
Fabaceae	*Vigna unguiculata subsp. unguiculata*	Cowpea	seed (dry)	11.2	1189	23.5	-	1.5	6.4	-	25
Fabaceae	*Phaseolus vulgaris*	Common bean	pod	88.0	151	2.5	750	27	1.4	0.2	26
Fabaceae	*Cajanus cajan*	Pigeon pea	seed (young, boiled)	71.8	464	6.0	2	28.1	1.6	0.8	27
Fagaceae	*Quercus variablis*	Chinese cork oak	nut	2	-	4	-	-	0.3	0.2	60
Fagaceae	*Castanea mollissima*	Chinese chestnut	nut	44	937	4.2	20	36	1.4	0.9	62
Grossulariaceae	*Ribes uva-crispa*	European gooseberry	fruit (ripe)	83.7	157	0.6	180	40	0.6	0.1	43
Grossulariaceae	*Ribes nigrum*	European black currant	fruit	77.4	121	0.9	200	200	1.3	0.3	44
Jugulandaceae	*Jugulans mandshurica*	Siberian walnut	seed (dry)	5	2700	17	-	-	3.4	3.6	63
Moraceae	*Morus australis*	Korean mulberry	fruit	-	-	-	-	-	-	-	39
Pinaceae	*Pinus koraiensis*	Korean nut pine	nut (dry)	2.0	2815	13.7	-	0.8	5.5	6.4	61
Poaceae	*Oryza sativa*	Rice	seed (brown)	13.5	1480	7.6	-	-	2.8	-	11
Poaceae	*Hordeum vulgare*	Barley	seed	13.7	1367	10.5	-	-	6.0	-	12
Poaceae	*Pennisetum glaucum*	Bullrush millet	seed	13.5	1363	12.7	-	-	3.5	-	13
Poaceae	*Sorghum bicolor*	Sorghum	seed	-	1459	11.1	0	-	-	-	14
Poaceae	*Zea mays*	Corn	seed (mature)	10.4	1528	10.0	100	4	4.9	2.2	19
Polygonaceae	*Fagopyrum esculentum*	Buckwheat	seed (dry)	10	1435	13	0	0	2.2	2.4	15
Polyporaceae	*Lentinus edodes*	Shitake mushroom	mushroom	83.5	230	1.6	-	0.3	0.4	1.3	65
Rhamnaceae	*Ziziphus jujuba*	Jujube	fruit (dried)	19.7	1201	3.7	-	13	1.8	0.2	41
Rosaceae	*Crateagus pinnatifida*	Chinese haw	fruit	73.9	385	0.4	-	-	2.1	-	40

Rosaceae	*Rubus idaeus*	European red raspberry	fruit (raw)	83.2	105	0.9	80	25	1.2	0.5	42
Roseacae	*Malus domestica*	Apple	fruit	85	235	0.3	-	10	-	-	36
Roseacae	*Pyrus pyrifolia*	Asian pear	fruit	88.3	176	0.5	-	3.8	-	-	37
Solanaceae	*Solanum tuberosum*	Potato	tuber (baked)	71.2	456	2.3	0	12.9	1.4	0.3	18
Solanaceae	*Lycium barbarum*	Goji berries	fruit (raw)	-	467	3.6	1518	43	7.7	-	45
Solanaceae	*Solanum melongena*	Eggplant	fruit	91.8	117	0.83	6	1.3	0.4	0.2	52
Solanaceae	*Lycopersicon esculentum*	Tomato	fruit	93.0	88	1.0	45	26	0.6	0.1	53
Solanaceae	*Capsicum annuum var. annuum*	Capsicum	fruit (yellow raw)	92	113	1.0	24	183.5	0.5	0.2	57