Potentially Important Food Plants of Ethiopia

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

N4ED NUTRITION 4 EDUCATION & DEVELOPMENT

Solutions to Malnutrition and Food Security

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

www.foodplantsolutions.org

Nutrition 4 Education & Development (N4ED) is an Ethiopian nonprofit whose mission is to improve children's nutrition and ensure their full cognitive and physical development. The main activities of the organization focus is on giving parents the knowledge, the desire, the self-confidence, and the financial capacity to provide nutritious and balanced food for their children. That is done through nutrition and health education, saving and loan programs, business, life-skill, and technical training, affordable child care services and gardening.

One of N4ED's program is gardening. This program is key to transforming in practice the nutritional concept that the organization teaches to communities with theoretical and demonstration classes. Food Plant Solutions (FPS), an Australian based Rotary Action Group, will support N4ED by providing the most appropriate informative resources regarding plants that are full of nutrients and that are easy to cultivate in Ethiopia's environment. This information is about different plants, and describes which part of the plant is edible, the nutrient value of each plant and well as other important information. N4ED will use these guides to implement its gardening projects and also to disseminate it among other stakeholders, the important information on Ethiopian endemic nutritious plants.

With its urban gardening project, N4ED is expecting to enable the community to develop a sustainable plan to feed themselves. Due to income and price fluctuations, marginalized and low-income communities have no guarantee that they will always afford to buy plant-based nutritious foods to feed their family. But with local gardens, they will have a source of food that they can rely on.

In general, this program aims to reduce food insecurity, improve dietary intake, and strengthen family relationships.

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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 – Ethiopia, Version 8, October 2022

Preface

This guide is based on information from the Food Plants International (FPI) database, "Edible Plants of the World", developed by Tasmanian agricultural scientist Bruce French AO. 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 Russ Stephenson 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 Ethiopia. This guide has been developed with the best intention to create interest and improve understanding of the important local food plants of Ethiopia, 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 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

Contents

Introduction

This book is designed as a simple introduction to useful, and sometimes under-utilised, food plants of Ethiopia. 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 the round or ballhead cabbages and lettuce, have very little food value. Many traditional tropical green, leafy vegetables and ferns have 10 times or more food value as ballhead cabbage or lettuce. It is important to find out more information about the food value of different foods if we want to eat well. Citrus fruit, such as lemons and oranges, are often grown for vitamin C that helps keep people healthy. These fruits do not grow well in the tropics - the common guava fruit has three times as much vitamin C and is loved by children. This is just one example showing there are often much better choices of local foods with higher levels of important nutrients.

Growing food

Growing food to feed a family is, without doubt, one of the most important things anyone can do. The more interest you take in your garden and the more you learn about plants and how to grow them well, the more interesting and fun food gardening becomes.

A country with very special plants

The local food plants of most countries have not been promoted and highlighted in the way they deserve. Visiting a local food market will quickly show what a rich variety of food plants can be grown in this country. Good information about these plants is often still in the minds and experience of local farmers, and has not been written down in books. This can make it hard for the next generation of young people to find out how to grow them.

In many countries, some of the traditional food plants are only harvested from the wild and others are only known in small 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. Taro will grow in light shade, but sweet potato will not. Ginger can grow in fairly heavy shade. Pruning the tips of betel leaf or pepper vines will cause more side branches to grow and therefore, produce more fruit. Stored yam tubers need special treatment if you want them to put out shoots early. 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

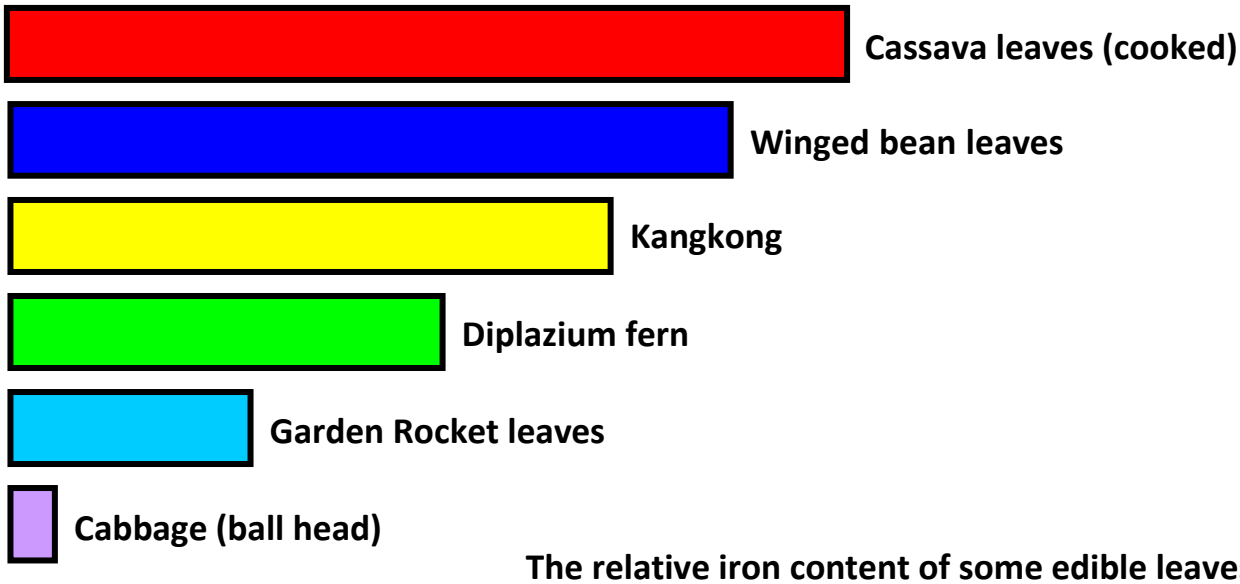
There are others, but these serve as examples.

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

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

Nutrient Value

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



The relative iron content of some edible leaves

A healthy balanced diet

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

Learning to cook well

Even though some nutrients in food can lose some of their value during cooking, it is normally much safer to cook all food plants, at least for a short time. Bacteria, which cause diarrhoea, can occur in gardens and on food plants. These are killed during cooking. Some plants contain cyanide, a chemical that makes them bitter and poisonous. This happens often with cassava (tapioca, manioc) and beans, but can also occur in many other plants. Boiling the food for two minutes normally destroys cyanide and makes the food safe to eat. Some of the nutrients our bodies need (such as vitamin A for good eyesight) 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 (like guava), new roots will start to grow from this cut and grow into the soil wrapped around the branch. It can then be cut off and planted. This is called air-layering. A similar method is used with the roots of breadfruit. A shallow root is uncovered and a small cut made from which a new sucker will start to grow. This can be cut off and replanted.

Growing from cuttings and suckers

Many food plants are grown from cuttings and suckers. This is very important, as it allows all the different kinds of yams, taros, bananas, sweet potato and sugarcane to be continually grown and ensures the varieties are preserved. Each plant has its own special propagation method. It is important to use healthy planting material, as diseases can be spread in planting material. In many cases, small tubers of yams, taro etc. are stored for planting for the next crop. This is not always good practice, as the small tubers could be the result of diseases (such as viruses) in the plant. A good rule is to take 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. Many large fleshy seeds, such as breadfruit, need to be planted while still fresh as they do not store easily. Other seeds do not "breed true" or do not grow into new plants that are the same as the original plants. With many of these plants, it may be necessary to find ways of growing them from cuttings or other methods such as grafting. Some plants "inbreed" and get smaller or poorer. This happens when a plant self-pollinates or receives pollen from a close relative. Corn grown in small plots normally does this and the plants grown from seed grown in this situation get smaller and smaller each year. The seed needs to be saved from several different plants with different history and then mixed together before sowing. All the seeds on one cob are related and will inbreed. Some seeds develop a hard seed coat and need to be scratched, soaked in water, or even put into hot water, before they will start to grow. Saving local seeds is often a good idea as they are already adapted to local conditions. For example, seed saved from pumpkins grown locally will produce plants with less pest and disease damage than those grown from imported seed. 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. *If you can't get seeds or planting material from local gardens, it is probably not a suitable local plant! Once again saving seed from the better plants helps ensure that you have better crops the next time you plant.*

Growing a garden of mixed plants

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

Different types of plants for food security

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

Looking after the soil

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

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

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

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

Poor soils where crops won't grow

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

Soil nutrients

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

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

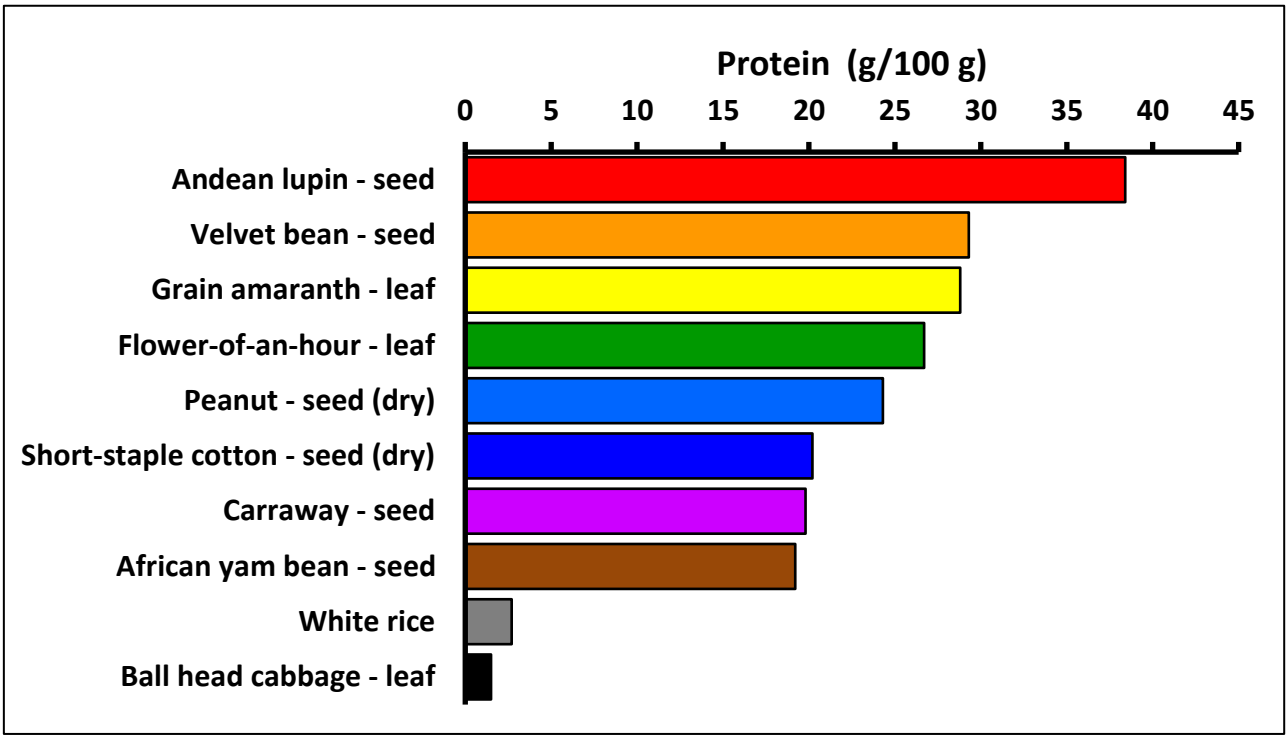
Pests

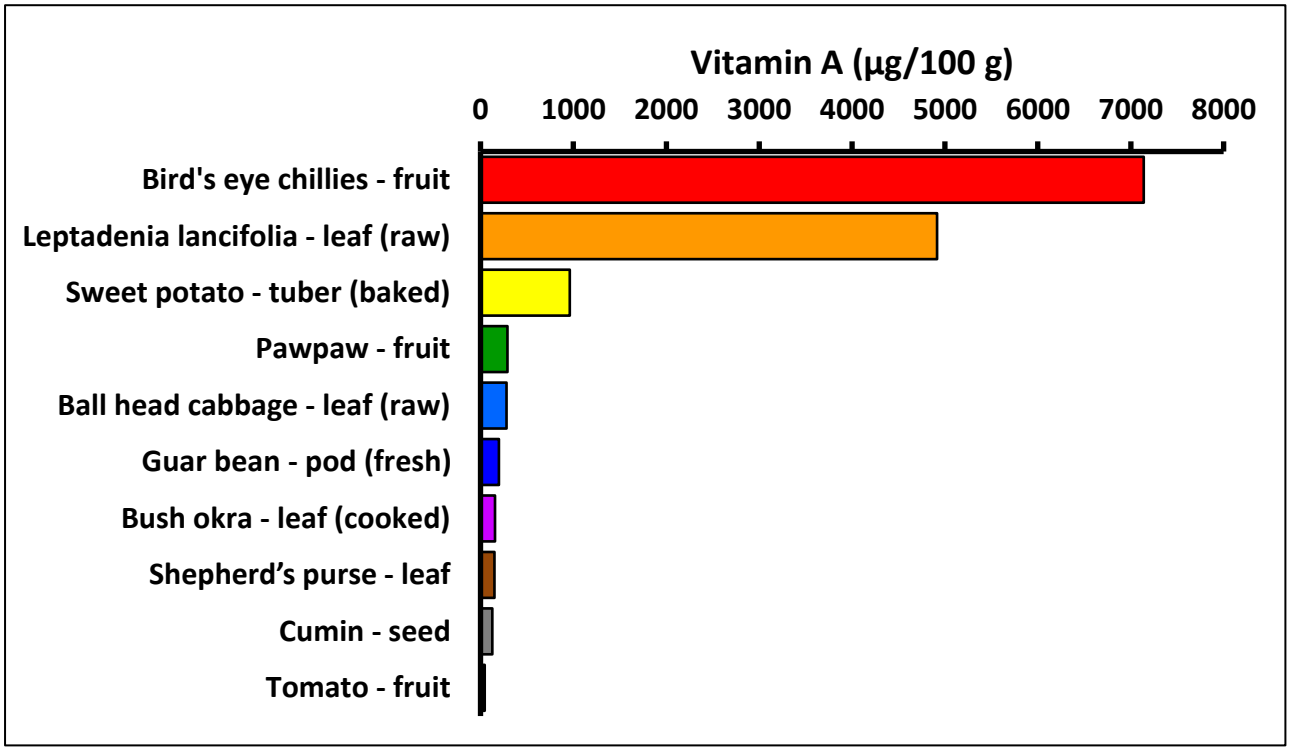
There are a large number of insects that enjoy sharing our food with us! We should not try to kill all these insects as they have an important role to play in keeping everything in nature in balance. What we need to do is to learn to manage these insects so we can all get some food to eat! Some insects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

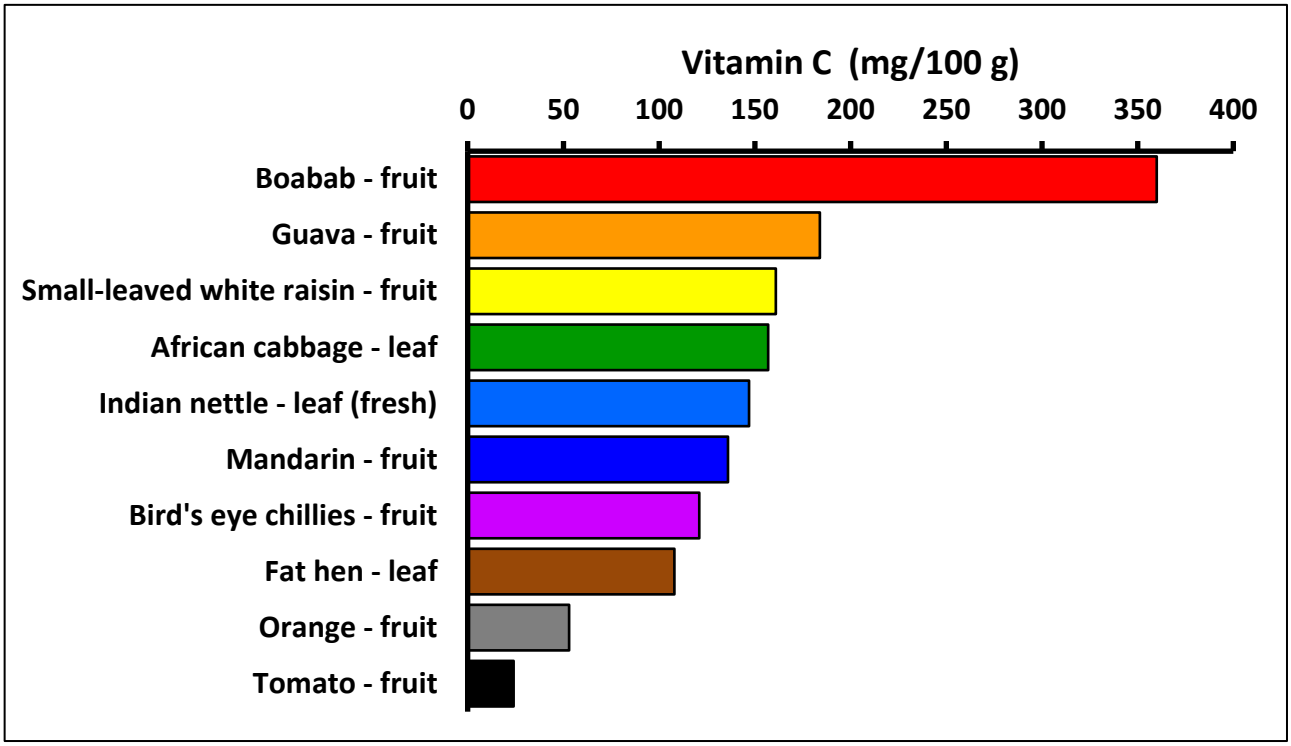
Diseases

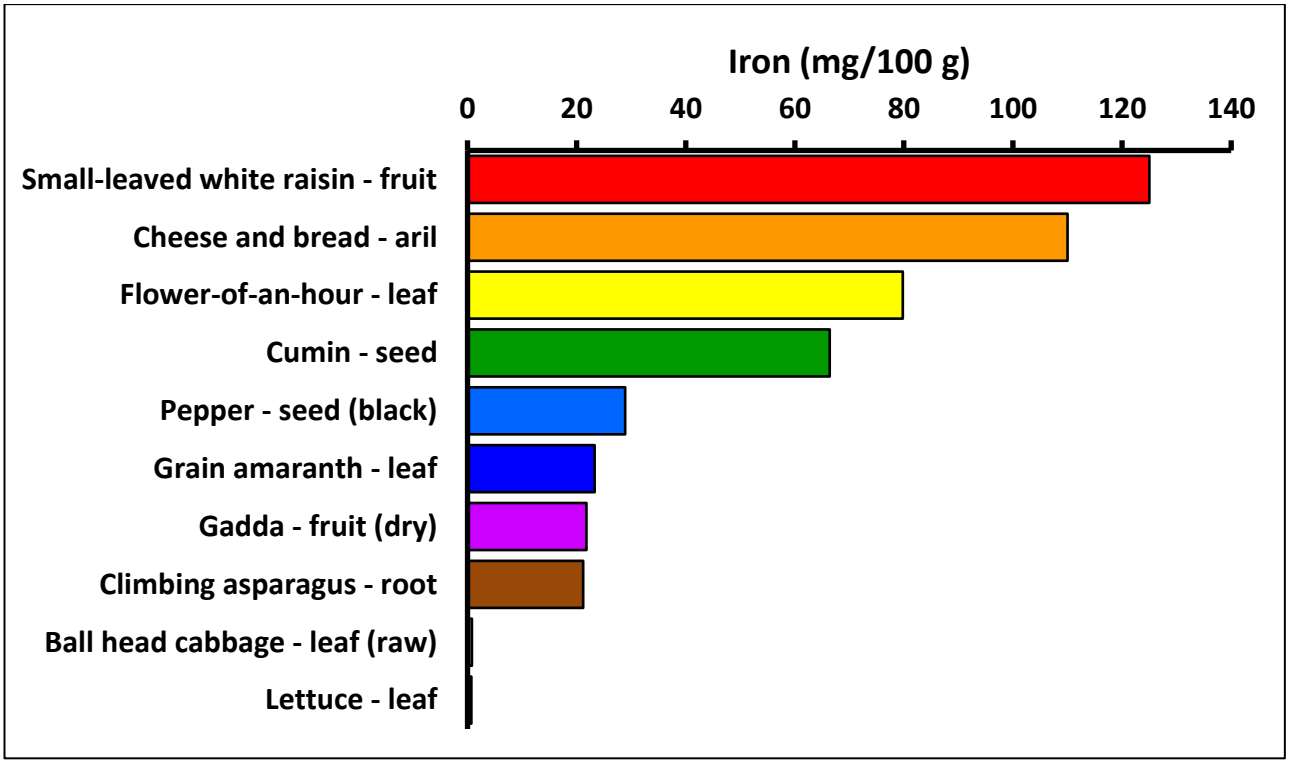
The living organisms that cause disease are much smaller than insects. These disease organisms can often only be seen with a microscope. There are three main kinds of disease organisms - fungi, bacteria and viruses. Fungi are like the mushrooms we eat, only very much smaller. They usually make distinct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

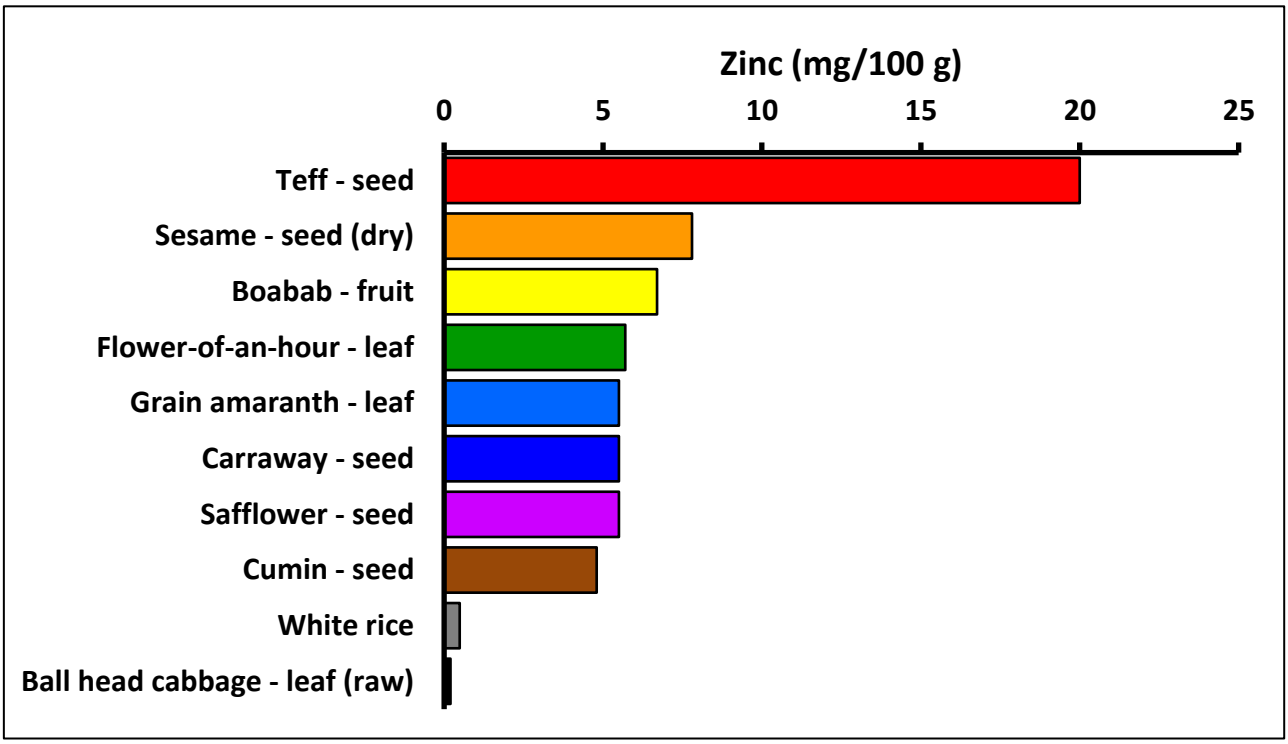
Food value charts for a selection of plants from Ethiopia






Vitamin C (mg/100 g)
0
50
100
150
200
250
300
350
400
Boabab - fruit
Guava - fruit
Small-leaved white raisin - fruit
African cabbage - leaf
Indian nettle - leaf (fresh)
Mandarin - fruit
Bird's eye chillies - fruit
Fat hen - leaf
Orange - fruit
Tomato - fruit


Iron (mg/100 g)
0
20
40
60
80
100
120
140
Small-leaved white raisin - fruit
Cheese and bread - aril
Flower-of-an-hour - leaf
Cumin - seed
Pepper - seed (black)
Grain amaranth - leaf
Gadda - fruit (dry)
Climbing asparagus - root
Ball head cabbage - leaf (raw)
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 (e.g. rice, corn). This does not mean that they are not useful, but merely reflects a desire for the Food Plant Solutions project to concentrate on plants that are less well known and/or underutilised.

Starchy staples

English: Taro
Local: Godere

Scientific name: *Colocasia esculenta*
Plant family: ARACEAE

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

Distribution: It is a tropical plant. Taro grows from sea level up to about 2,300 m altitude in the tropics. It grows well in humid places. It can stand damp soil and grow under light shade. It suits hardiness zones 9 - 12.

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

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

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

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

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

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

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

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

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

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

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

Food Value: Per 100 g edible portion

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

Starchy staples

Common name: Teff
Local:

Scientific name: *Eragrostis tef*
Plant family: POACEAE

Description: It is an annual tufted millet grass that grows 60-120 cm tall. It has a slender stem and long narrow smooth leaves. The flowers occur in loose open panicles 15-35 cm long. The branches are very thin and droop over. The seeds are very small (1-1.5 mm long). There are about 2500-3000 seeds per gram. Brown and white-seeded types are recognised.

Distribution: A drought resistant tropical grass. It grows in places with a distinct dry season. It grows best at about 2000 m altitude in Ethiopia in temperatures of 25-28°C. It is grown from 1700 m to 2800 m. Brown teff is grown at the higher locations. The rainfall in this region is about 950-1000 mm. It can be grown with rainfall of 400 mm. Soils should be permeable. It can tolerate frost and can grow in arid places.

Use: Seeds are ground into flour and cooked in a variety of ways. It can be used in stews or to make unleavened bread. This is called *injera* in Ethiopia.

Cultivation: Teff is best grown in fallowed land or after legume crops. Land preparation needs to be very thorough. A fine firm weed-free seed bed is needed. Seed are mostly broadcast. Driving sheep or cattle over the land is used to trample in the seed. Seed is sown at 25-30 kg per hectare. Nitrogen fertiliser is recommended. It is usually harvested with sickles.

Production: It is fast growing. Plants take 90-120 days for early varieties and 120-160 days for late maturing varieties. Yields range between 300 and 3000 kg per hectare. Seeds can be stored for many years as a reserve food supply.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	9.3	1541	8.9	-	-	9.9	20

Image sourced from www.feedipedia.org

Starchy staples

English: Sweet potato
Local: Squardinich

Scientific name: *Ipomoea batatas*
Plant family: CONVOLVULACEAE

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

Distribution: A tropical and subtropical plant. They grow from sea level up to about 2,700 m altitude in the tropics. Plants can grow with a wide range of rainfall patterns and in different soils. Plants are killed by frost and can't stand water-logging. Plants grow well with temperatures between 21 - 26°C. It can grow with a pH between 5.2 - 6.8. It suits hardiness zones 9 - 12.

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

Cultivation: Vine cuttings are used for planting. In grassland soils it is grown in mounds, ridges or other raised beds. In bush fallow, it is mostly planted in undug loose soils. It needs a sunny position. Tubers won't form if the ground is waterlogged when tubers start to develop. Sweet potato is grown by cuttings of the vine. About 33,000 cuttings are required per hectare. These weigh about 500 kg. Vine lengths of about 30 cm are optimum. As long as the vine is adequately inserted in the soil, the length of vine inserted does not significantly affect yield. Fresh sweet potato seeds germinate relatively easily and lead to continuous production of new cultivars under tropical conditions. Excess nitrogen restricts storage root initiation and therefore excess leaves are produced without significant tuber yield. Dry matter percentage increases with increasing age of the crop. Higher dry matter tubers are normally preferred.

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

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

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

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

Food Value: Per 100 g edible portion

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

Starchy staples

English: Japanese arrowroot
Local: Nech/setekertatume

Scientific name: *Dolichos trilobus*
Plant family: FABACEAE

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

Distribution: It is a tropical plant that grows in grassland and bushland. It grows from sea level to 1,200 m above sea level in Tanzania.

Use: The seeds are edible. They are collected and cooked while fresh or after being dried in the sun. In Ethiopia, the plant is also used medicinally.

Cultivation: It can be grown from fresh seed.

Production: Dried seeds can be stored for several months.

Food Value: Per 100 g edible portion

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

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

Starchy staples

English: Climbing asparagus
Local: Seriiti/seriti

Scientific name: *Asparagus racemosus*
Plant family: ASPARAGACEAE

Description: A creeping or climbing shrub. It has woody stems. It grows 2 m high and spreads 2 m wide. The stems are slender and trailing. The leaves are light green and narrow. They are 5 cm long. The flowers are very small. The fruit are small round red berries.

Distribution: It is a tropical plant that grows best in rich moist soils and filtered sunlight. It is damaged by frost and drought. It can grow in arid places.

Use: The tubers (rhizome) are cooked and eaten. The outer skin is removed and cut into small pieces then pounded. The young leaves are used as a green vegetable. They are eaten cooked or raw. They are also used for pickles. The fruit are eaten as a dessert fruit. The harvested shoots can be stored for 10 days. In Ethiopia, the plant is used medicinally to treat urinary tract disorders.

Cultivation: It can be grown by seed or by division.

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	78.4	1682	6.7			21.2	2.1

Starchy staples

English: Short-staple cotton
Local: Tit

Scientific name: *Gossypium herbaceum*
Plant family: MALVACEAE

Description: A shrub. It grows 2 m high. The leaf stalk is 2.5 - 8 cm long. The leaf blade is divided into 5 lobes like the fingers on a hand. The leaves are 5 - 10 cm across. The lobes are broad and oval and half the length of the leaf. The flowers occur singly in the axils of the leaves. The flowers are yellow and red or purple at the centre. The fruit is a capsule with 3 - 4 valves. It is about 3 cm across. The seeds are about 1 cm across. They are white and woolly.

Distribution: A tropical plant. It needs a temperature above 13 - 18°C.

Use: The seeds yield a cotton oil used for salads. It is also used in cooking. The seed is roasted and used as a coffee substitute. The leaves are eaten.

Cultivation: Plants are grown from seed.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed (dry)	8.0	1827	20.2	-	-	-	-

Image sourced from: www.medicinalplantsinnigeria.com

Starchy staples

English: Yeheb nut
Local: Yicib

Scientific name: *Cordeauxia edulis*
Plant family: FABACEAE

Description: A small evergreen shrub. It has many stems. It grows to about 1.6 m tall but can grow to 2.5 m tall in good growing conditions. It has a long tap root. The leaves are 3 - 5 cm long. They are divided into 4 pairs of leaflets. The leaflets are oval and leathery. They are 1 - 2.5 cm long and 1 - 1.4 cm wide. The flowers have both sexes and are carried in clusters at the ends of branches. They are bright yellow and 2.5 cm across. The pods are 4-6 cm long and curved with a beak. The pods are leathery and slightly flattened. The pods contain 1 - 4 seeds. The seeds are round and about 12 mm across.

Distribution: A tropical plant. It grows in arid and semi-arid areas in Somalia and Ethiopia. It is a very hardy shrub. It can survive droughts. It suits areas with an average temperature of 25°C. It grows in Ethiopia from 300 – 1,000 m altitude. The average rainfall is 250 - 400 mm but it can grow with rainfalls down to 150 - 200 mm. It grows in poor low nitrogen soils.

Use: Seeds are dried then boiled or roasted or eaten raw. Tea is made from the leaves. In Ethiopia, this is a staple food for nomadic people.

Cultivation: Plants naturally re-seed easily. Seeds are best sown where the plant is to grow due to the large taproot. Seeds should be sown fresh as they remain viable for only a few months.

Production: Plants grow slowly in the early stages. They may produce few pods in the first three years. Trees can live for very many years. In humid conditions plants produce more leaves but few seeds. Plants are pollinated by insects. Pods can develop 2 weeks after flowering. Immature fruit can remain dormant on the plant until further rains allow them to reach maturity. Yields of about 5 kg of seed per shrub can be obtained. A seed weighs 2 - 3 g.

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	11.1	1664	10.8	-	-	6.4	-

Image sourced from: www.satg.org

Legumes

English: Marama bean
Local:

Scientific name: *Tylosema fassoglensis*
Plant family: FABACEAE

Description: A trailing or climbing plant. It is evergreen and shrubby. It can be 6 m long. It has a large tuberous root. This can be to a depth of 2.5 m. Young plant parts have rusty coloured hairs. The leaves are simple and almost round but with two lobes or divided at the tip. Leaves are 5 - 20 cm long by 6 - 23 cm wide. There are rusty hairs on the veins underneath the leaf. The flower clusters are 2 - 42 cm long on stalks 2 - 17 cm long. The flowers have 5 petals. Four of these are yellow and one is reduced to a green stub. The petals are yellow. The outer layer or sepals have wings. Fruit are 7 - 12 cm long and 4 - 7 cm wide. The seeds are not quite round and are 1.7 - 2.8 cm long.

Distribution: It is a tropical plant. It does well in seasonally wet and dry climates. It needs well-drained soil. It needs full sun. It can grow in arid places. It suits hardiness zones 9 - 12.

Use: The pods are eaten raw or cooked. Young pods are eaten raw. The seeds can be eaten raw but are usually cooked or roasted. The seeds are also used as a coffee substitute. The tubers are eaten raw. They also provide water. They can be roasted and eaten or then stored for later use. They can also be crushed and pounded to make a meal. In Ethiopia, the plant is used medicinally to treat diarrhea, and also as an insecticide.

Cultivation: Plants can be grown from seeds.

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

Food Value: Per 100 g edible portion

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

Image accessed from http://www.africamuseum.be/collections/external/prelude/view_plant?pi=12675

Legumes

English: Andean lupin
Local: Gibto

Scientific name: *Lupinus mutabilis*
Plant family: FABACEAE

Description: An erect annual herb that grows to 1.5 m tall. It has a thick taproot. It can keep growing from year to year. The stems are branched, woody and mostly without hairs. The leaves have leaflets arranged like fingers on a hand. There are 7 - 9 leaflets. These are oblong and about 6 cm long by 1.4 cm wide. They are hairy underneath. The flowers are large and have a smell. They are about 2 cm long. The standard is white and blue with a yellow mark in the centre. Many flowers (50 - 70%) fall off without forming pods. The fruit is a pod. It is finely hairy and does not split open before falling in cultivated varieties. The pods are oblong but pointed at both ends. There can be 130 pods on a plant. The seeds bulge towards the centre. They are 8 - 10 mm long and 6 - 8 mm wide. The colour can vary from black to light grey.

Distribution: A tropical plant with cold resistance. It does not do well under high humidity and cannot tolerate drought at flowering. It requires 350 - 800 mm rainfall. It can grow in arid places.

Use: The seeds are soaked overnight and the water discarded, then the beans cooked. The seeds are used in soups, stews and made into flour. Up to 15% of lupin flour can be added to bread flour. **Caution:** The seeds contain poisonous alkaloids which are bitter, and require soaking and washing before eating. Varieties free of alkaloid are available.

Cultivation: Plants are grown from seed. Rates of 100 - 120 kg per hectare are used. The seed is broadcast.

Production: The growing cycle varies between 150 and 360 days. Yields from 3,500 kg - 7,000 kg are possible.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	8.2	1723	38.4	-	-	-	-
pod	9.5	1671	37.8	-	-	-	-

Image accessed from: https://en.wikipedia.org/wiki/Lupinus_mutabilis from Peruvian Field Lupines (*Lupinus mutabilis*), Pisac, Peru, D. Gordon E. Robertson

Legumes

English: Guar bean
Local:

Scientific name: *Cyamopsis tetragonolobus*
Plant family: FABACEAE

Description: An upright bushy plant often only 1 m tall. Some kinds grow to 3 m. The branches are stiff and usually with white hairs. The branches stick upwards and are angled and with grooves. The leaves are produced alternately and have 3 leaflets. The leaflets are oval and with slight saw teeth around the edge. The leaf stalks have grooves. The flowers are small in clusters in the axils of leaves. The flowers are white with pink wings. It produces clusters of thick fleshy pods. They are stiff and straight. There is a double ridge along the top of the pod and a single one below. There are also 2 ridges along the flat sides. The pods have a beak at the end. There are 8 - 10 small oval seeds inside.

Distribution: A tropical plant. It is a hardy, drought resistant plant that suits dry areas. It grows well on alluvial and sandy soils and in areas with high summer temperatures and low rainfall. It can tolerate an alkaline soil with pH 7.5 - 8.

Use: The green immature pods are eaten cooked. They are added to curries. They can be fried in oil, salted or dried for later use. The seeds are eaten. The seeds contain a gum used as a thickening agent. It is used in ice cream, baked goods, gluten free foods and salad dressing. The sprouted seeds are also eaten.

Cultivation: They are grown from seed, often in mixed cropping situations. It requires 15 - 24 kg of seed to sow a hectare. Seeds are sown 2 - 3 cm deep. They are often put 20 - 30 cm apart in rows 65 cm apart. Seeds germinate within one week.

Production: Plants mature in 3 - 3.5 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	9.9	1452	30.5	-	-	-	-
pod (fresh)	82.0	-	3.7	198	49	5.8	-

Legumes

English: Velvet bean
Local: Bushaa, velvet bean

Scientific name: *Mucuna pruriens*
Plant family: FABACEAE

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

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

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

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

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	7.29	-	29.3	-	4.8	-	-

Legumes

English: African yam bean
Local:

Scientific name: *Sphenostylis stenocarpa*
Plant family: FABACEAE

Description: A vigorous climbing vine. It grows 1.5 - 2 m high. The leaves have 3 leaflets. They are 14 cm long and 5 cm wide. The flowers are pink, purple or greenish-white. They are 2.5 cm long. They occur on stout stalks in the axils of leaves. The seed pods are smooth and 25 - 30 cm long by 1 - 1.5 cm wide. They are flat but have both edges raised. The seeds vary in shape, size and colour. They can be 1 cm long by 0.7 cm wide. They can be cream or brown. Small narrow tubers grow under the ground. They can be 5 - 7.5 cm long and weigh 50 - 150 g. The flesh is white and watery.

Distribution: It is a tropical plant that grows from sea level up to 1,800 m altitude. It grows in grassland and woodland and sometimes in marshy sites. It can grow in arid places.

Use: The pods, leaves, seeds and tubers are cooked and eaten. They are used in soups or with maize or rice. The hard seeds need to be soaked in water for 12 hours before cooking and being ground. The tubers are cooked and eaten.

Cultivation: It can be grown from seed or tubers.

Production: Tubers are ready for harvest about 8 months 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	9.0	1470	19.2	-	-	-	-
tuber	64.0	542	3.8	-	-	-	-

Legumes

English: Peanut
Local: Ocholoni/lewiz

Scientific name: *Arachis hypogea*
Plant family: FABACEAE

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

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

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

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

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

Food Value: Per 100 g edible portion

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

Leafy greens

English: Grain amaranth
Local: Alma

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 tropical plant. It can grow in warm temperate places. It cannot tolerate frost. Plants do best under high light, warm conditions 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 only contain 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 of 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 - 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 recollected 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. Yields from 1-5 tonnes per hectare of seed 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	-	23.3	5.5

Leafy greens

English: Fat hen
Local: Nechillo

Scientific name: *Chenopodium album*
Plant family: CHENOPODIACEAE

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

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

Use: The seeds can be ground into flour. They contain saponin which should be leached out. They are used for bread, pancakes, muffins and biscuits. The tender leaves are cooked and eaten as a vegetable. They are also used in stews. Young flowers are cooked and eaten. The sprouted seeds are edible. In Ethiopia, the plant is also used medicinally to treat urinary tract disorders.

Cultivation: Plants are grown from seed. Seedlings can be transplanted at a spacing of 30 cm. It does well in soils with lots of nitrogen.

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

Food Value: Per 100 g edible portion

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

Leafy greens

English: Garden cress
Local: Fetto

Scientific name: *Lepidium sativum*
Plant family: BRASSICACEAE

Description: A cabbage family herb. It is an annual plant about 60 cm high. It has narrowly lobed leaves. The leaves near the base have long stalks and the leaves higher on the plant do not have stalks. The flowers are small and white. The fruit is a pod. These are oval and deeply notched. The seed pods are reddish brown. The plant develops tuberous roots and grows for a second season. There are some named cultivated varieties.

Distribution: A temperate plant. In tropical Africa it grows between 750 - 2,900 m and is best at cooler locations. It suits plant hardiness zones 4 - 10.

Use: The leaves are used in salads. They are cut when young. The tender leaves are cooked as a vegetable. They are used in curries. The fresh or dried seed pods can be used as a pungent seasoning. The seeds also yield an edible oil. The seeds can be sprouted and eaten. In Ethiopia, the plant is also used medicinally.

Cultivation: Seeds are sown at regular intervals of about 2 weeks throughout the year. They need to be sown shallowly in a fine soil. Plants can start to be harvested in a few weeks.

Production: It is fast growing.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	87.2	150	4.2	58	59	2.9	0.2
leaf (boiled)	92.5	96	1.9	2310	23	0.8	0.2

Image sourced from: www.gobotany.newenglandwild.org

Leafy greens

English:
Local: Mesker (som)

Scientific name: *Leptadenia lancifolia*
Plant family: APOCYNACEAE

Description: A creeping shrub with many stems. The leaves are alternate and taper towards the tip. The stems are light green. Young shoots curve upwards and there are long spaces between the leaves. The leaves are up to 10 cm long. They are oval and light green. The flowers are greenish-yellow. The fruit are cone shaped and have 2 valves. These split open releasing cottony winged seeds. The plant has a sticky sap when crushed.

Distribution: A tropical plant that grows in dry savannah. In Ethiopia it grows between 500 - 1,500 m altitude. It grows on sandy loams. It grows in areas with an annual rainfall between 1,100 - 1,500 mm. It can grow in arid places. It can tolerate drought. It is little damaged by insects.

Use: The young leaves are eaten. They are washed then cooked. They are usually cooked along with other leaves. They are slightly bitter and are eaten with beans, pigeon pea, or cowpeas. Im Ethiopia, the plant is also used medicinally.

Cultivation: It can be grown on the fences near houses to provide leafy greens. Plants are grown from seeds.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf (raw)	81.0	226	4.9	4915	78	5.4	-

Image accessed from:
http://www.westafricanplants.senckenberg.de/images/pictures/leptadenia_hastata,_kafoutine,_senegal,_7116_6620915747_o_996_b0494d.jpg

Leafy greens

English: Shepherd's purse
Local:

Scientific name: *Capsella bursa-pastoris*
Plant family: BRASSICACEAE

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

Distribution: It grows in temperate and subtropical places. It grows in higher rainfall areas and does best in moist soils. It is resistant to frost and drought and can survive winter snow.

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

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

Production: The seeds contain 15 - 20% oil.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	88.2	138	4.2	150	91	4.8	-

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

Leafy greens

English: Indian nettle
Local: Habrid (som)

Scientific name: *Acalypha indica*
Plant family: EUPHORBIACEAE

Description: An erect and slightly branched annual herb. It can grow 30 - 80 cm tall. The leaves have long leaf stalks. The leaves have notched or toothed edges and are 3 - 6 cm long. The flowers occur singly in spikes in the axils of leaves. The male flowers are few, small and at the end. The bracts are few and green, at a distance from the flower and 5 - 6 mm long. The female flowers are at the base. They have large, green, cup shaped bracts. There may be one or more female flowers. The capsule is about 2 mm long with bristle-like hairs.

Distribution: A tropical plant that grows in hot places. They occur as a weed and are found throughout the Philippines in waste places. In tropical Africa it grows up to 1,350 m altitude. It can grow in arid places. It grows in sunny waste places.

Use: The leaves are eaten cooked as a vegetable. In Ethiopia, the aerial parts are pounded and boiled with water to make a drink.

Cultivation: Plants are grown from seed.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf (fresh)	80	269	6.7	-	147	17	-

Image accessed from: http://farm5.static.flickr.com/4108/5004450272_229449ed20.jpg

Leafy greens

English: Flower-of-an-hour
Local: Kenaf, jute

Scientific name: *Hibiscus trionum*
Plant family: MALVACEAE

Description: An annual herb. It can be erect or lie over. It is 25 - 70 cm high. The leaves are alternate. The leaf stalk is 2 - 4 cm long. The leaf blade has 3 - 5 lobes arranged like fingers on a hand. The leaf blade is 3 - 6 cm across. The central lobe is longer. The leaf blade is covered with coarse star like hairs. The flowers occur singly in the axils of leaves. They are yellow and purple at the base. They are like a Hibiscus flower. The fruit is a capsule which is about 1 cm across. It is a hairy five celled capsule. There are many black seeds.

Distribution: It suits tropical, subtropical and temperate regions. It does best in a sunny position. It does not occur in hot humid tropical rain forest zones. It suits drier warmer places. It can grow in hot arid zones with a marked dry season. It grows up to 2,635 m above sea level. It can grow in arid places. It suits hardiness zones 10 - 12.

Use: The shoots and leaves are cooked and eaten. The pods are used in soups and stews. The pods are sun-dried and powdered and used later in food in Sudan. The seeds are eaten raw and have a sesame flavour.

Cultivation: Plants can be grown from seed or cuttings.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	6.3	1263	26.7	-	-	79.8	5.7
shoot	-	-	21.0	-	-	21.8	9.4

Image accessed from: L. von Richter ©The Royal Botanic Gardens & Domain Trust

Fruit

English: Maroola plum
Local:

Scientific name: *Sclerocarya birrea*
Plant family: ANACARDACEAE

Description: A shrub or tree. It grows 9 m high and spreads 6 m wide. It can be 15 m tall. It loses its leaves during the year. The crown is dense and rounded. The bark is grey and finely cracked. The leaves have leaflets along the stalk. The leaves are near the tips of the branches. The edges of the leaflets can be wavy. Plants are separately male and female. Female flowers are reddish and on long stalks at the ends of branches. The fruit are oval or round and 3-4 cm long. They are green but turn yellow as they ripen. The skin is tough and leathery. The pulp is juicy and white. There is one large stone. There are some subspecies.

Distribution: A tropical plant. It grows in the lowlands. It grows in equatorial Africa. It grows in dry areas. It grows in the Sahel. It can grow in arid places. It grows in Miombo woodland in Africa.

Use: The fruit are eaten. The juice is also fermented to produce a cider-like drink. The oily kernel is eaten.

Cultivation: Plants can be grown by seeds but the seeds do not easily germinate. They need to have a hole cut in the hard seed coat or put into sulphuric acid. The seeds can be soaked overnight in water before planting. It can be grown from cuttings and root suckers. Using fertilizer, manure and early irrigation reduce the survival and growth of young plants. They are adapted to low fertility and seasonal rainfall.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
kernel	3.9	2704	28.3	-	-	0.4	-
fruit	87.0	226	0.5	-	-	-	-

Image sourced from: Wikimedia commons

Fruit

English: Boabab
Local: Bamba/fertata/baobuba

Scientific name: *Adansonia digitata*
Plant family: BOMBACACEAE

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

Distribution: It is a tropical plant that grows in the lowlands. It grows in the hot dry regions of tropical Africa, such as the Sahel. It survives well in dry climates. It grows where rainfall is 100 - 1,000 mm a year. It can tolerate fire. It grows where the annual temperatures are 20 - 30°C. In most places it grows below 900 m altitude but occasionally grows to 1,500 m altitude. It requires good drainage. It can grow in arid places and suits hardiness zones 11 - 12.

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

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

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

Food Value: Per 100 g edible portion

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

Fruit

English: Guava
Local: Zeituna

Scientific name: *Psidium guajava*
Plant family: MYRTACEAE

Description: A small evergreen tree 8 - 10 m tall with smooth, mottled bark which peels off in smooth flakes. It branches close to the ground and is shallow rooted. The branches are four-angled. The leaves are opposite, dull green, and somewhat hairy. They are oval and somewhat pointed at both ends, 15 cm long by 2 - 5 cm wide with short leaf-stalks. The showy flowers are white and borne in loose, irregular arrangements of 1 - 3 flowers that grow in the axils of leaves on new growth. The petals are 1.5 - 2 cm long. Both self and cross-pollination occurs. The fruit are rounded and 4 - 5 cm long. They are green, turning yellow when ripe. The outer covering is firm and encloses a pink, or nearly white, sweet-smelling, edible pulp with many seeds. In better selected varieties, the skin and the seeds are fully edible. Fruit vary from very acid to very sweet.

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

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

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

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

Food Value: Per 100 g edible portion

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

Fruit

English: Small-leaved white raisin
Local: Dhoqnuu/lenquata

Scientific name: *Grewia tenax*
Plant family: MALVACEAE

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

Distribution: A tropical plant that grows in arid zones. It occurs in very dry woodland and semi-desert scrub. It grows on rocky and gravely soils. It grows in the Sahel. It is often near temporary pools. It grows in areas with over 200 mm rainfall. It can tolerate salt. In East Africa it grows between sea level and 1,500 m altitude.

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

Cultivation: Plants can be grown from seeds.

Food Value: Per 100 g edible portion

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

Image accessed from:
http://www.southernafricanplants.net/photocollection/batch005/medium/G/TILLIACEAE_Grewia_tenax_Arandis_20090215_072_(1).jpg

Fruit

English: Gadda
Local: Dumbra

Scientific name: *Zanthoxylum chalybeum*
Plant family: RUTACEAE

Description: A shrub or small tree. It loses its leaves during the year. It grows 6 m tall. The crown is broad and dense. The leaves are 6 - 20 cm long. There are 2 - 5 leaflets. The leaflet blades are 3 - 7 cm long by 1 - 3 cm wide. They are narrowly oval. The flower panicle is 9 cm long. It is at the base of new branches. Male and female flowers are separate. The fruit are about 6 mm across. The seed is black and shiny.

Distribution: It is a tropical plant. It grows in the lowlands. It grows in dry woodland and on termite mounds. It grows on coastal sands and well-drained red clay soils. It can grow in arid places.

Use: The leaves and fruit have a strong aroma and are used to flavour tea. They are also used as a vegetable. They can also be pounded, dried and stored. The bark is also used to make tea and put in soups for flavour. In Ethiopia, the plant is used medicinally to treat fever.

Cultivation: Plants can be grown from seeds or root suckers. Plants can be cut back and allowed to re-grow.

Production: It is slow growing. Leaves are collected during the rainy season and early dry season.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	57.0	275	14.0	-	-	-	-
fruit (dry)	11.0	-	8.5	-	-	21.8	-

Image sourced from: www.westafricanplants.senckengerg.de

Fruit

English: Cheese and bread
Local: Qeraa, berbere (red)

Scientific name: *Paullinia pinnata*
Plant family: SAPINDACEAE

Description: A woody creeper. It can be 5 - 10 m long. The leaves have 5 leaflets. The leaf stalk has wings. The flower racemes occur singly in the axils of leaves. They can be 10 cm long. The flower are in clusters without stalks. The flowers are white. The fruit is an oblong or pear shaped capsule. It is 3 cm long by 1.4 cm wide. It is pinkish red and has fine lines along it. The valves are woody and there is 1 or sometimes 3 seeds inside. These are 1 cm long by 0.8 cm wide and 0.6 cm thick. They are shiny and blue-purple to black. There is a white aril or layer around the seed. This is edible.

Distribution: It is a tropical plant. It grows on coastal plains, swamps and sandy beaches. It grows in seasonally flooded forests. It grows along riverbanks and can grow on sand or clay. It grows between sea level to 1,600 m above sea level. It can grow in arid places.

Use: The aril or soft layer around the seeds and the pulp of the fruit are sometimes eaten. The flowers are eaten. The leaves are eaten.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
aril	83.0	1203	0.7	-	-	110	-

Image sourced from: www.botany.si.edu

Fruit

English: Pawpaw
Local: Papaya

Scientific name: *Carica papaya*
Plant family: CARICACEAE

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

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

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

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

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

Food Value: Per 100 g edible portion

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

Fruit

English: Mandarin
Local: Lomi

Scientific name: *Citrus reticulata*
Plant family: RUTACEAE

Description: A small, evergreen tree that grows 4 - 8 m tall and 2 m across. The stem is erect, branching and thorny. The leaves are dark green, and long and narrow in shape. They are 3 - 4 cm long. There is only a narrow wing on the leaf stalk. It has a few or no spines. The flowers are white and star-shaped. They are 2.5 - 4 cm across and have a scent. Fruit are almost round and the skin peels off easily. The fruit are 4 - 8 cm long. The flesh is red, juicy and sweet.

Distribution: It is grown in many tropical countries. It is the hardiest of the citrus. It grows from sea level up to 2,300 m altitude in the tropics. It does best between 800 m and 1,200 m altitude. A well-drained soil is needed. It also prefers a drier climate. It is drought and frost resistant. It needs a temperature above 3 - 5°C. It suits hardiness zones 9 - 11.

Use: The fruit are eaten fresh.

Cultivation: Trees are often grown from seed. Some breed true from seed. Seedling trees take a long time to start producing fruit. Budded trees are best. A spacing of about 8 m between trees is suitable. Several seedlings can grow from one seed. Using seedlings of seeds with three or more shoots helps produce trees true to type. Cuttings or layering can also be used.

Production: Fruit tend to be produced seasonally. The season is often from April to August in the southern hemisphere.

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	87.6	184	1.5	42	136	0.8	

Vegetables

English: Moringa
Local: Sheferaw

Scientific name: *Moringa oleifera*
Plant family: MORINGACEAE

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

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

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

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

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

Food Value: Per 100 g edible portion

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

Vegetables

English: Bush okra
Local: Jute

Scientific name: *Corchorus olitorius*
Plant family: MALVACEAE

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

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

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

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

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

Food Value: Per 100 g edible portion

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

Vegetables

English: Bottle gourd
Local: Buqqee/kill

Scientific name: *Lagenaria siceraria*
Plant family: CUCURBITACEAE

Description: A pumpkin family plant. It is an annual vine with large leaves. It can grow 3 - 9 m long and spread 3 - 6 m wide. The thick stems have furrows along them. It can climb over logs by attaching the tendrils which grow out of the stem near the leaf. The leaves are large and have soft hairs especially underneath. Flowers of both sexes are borne in the same plant. The plant produces male flowers first and these are on long stalks. Next it produces female flowers on short stalks. Flowers are large and white. They can be 10 cm across. They are mainly pollinated by insects. Fruit vary in shape and can be 8 - 90 cm long. They have brown seeds in a whitish green pulp. There are several varieties.

Distribution: A tropical plant that grows from sea level up to 2,700 m altitude in the tropics. It grows best in a warm humid climate. It is sensitive to frost and prefers full sunlight. It grows best with a night temperature of 17 - 23°C and day temperatures of 28 - 36°C.

Use: The young fruit are boiled as a vegetable. The skin and seeds are removed and can also be steamed, fried or pickled. Young tips and leaves are edible. They are often cooked with milk or coconut milk to improve the flavour. They are also mixed with other edible leaves. The seeds are sometimes eaten and provide an edible oil. Old fruit are used as containers, and the seeds are not normally edible.

Cultivation: To achieve fast and uniform emergence, seed should be soaked overnight. Seeds are best sown in raised beds. Seedlings emerge in 5 - 7 days. Seedlings can be transplanted is required. Because plants cross pollinate, plant and fruit types vary. Removing the young fruit to use as a vegetable will prolong the life of the plant. Large fruit can be obtained by removing some of the small fruit. A spacing of 1 - 2 m is suitable. It prefers a trellis to climb. Because it is shallow rooted, weeding needs to be done carefully.

Production: It is fast growing and flowers 2 months after seeding.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
bean (dry)	3.2	2399	28.2	-	-	5.3	-
leaf	83.0	180	4.4	66	-	7.4	-
fruit	93.0	88	0.5	25	10	2.4	-

Vegetables

English: Bitter cucumber
Local: Kiyar

Scientific name: *Momordica charantia*
Plant family: CUCURBITACEAE

Description: A pumpkin family plant. It is a slender annual climber with flowers of both sexes on the one plant. It has simple tendrils and vines can be 4 m long. It has bright green lobed leaves 5 - 12 cm long on thin leaf stalks 3 - 10 cm long. The flowers have a sweet smell and 5 small, yellow petals. Fruit are green when young and orange when ripe. The fruit have a lumpy appearance, with ridges along its length and when fully ripe burst open. It has bright red covering on the seeds inside. The seeds are pale brown and 10 - 16 mm long and 7 - 10 mm wide.

Considerable variation in the fruit occurs between varieties.

Distribution: A tropical plant that grows from sea level up to about 500 m and will probably grow to 1,000 m altitude in tropical regions. They require a well-drained soil preferably rich in organic matter. Seeds do not germinate below 15°C. Plants grow best with temperatures of 18 - 35°C. A soil pH of 6.5 is best. It suits hardiness zones 9 - 12.

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

Cultivation: Plants are grown from seed. For large scale plantings, 6 - 7 kg of seed are required for planting one hectare. Seeds are planted at 50 cm spacing in the place where the plants are to grow and need a stick to climb up. Often plants are grown on raised beds 2 m apart with 0.5 m between plants. The seed has a hard seed coat and germinates slowly. Soaking seeds for 24 hours before sowing gives a quicker more even germination. Regular watering is required.

Production: Fruit are ready to harvest 45 - 55 days after planting. Fruit should be harvested when young and tender. Once fruit have begun to change colour to yellow they are past maturity for eating. Early removal of young fruit also ensures continuous fruit setting. This can allow 6 - 8 successive pickings of fruit. Fruit on the plant are sometimes wrapped in paper to prevent fruit fly damage. Seed well stored can remain viable for 4 - 5 years. The young bitter fruit are cooked and eaten. The fruit is blanched or soaked in salt water to reduce the bitter taste.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	8.6	2020	18.6	-	-	-	-
leaf (raw)	84.7	252	5.0	44	170	7.1	0.3
leaf tip (boiled)	88.7	146	3.6	173	57	1.0	0.3
fruit	93.6	105	1.2	-	-	0.2	-
pod (boiled)	94.0	79	0.8	11	33	0.4	0.8
pod (raw)	94.0	71	1.0	380	84	0.4	0.8

Vegetables

English: African cabbage
Local: Abesha gomen

Scientific name: *Brassica carinata*
Plant family: BRASSICACEAE

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

Distribution: A tropical plant. It occurs in the highlands of Ethiopia and Kenya. It has been introduced to other countries. It will grow on most agricultural soils. It needs a cool climate (15 - 20°C) and requires a sunny position. It is mostly grown between 1,500 - 2,500 m altitude in tropical regions. It can grow with a rainfall of 200 - 500 mm but is usually sown at the beginning of the rains.

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

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

Production: Leaf yields can be up to 4,800 kg per hectare. Much higher yields are possible with intensive production. Leaf harvest can occur after 47 days under best growing conditions.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
leaf	88.0	86.1	3.5	-	157.0	1.3	0.9

Vegetables

English: Okra
Local: Bamia

Scientific name: *Abelmoschus esculentus*
Plant family: MALVACEAE

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

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

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

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

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

Food Value: Per 100 g edible portion

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

Nuts, seeds, herbs and other foods

English: Fenugreek
Local: Abish

Scientific name: *Trigonella foenum-graecum*
Plant family: FABACEAE

Description: A small herb that grows 30 - 60 cm tall and spreads 20 - 30 cm wide. It grows each year from seed. The leaves have 3 leaflets like clover. The leaflets are oval and do not have stalks. They are 1.3 - 2.7 cm long by 0.5 - 1.7 cm wide. They are spoon shaped with teeth and a rounded tip. They narrow towards the base. The leaves are light green. The flowers are small and pea like. They are yellow. The fruit is a long narrow pod. It has a pronounced beak. The seeds are like small golden brown pieces of gravel.

Distribution: It suits dry temperate and subtropical regions. It needs a well-drained soil. It needs a sunny position. It can tolerate frost. It can grow in acid, neutral and alkaline soils. It can grow in salty soils. It grows in areas with an annual rainfall of 380 - 1,530 mm. It can grow in arid places. It suits hardiness zones 9 - 11.

Use: The seeds can be sprouted and eaten. They are also soaked and cooked. The seeds are ground and used as a spice. They are used in curry powder. The leaves can be eaten as a vegetable. They are also dried and mixed into vegetable dishes. The bitter taste of the seeds can be removed by slightly dry roasting. The roasted seeds are used as a coffee substitute. The seeds and leaves can be brewed into a tea. The seeds produce an oil. In Ethiopia, the plant is also used medicinally.

Cultivation: Plants are grown from seed. The seeds are sown directly. They are thinned out to 10 cm between plants.

Production: Plants mature in 3 - 5 months. The seeds are harvested when ripe. Often the whole plant is pulled up and dried and the seed threshed out. They are dried in a warm dry spot. They are normally dried to 10% moisture.

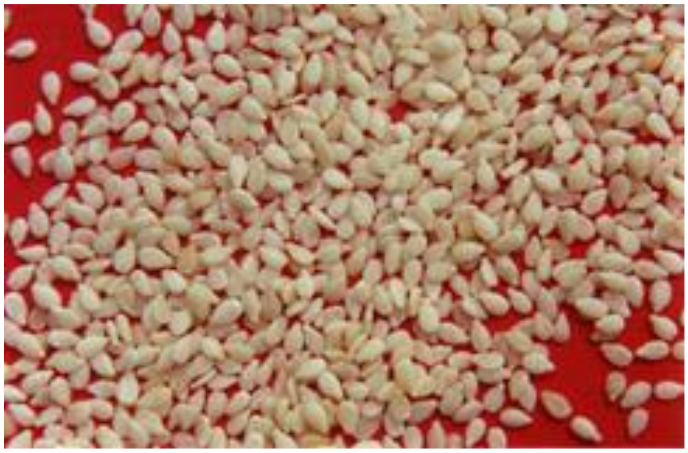
Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	8.8	1352	6.4	6	3.0	33.5	2.5
leaf	87.6	146	4.6	92	-	8.8	-
sprout	90.4	125	2.8	-	-	-	-

Nuts, seeds, herbs and other foods

English: Sesame
Local: Selit/seame

Scientific name: *Sesamum indicum*
Plant family: PEDALIACEAE



Description: A small, upright annual plant. It is erect and very branched and grows 1 - 2 m tall. The stem is stou, 4 sided and furrowed along its length. It is densely covered with fine, downy, glandular hairs that vary in shape. The lower leaves have long stalks and are spear shaped, often with lobes or a toothed edge. The leaf stalks are 3 - 11 cm long. The leaf blade is 4 - 20 cm long by 2 - 10 cm wide. Upper leaves are narrow and oblong. They are 0.5 - 2.5 cm wide. The flowers are pink and white. They occur in the axils of upper leaves, either on their own, or in groups of 2 or 3. They can be white, pink, purplish and with yellow spots and stripes. The fruit can be smooth or rough and there are 2 chambers in the capsule. The fruit are brown or purple. They are oblong and deeply grooved. The seeds are small and oval. They are 3 mm by 1.5 mm and vary in colour from white, yellow, grey, red, brown or black. The fully ripe pods burst open.

Distribution: A tropical plant that suits the hot, dry, semi-arid tropics and sub-tropics. It can tolerate short periods of drought once established. It needs a temperature of 20 - 24°C in early growth then 27°C for ripening. It grows from sea level to about 1,200 m in areas with an annual rainfall of 400 – 1,000 mm. Soils need to be well drained. It is very intolerant of water-logging. It cannot stand high humidity and needs frost free conditions. It needs a dry period for seed drying. It does not like acid soils. It grows in open sunny places. It can grow in arid places.

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

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

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

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed (dry)	4.7	2397	17.7	1	0	14.6	7.8
leaf (raw)	85.5	188	3.4	-	-	-	-

Nuts, seeds, herbs and other foods

English: Safflower
Local: Suf

Scientific name: *Carthamus tinctorius*
Plant family: ASTERACEAE

Description: An erect, annual herb that grows to 60 - 150 cm tall. It has many branches. It has spines but the numbers vary. The stems are white, stiff and round with fine grooves along their length. The types with more spiny leaves are better for oil production. The leaves are arranged in spirals around the stem. They do not have leaf stalks. The leaves are dark green and glossy. They are 10 - 15 cm long and 2 - 4 cm wide. The flower head is made up of many small flowers that are 13 mm long and like tubes. They are yellow to orange in colour. The fruit is 4 angled and has a hard hull and a single white or grey seed. The seed is oblong.

Distribution: It grows in both tropical and temperate zones. It does better in drier regions. It cannot tolerate waterlogging. It does not suit the low, wet tropics. It needs a good dry season for drying. It is resistant to drought. It can stand some wind and salinity. High temperatures can result in poor seed set. It does best where temperatures are 17 - 20°C on average. At the equator it can grow at 1,600 - 2,000 m altitude but most commonly in other regions it grows below 900 m altitude. A soil pH of 5 - 8 is suitable. It can grow in arid places.

Use: The young shoots and leaves are eaten cooked or raw. They can be seasoned with soy sauce. The seeds are hulled and roasted. They are eaten as snacks. They are also used in chutneys. The seed oil is used in cooking and as a salad oil. (This can be done by boiling the seeds and floating off the oil). The dried, edible petals are used to colour foods. They can give red or yellow dyes. The slightly bitter petals can be cooked with rice.

Cultivation: Plants are grown from seed. A fine seed bed is required and seed are broadcast or drilled. It is best sown about 2 - 3 cm deep. Seeds germinate in 4 - 7 days and a soil temperature of 15°C is best. Plants should be topped as soon as the first buds appear to increase the number of flower heads. A spacing of 15 - 30 cm between plants is suitable. Wider spacing gives more heads per plant and closer spacing gives higher yields per area. A seeding rate of 20 - 30 kg per hectare is required. Crops respond to fertiliser if there is sufficient moisture. In very dry weather, harvesting in the more moist morning or evening avoids seed shattering. Plants are uprooted and heaped for a few days before threshing.

Production: Plants take 120 days to maturity. Seeds are ripe about 35 - 40 days after maximum flowering. Plants are harvested when leaves turn brown.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	5.6	2163	16.2	5	0	4.9	5.5

Image sourced from http://www.herbgarden.co.za/mountainherb/herbinfo.php?id=516

Nuts, seeds, herbs and other foods

English: Cumin
Local: Ensilal, cumin

Scientific name: *Cuminum cyminum*
Plant family: APIACEAE

Description: A slender annual herb. It grows about 30 - 60 cm high. It spreads 30 cm wide. The stems are angular. The lower leaves have stalks and the upper leaves do not. The leaves are like fronds. They are divided into long narrow segments. The leaves are 10 cm long. The flowers are white. They occur in a compound umbel. The fruit is like a cylinder and has ridges. It is 4 - 5 mm long. It tapers at the ends and is only slightly curved.

Distribution: A warm temperate to tropical plant. It suits hot climates. It needs full sun. It needs fertile, well-drained soils. It needs 3 - 4 warm months to ripen the seed. It suits hardiness zones 8 - 12.

Use: The fruitlets are used as a spice. They are used whole or ground. They are common in curries. They are also used to flavour cheese, cakes and liqueurs. The oil is used to flavour sauces and sausages. In Ethiopia, the fruit is also used to treat coughs.

Cultivation: Plants are grown from seed. They can be transplanted.

Production: The stems are harvested when the plant has finished flowering and before the fruit are ripe. These are dried before threshing. The seeds are rubbed to remove the hair like tails. The ground seeds produce a coarse textured, dark green, oily-feeling powder.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	8.1	1567	17.8	127	7.7	66.4	4.8

Image sourced from: https://www.amkhaseed.com/products/cumin-common-cuminum-cyminum

Nuts, seeds, herbs and other foods

English: Carraway
Local: Sperkai

Scientific name: *Carum carvi*
Plant family: APIACEAE

Description: A herb. The plant takes two years to grow then flower. It is an erect herb. It grows about 40 cm high. The root is thick, long and tapering like a carrot. It has a pale colour. The leaves are twice divided. The upper leaves are smaller and less divided. The leaves are pale green. The flowers are white. The fruit are oblong and narrow. They usually have distinct ribs. These dark brown fruit are 5-6 mm long. Caraway is more curved and darker in colour than cumin.

Distribution: A hardy plant. It needs a sunny, sheltered position. It grows in Nepal from 2,500 - 4,500 m altitude. It suits hardiness zones 3 - 10.

Use: The seeds are used to flavour cakes, bread and biscuits. They can also be used in vegetable dishes, pickles and coleslaw. They have a licorice flavour. They are used to flavour various alcoholic drinks. The young leaves are used to flavour soups, meats and salads. The tender leaves and shoots are cooked as a vegetable. The young roots can be cooked and eaten.

Cultivation: It is grown from seed. It does not transplant well.

Production: It is harvested in the very early morning before seed heads shatter. Complete seed heads are stored for 10 days to dry out before threshing.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
seed	9.9	1393	19.8	36.0	21.0	16.2	5.5
root	-	451	-	-	-	-	-
leaf	-	111	4.9	-	-	-	-

Image sourced from: www.carumcarviextract.blogspot.com

Nuts, seeds, herbs and other foods

English: Pepper
Local: Kundo berbere

Scientific name: *Piper nigrum*
Plant family: PIPERACEAE

Description: A woody, climbing, green, leafy vine. The nodes are enlarged. The plant has roots on the main stem which attach to tree trunks. The vines can be 8 - 10 m long. The leaf stalk is 1 - 2 cm long. The leaf blade is oval and 10 - 15 cm long by 5 - 9 cm wide. It is thick and leathery. The base of the leaf is rounded and it tapers to a short tip. The flowers are usually of one sex, but many flowers occur together. The flower spikes are opposite the leaves. The spikes are 3 - 3.5 cm long by 0.8 mm wide. They can be 10 cm long. It has clusters of berries on the side branches. The berries are red when ripe and 3 - 4 mm across.

Distribution: It is a tropical plant. It grows from sea level up to at least 1,100 m altitude in equatorial places. It suits areas with a temperature between 24 - 26°C. It cannot tolerate frost. It likes high humidity and shade. It does best with an annual rainfall of 1,200 - 2,500 mm. It originally came from the tropics of India. It suits hardiness zones 10 - 12.

Use: The berries are used as a spice. The dried fruit are used as pepper. Immature green berries are sold in brine or dried. As a spice, it is unlikely that sufficient is eaten to contribute to the diet.

Cultivation: Plants are normally grown from cuttings of the main (rooted) vine. Pruning of the tips can increase branch formation on which berries are produced. It needs a support to climb.

Production: Berries, dried with the skin on, give white pepper. Berries, with the skin soaked off in water for a few days, produce black pepper. Plants produce in the third year. They can continue producing for 20 years. Flowering normally follows rain. Fruit ripen 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
seed (white)	11.4	1238	10.4	0	21.0	14.3	1.1
seed (black)	10.5	1067	11.0	19	21.0	28.9	1.4

Nuts, seeds, herbs and other foods

English: Bird's eye chillies
Local: Mitmita

Scientific name: *Capsicum frutescens*
Plant family: SOLANACEAE

Description: It is a shrubby, perennial plant growing about 1 m tall. The leaves are smaller than round capsicums or bell peppers. Two or more flowers occur together in the axils of leaves. They have small pointed fruit about 1 - 2 cm long and they are red when ripe. They have a very hot taste when eaten or touched on the lips.

Distribution: It is grown in most tropical countries. It grows from sea level up to about 1,800 m altitude in the equatorial tropics. It can't tolerate water-logging or frost. It tolerates high temperatures and a wide range of rainfall. Very high rainfall leads to poor fruit set and rotting of fruit. Soil needs to be well-drained and, preferably, fertile with adequate organic material. Light, loamy soils rich in lime are best. It suits hardiness zones 10 - 12.

Use: The leaves are eaten for their mild, spicy taste. The leaves are eaten cooked. The fruit can be used in very small quantities to spice food. The small, red fruit are very hot to eat due to a chemical called capsaicin. They are used to add spice and flavour to other foods. It would not be appropriate to eat sufficient of Bird's eye chilli fruit to significantly affect nutrition.

Cultivation: The seeds are dried in the sun. They are small. For large-scale plantings, 1.8 - 2.3 kg/ha of seed is needed. Seed is best sown in nurseries and the seedlings transplanted when they have 4 - 5 leaves (after 3 - 4 weeks). They can be transplanted at about 0.8 m spacing. Pruning out the tops can increase branching. This is often done 10 days before transplanting. Excessive nitrogen can reduce fruit setting.

Production: The first picking of fruit can occur 3 months after planting and continue about every two weeks. Plants continue to be harvested for about 4 - 5 years before replanting. For dried chillies, the fruit are dried in the sun for 3 - 15 days. The fresh weight is reduced by about two thirds during drying. Yields of dry chillies can be from 300 - 2,500 kg/ha depending on growing conditions, irrigation, etc.

Food Value: Per 100 g edible portion

Edible part	Moisture %	Energy kJ	Protein g	proVit A µg	proVit C mg	Iron mg	Zinc mg
fruit	74.0	395	4.1	7140	121	2.9	

Nutritional values of food plants by plant Family

Plant Family	Scientific name	Common name	Local name	Edible part	Moisture %	Energy kJ	Protein g	Vit A µg	Vit C mg	Iron mg	Zinc mg	Page
AMARANTHACEAE	*Amaranthus caudatus*	Grain amaranth	Alma	leaf	6.0	1034	28.8	33	-	23.3	5.5	29
ANACARDACEAE	*Sclerocarya birrea*	Maroola plum		fruit	87.0	226	0.5	-	-	-	-	37
APIACEAE	*Cuminum cyminum*	Cumin	Ensilal, cumin	seed	8.1	1567	17.8	127	7.7	66.4	4.8	54
APIACEAE	*Carum carvi*	Carraway	Sperkai	seed	9.9	1393	19.8	36.0	21.0	16.2	5.5	55
APOCYNACEAE	*Leptadenia lancifolia*		Mesker (som)	leaf (raw)	81.0	226	4.9	4915	78	5.4	-	33
ARACEAE	*Colocasia esculenta*	Taro	Godere	root	66.8	1231	1.96	3	5	0.68	3.2	14
ASPARAGACEAE	*Asparagus racemosus*	Climbing asparagus	Seriiti/seriti	root	78.4	1682	6.7	-	-	21.2	2.1	20
ASTERACEAE	*Carthamus tinctorius*	Safflower	Suf	seed	5.6	2163	16.2	5	0	4.9	5.5	53
BOMBACACEAE	*Adansonia digitata*	Boabab	Bamba/fertata/baobuba	fruit	16.0	1212	2.2	-	360	7.4	6.7	38
BRASSICACEAE	*Lepidium sativum*	Garden cress	Fetto	leaf	87.2	150	4.2	58	59	2.9	0.2	32
BRASSICACEAE	*Capsella bursa-pastoris*	Shepherd's purse		leaf	88.2	-	4.2	150	91	4.8	-	34
BRASSICACEAE	*Brassica carinata*	African cabbage	Abesha gomen	leaf	88.0	86.1	3.5	-	157.0	1.3	0.9	49
CARICACEAE	*Carica papaya*	Pawpaw	Papaya	fruit	88.0	163	0.5	290	54	0.4	0.18	43
CHENOPODIACEAE	*Chenopodium album*	Fat hen	Nechillo	leaf	87.7	113	5.3	33	108	-	-	31
CONVOLVULACEAE	*Ipomoea batatas*	Sweet potato	Squardinich	tuber (baked)	72.9	431	1.7	961	24.6	0.5	0.3	17
CUCURBITACEAE	*Lagenaria siceraria*	Bottle gourd	Buqqee/kill	fruit	93.0	88	0.5	25	10	2.4	-	47
CUCURBITACEAE	*Momordica charantia*	Bitter cucumber	Kiyar	pod boiled	94.0	79	0.8	11	33	0.4	0.8	48
EUPHORBIACEAE	*Acalypha indica*	Indian nettle	Habrid (som)	leaf (fresh)	80	269	6.7	-	147	17	-	35
FABACEAE	*Dolichos trilobus*	Japanese arrowroot	Nech/ setekertatume	root	72.4	1794	7.1	-	-	0.2	4.4	19
FABACEAE	*Cordeauxia edulis*	Yeheb nut	Yicib	seed	11.1	1664	10.8	-	-	6.4	-	22
FABACEAE	*Tylosema fassoglensis*	Marama bean		pod	72.5	446	6.4	-	39	0.5	2.2	23
FABACEAE	*Lupinus mutabilis*	Andean lupin	Gibto	seed	8.2	1723	38.4	-	-	-	-	24
FABACEAE	*Cyamopsis tetragonolobus*	Guar bean		pod (fresh)	82.0	-	3.7	198	49	5.8	-	25
FABACEAE	*Mucuna pruriens*	Velvet bean	Bushaa, velvet bean	seed	7.29	-	29.3	-	4.8	-	-	26
FABACEAE	*Sphenostylis stenocarpa*	African yam bean		seed	9.0	1470	19.2	-	-	-	-	27
FABACEAE	*Arachis hypogea*	Peanut	Ocholoni / lewiz	seed (dry)	4.5	2364	24.3	-	-	2.0	3.0	28
FABACEAE	*Trigonella foenum-graecum*	Fenugreek	Abish	leaf	87.6	146	4.6	92	-	8.8	-	51
MALVACEAE	*Gossypium herbaceum*	Short-staple cotton	Tit	seed (dry)	8.0	1827	20.2	-	-	-	-	21
MALVACEAE	*Hibiscus trionum*	Flower-of-an-hour	Kenaf, jute	leaf	6.3	1263	26.7	-	-	79.8	5.7	36
MALVACEAE	*Grewia tenax*	Small-leaved white raisin	Dhoqnuu/ lenquata	fruit	59.1	-	4.5	-	161	125	-	40
MALVACEAE	*Corchorus olitorius*	Bush okra	Jute	leaf (cooked)	87.2	155	3.4	156	33.0	3.1	0.8	46

Plant Family	Scientific name	Common name	Local name	Edible part	Moisture %	Energy kJ	Protein g	Vit A µg	Vit C mg	Iron mg	Zinc mg	Page
MALVACEAE	*Abelmoschus esculentus*	Okra	Bamia	fruit (cooked)	90.0	134	1.9	58	16.3	0.5	0.6	50
MORINGACEAE	*Moringa oleifera*	Moringa	Sheferaw	leaf (boiled)	87	189	4.7	40	31.0	2.0	0.2	45
MYRTACEAE	*Psidium guajava*	Guava	Zeituna	fruit	77.1	238	1.1	60	184	1.4	0.2	39
PEDALIACEAE	*Sesamum indicum*	Sesame	Selit/seame	seed (dry)	4.7	2397	17.7	1	0	14.6	7.8	52
PIPERACEAE	*Piper nigrum*	Pepper	Kundo berbere	seed (black)	10.5	1067	11.0	19	21.0	28.9	1.4	56
POACEAE	*Eragrostis tef*	Teff		seed	9.3	1541	8.9	-	-	9.9	20	16
RUTACEAE	*Zanthoxylum chalybeum*	Gadda	Dumbra	fruit (dry)	11.0	-	8.5	-	-	21.8	-	41
RUTACEAE	*Citrus reticulata*	Mandarin	Lomi	fruit	87.6	184	1.5	42	136	0.8	-	44
SAPINDACEAE	*Paullinia pinnata*	Cheese and bread	Qeraa, berbere (red)	aril	83.0	1203	0.7	-	-	110	-	42
SOLANACEAE	*Capsicum frutescens*	Bird's eye chillies	Mitmita	fruit	74.0	395	4.1	7140	121	2.9	-	57

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