# Potentially Important Food Plants of Uganda




FOOD PLANT SOLUTIONS
ROTARIAN ACTION GROUP

*Solutions to Malnutrition*

THE CRAWFORD FUND
*For a Food Secure World*

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

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THE CRAWFORD FUND

The Tasmanian committee of the Crawford Fund is very pleased to be able to support the production of the field guide for Uganda. The Fund was an early supporter of FPS, with production of the guide for the Solomon Islands, and the Tasmanian committee has been searching for a way to further our collaboration. Uganda is a very worthy recipient of our support as we know it has the challenges common to most developing countries, but with plenty of opportunities for advancement of health and well-being of its people. We are sure the guide will be a very positive step in that direction.

The Fund's main goal is to support international agricultural research, with an emphasis on food security. We are for "a food secure world", in the broader context which includes agriculture, fisheries and forestry, and the ecosystems which support these activities. We are funded by the Australian federal and state governments, and a range of private donors and partnerships. We support a range of training activities, where we either fund Australian researchers to run courses or other activities in developing countries, or bring participants to Australia to undertake various kinds of training here. These activities can be funded by one or more of the state committees, or with national office support as a "Master Class", aimed at higher level research and development workers. We run a public awareness program, which includes annual conferences on food security and related issues, and we also facilitate the generation of news stories about international work to raise its profile with the Australian and international public.

We are particularly keen to develop partnerships with other providers such as FPS and their in-country collaborators, to our mutual benefit.

Full details of the Fund's activities, including that of the Tasmanian Committee, can be found on our website: www.crawfordfund.org

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# Potentially Important Food Plants of Uganda

**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.

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**Preface**

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

The selection of plants included in this guide has been developed by Peracto SA working in a voluntary capacity using 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 guide 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 Uganda. This guide has been developed with the best intention to create interest and improve understanding of the important local food plants of Uganda. It may 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.

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

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

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

The authors and sponsors of this guide would like to see as many people as possible in Uganda read it use it. To achieve this the local names of food plants in as many Ugandan languages as possible is required. This issue of the book gives local names of foods in Luganda and Runyankole only. If you are able to assist with providing local names in other Ugandan languages, please contact Food Plant Solutions at info@foodplantsolutions.org

# Contents

## Introduction

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

**Growing food**

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

**A country with very special plants**

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

In many countries, some of the traditional food plants are only harvested from the wild and others are only known in small areas. Others have hundreds of varieties and are the main food for people in different regions. Information on all these plants, their food value and the pest and diseases that damage them is available in the Food Plants International database.

**Getting to know plants**

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

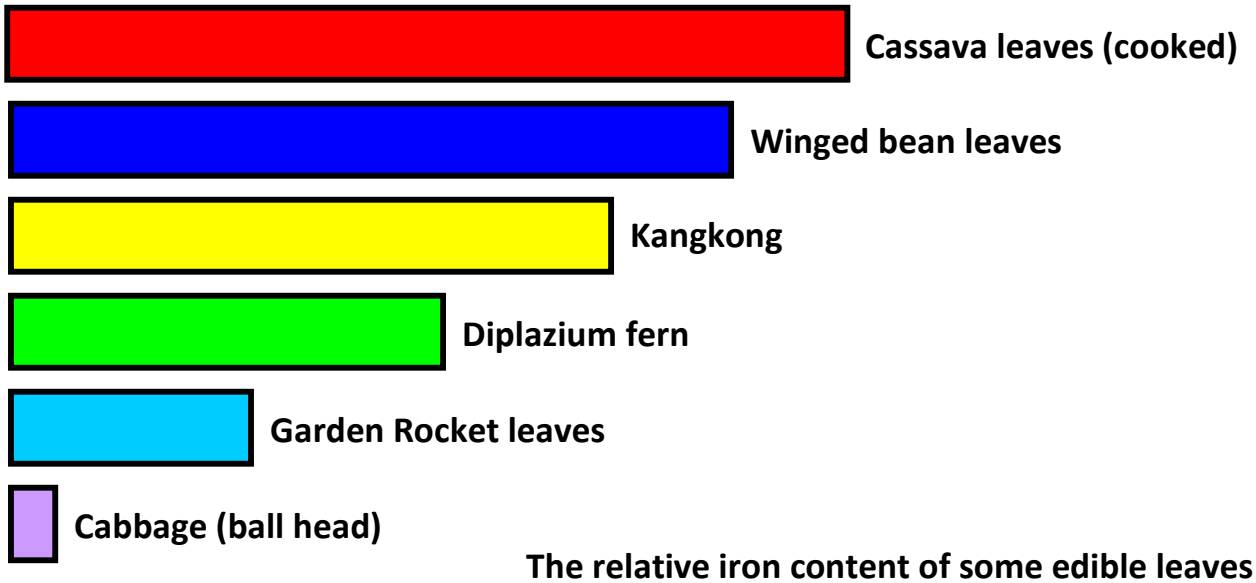
**Naming of plants**

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

**Local food plants are often very good**

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

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




**The relative iron content of some edible leaves**

**A healthy balanced diet**

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

**Learning to cook well**

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

**Learning to grow "wild" food plants**

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

**Saving better types of plants**

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

**Growing from cuttings and suckers**

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

**Saving seed**

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

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

**Growing a garden of mixed plants**

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

**Different types of plants for food security**

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

**Looking after the soil**

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

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

**Building up the soil**

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

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

**Poor soils where crops won't grow**

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

**Soil nutrients**

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

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

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

**Making compost**

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

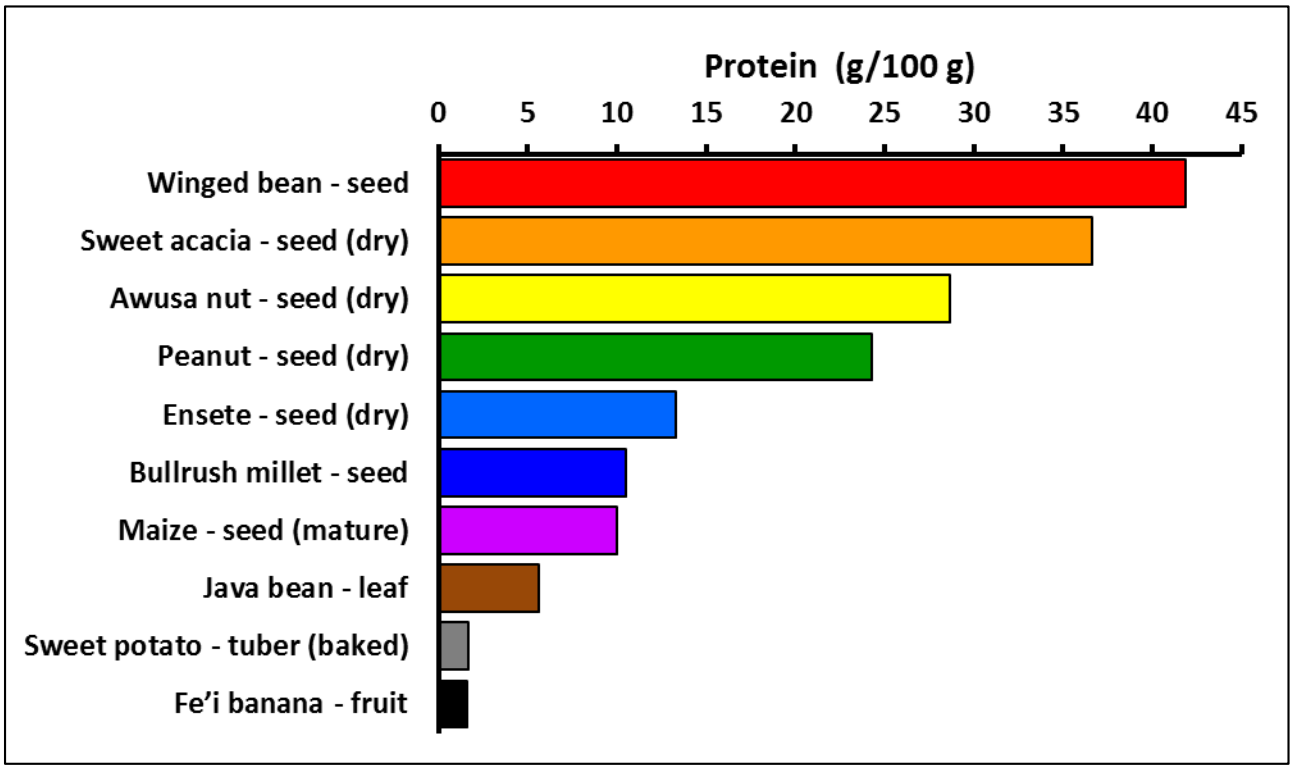
**Pests**

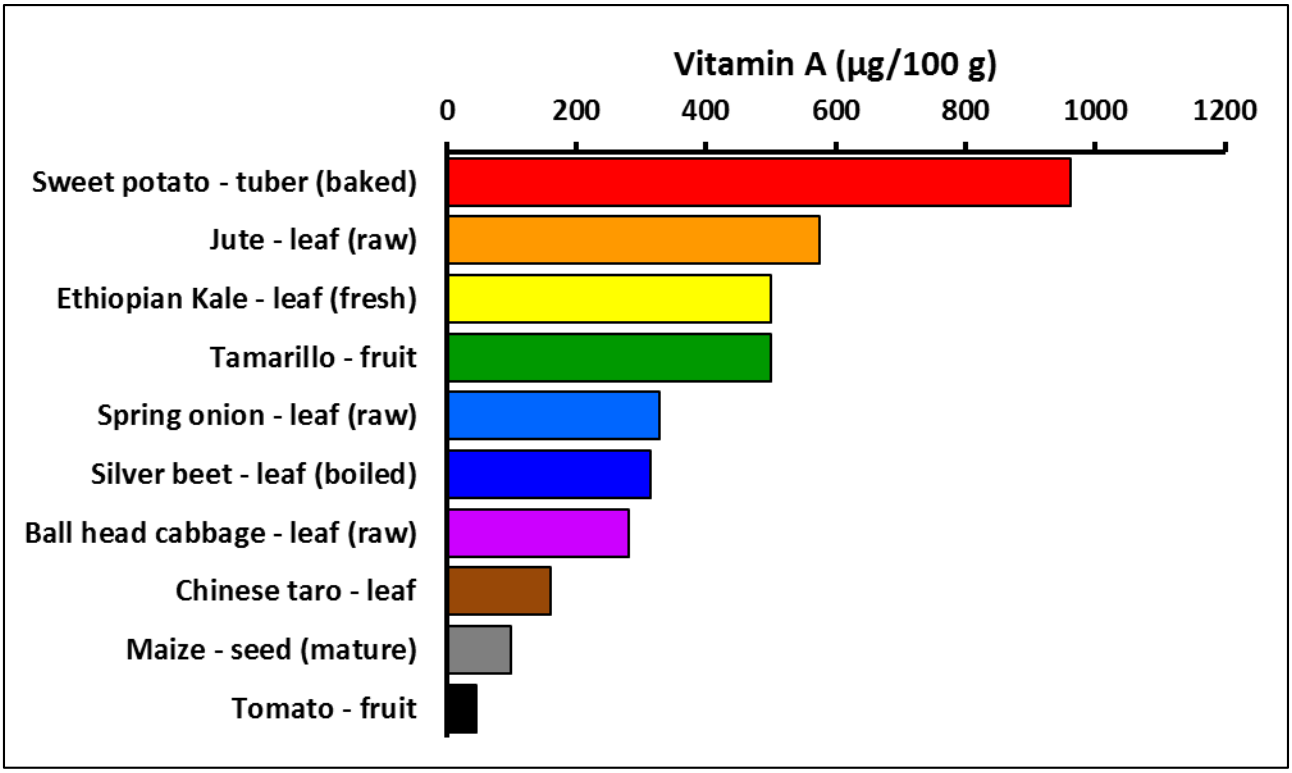
There are a large number of insects that enjoy sharing our food with us! We should not try to kill all these insects as they have an important role to play in keeping everything in nature in balance. What we need to do is to learn to manage these insects so we can all get some food to eat! Some insects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

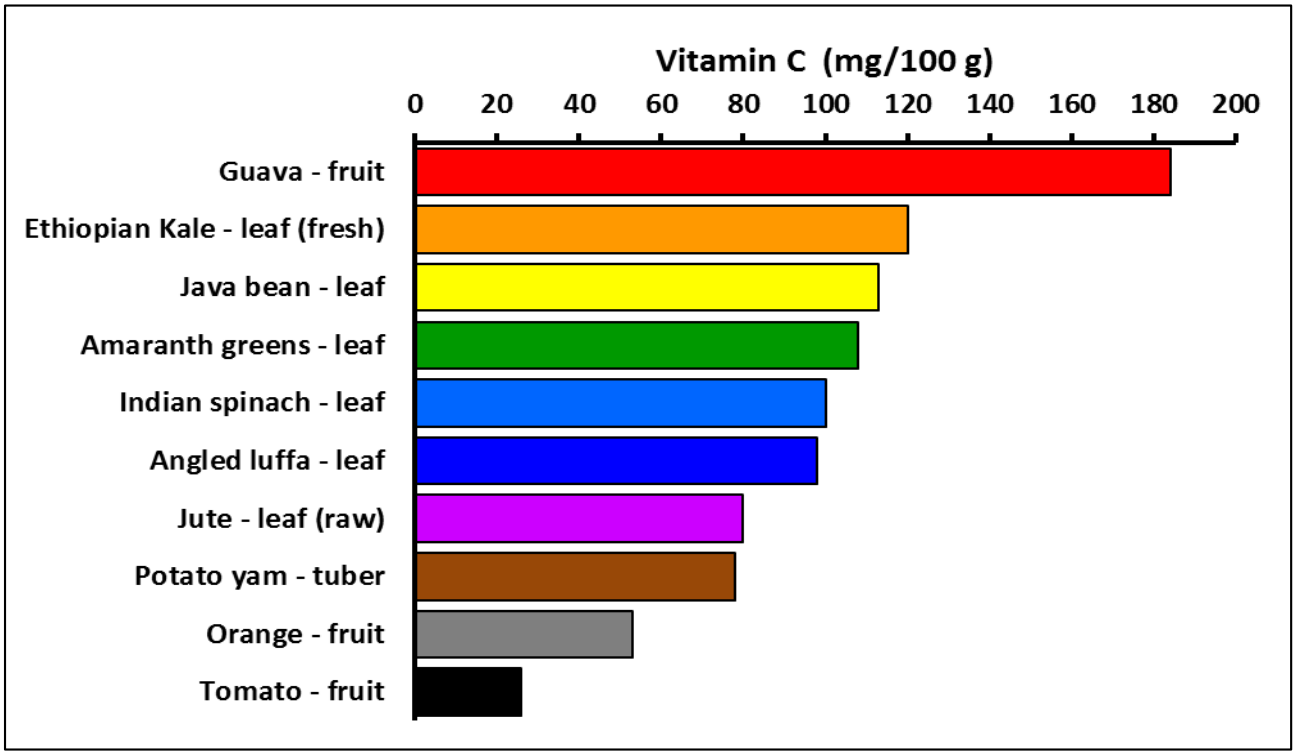
**Diseases**

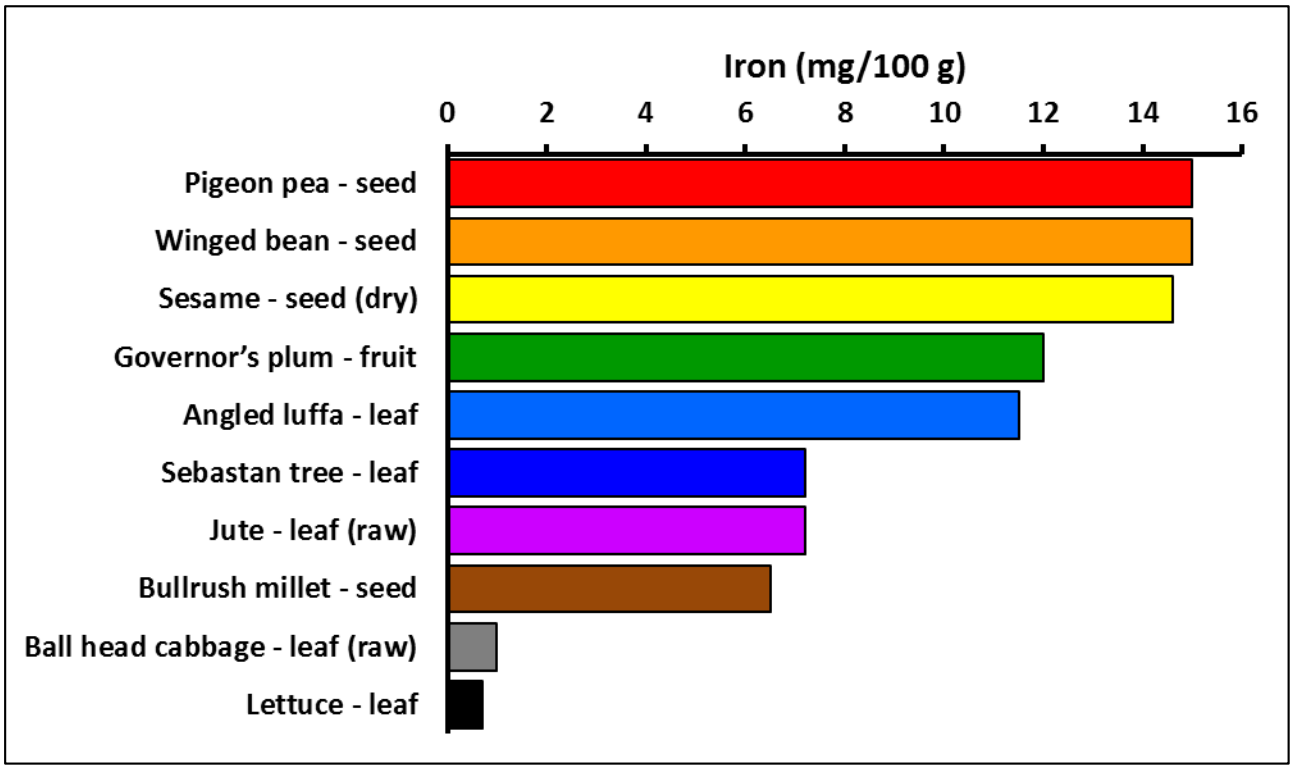
The living organisms that cause disease are much smaller than insects. These disease organisms can often only be seen with a microscope. There are three main kinds of disease organisms - fungi, bacteria and viruses. Fungi are like the mushrooms we eat, only very much smaller. They usually make distinct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

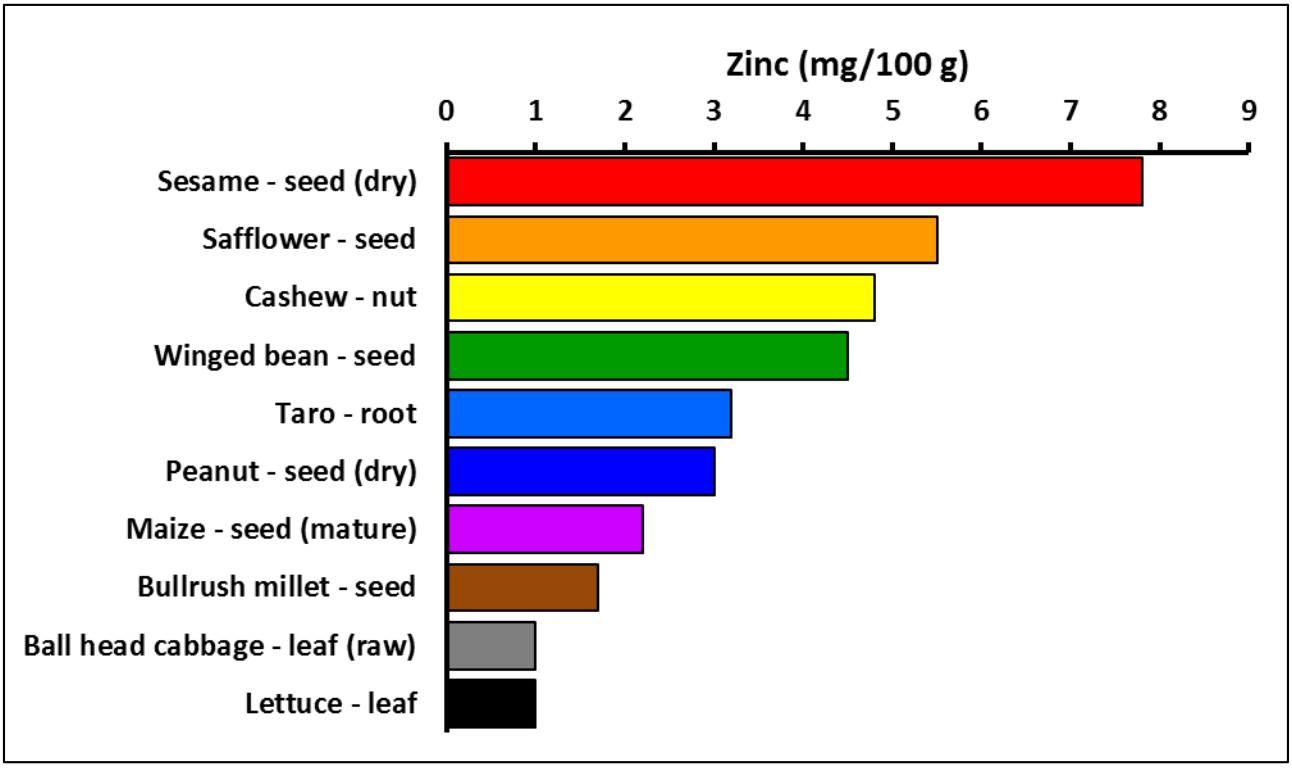
**Food value charts for a selection of plants from Uganda**




Vitamin C (mg/100 g)
0
20
40
60
80
100
120
140
160
180
200
Guava - fruit
Ethiopian Kale - leaf (fresh)
Java bean - leaf
Amaranth greens - leaf
Indian spinach - leaf
Angled luffa - leaf
Jute - leaf (raw)
Potato yam - tuber
Orange - fruit
Tomato - fruit


Iron (mg/100 g)
0
2
4
6
8
10
12
14
16
Pigeon pea - seed
Winged bean - seed
Sesame - seed (dry)
Governor's plum - fruit
Angled luffa - leaf
Sebastan tree - leaf
Jute - leaf (raw)
Bullrush millet - seed
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**: Cassava
**Local:** Muwogo (Luganda); Muhoogo (Runyankole)

**Scientific name:** *Manihot esculenta*
**Plant family: EUPHORBIACEAE**

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

**Distribution**: A tropical plant. Plants grow from sea level up to about 1,650 m. In Fiji they grow to 900 m. They can grow in poor soil and can survive drought. It is native to tropical America. It grows between 25°N and 25°S and needs a rainfall above 750 mm. It suits hardiness zones 10 - 12.

**Use**: The tubers are eaten after thorough cooking. They are boiled, roasted or made into flour. The starch is used in puddings, soups and dumplings. Young leaves are edible after cooking. They are also sometimes dried and stored. Seeds are also eaten. **Caution:** Bitter kinds of cassava contain poison but this is destroyed on heating. This kind of cassava should be cooked, sun dried, soaked and cooked again.

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

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

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

Because cassava can still grow satisfactorily in poorer soils it is often put last in a rotation after others crops have already been grown on the piece of land. Cassava is more responsive to nitrogen and potassium than phosphorus under many field situations. Nitrogen can increase cyanide levels. Under very acid conditions with high soluble aluminium levels, cassava has been able to achieve and maintain top growth but with significantly reduce root yields. When drainage is good and soil

moisture is adequate, cassava stalks can be planted at any orientation from horizontal to vertical, but in very sandy soils horizontal planting is best and in heavy clay soils vertical planting is best.

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

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

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

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

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

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

## Starchy staples

**English**: Potato yam
**Local:** Ndaggu (Luganda); Ekiyuni (Runyankole)

**Scientific name:** *Dioscorea bulbifera*
**Plant family: DIOSCOREACEAE**

**Description**: A yam with a long smooth stemmed vine, round in cross section and without spines. The vine winds to the left, can climb into trees and grow to long lengths. The large leaves (14 - 30 cm across and slightly longer than wide) have pointed tips and round bases. About 7 veins arise from the tip of the leaf stalk. It produces often flattened bulbils (potatoes) in the leaf angles along the vine. They can be grey brown or purple. The smaller tuber underground is normally covered with roots. The flowers are large. The male flowers are in spikes up to 20 cm long. The female spikes are usually in pairs. The winged fruit are about 2.5 cm long by 1.5 cm across. The seeds have wings. The bulbils normally have few fibres through the tissue compared to some yam tubers. Many varieties have yellow flesh.

**Distribution**: An annual tropical plant. It will grow from the coast up to about 1,700 m altitude in equatorial zones. It is common near the edge of grassland and forest at mid altitudes. Both wild and cultivated forms occur. It is common near secondary forest at low and medium altitudes.

**Use**: The cooked tubers aerial bulbils are eaten. Some kinds are bitter and inedible or at least require special processing and cooking. Some varieties are poisonous.

**Cultivation**: Either the vine bulbils or the underground tubers are planted. The long vines can be trained up trees. The bulbils need a set storage time before sprouting. The leaves die off for 1 - 4 months each year before re-sprouting from the tuber. Bulbils only grow shoots from one end unless the bulbil is cut into pieces. If larger bulbils are cut, the cut surfaces should be dried and healed in a shady place for 2 - 3 days before planting. Bulbils are planted 8 - 12 cm below ground at a spacing of about 100 cm by 100 cm. Nitrogen and potassium fertilisers give greater responses than phosphorus. Friable well drained soils are most suitable. Often little cultivation or mounding is done. A high level of organic matter improves yield. Strong staking is required with branched 2 m stakes, or with trees or living stakes. Vine and tuber growth can be extensive and heavy.

**Production**: Bulbils or aerial yams are produced as leaves begin to unfold, continue until plant maturity, and often fall. Harvesting can start 3 months after planting but immature tubers have less starch. Underground tubers are normally not harvested until leaf die back. Wounds and damage to the tubers normally heal naturally given dry aerated conditions. Some varieties have seasonally dormant aerial tubers which only grow after an extended storage period. Others germinate quickly.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| tuber | 70.8 | 357 | 2.7 | - | 78 | 3.1 | 0.4 |
| bulbil | 79.4 | 326 | 1.4 | - | - | 2.0 | - |

## Starchy staples

**English**: Taro
**Local:** Jjuuni (Luganda); Ekitekyere (Runyankole)

**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 their 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 | 100 | 2.7 | 424 | 35.5 | 1.2 | 0.2 |

## Starchy staples

**English**: Sweet potato
**Local:** Lumonde (Luganda); Ekitakuri (Runyankole)

**Scientific name:** *Ipomoea batatas*
**Plant family: CONVOLVULACEAE**

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

**Distribution**: A tropical and subtropical plant. They grow from sea level up to about 2,700 m altitude in the tropics. Plants can grow with a wide range of rainfall patterns and in different soils. Plants are killed by frost and can't stand water-logging. Plants grow well with temperatures between 21 - 26°C. It can grow with a pH between 5.2 - 6.8. Sweet potato are not tolerant to shading. Under shaded conditions, both foliage growth and storage root production are decreased. Some cultivated varieties can be selected for increased production under mild shade but not heavy shade. The survival of cuttings at planting is also reduced under shaded conditions. Under shaded conditions plant become more climbing and with fewer leaves which are however larger. With increasing shade less tubers are produced and these grow more slowly. Sweet potato tends to be responsive to potassium fertiliser. cultivated varieties are often selected for yield under low fertility conditions. Under lowland conditions in the tropics sweet potato tubers undergo active tuber enlargement from 6 - 16 weeks. Weed control is essential especially during early stages of growth. The rate of ground coverage by foliage varies greatly with growing conditions and cultivar but once ground coverage has occurred weed control is less of a problem. Sweet potato tuber initiation is subject to aeration in the soil. Either heavy clay soils, waterlogged conditions or other factors reducing aeration can result in poor tuber production. For this reason sweet potatoes are often grown on mounded beds. It suits hardiness zones 9 - 12.

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

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

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**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**: Esente
**Local:** Ekitembe (Luganda); Ekizirakoma (Runyankole)

**Scientific name:** *Ensete ventricosum*
**Plant family: MUSACEAE**

**Description**: A banana like plant that grows to 6 - 12 m tall. The lower part of the leafy false stem is swollen. Many different varieties exist. The leaves are bright green with an obvious red midrib. The leaves can be 5 m long and 0.9 m wide. The flower is a very large hanging spike 2 - 3 m long. The flowers are cream coloured. There is a single petal in a large red bract. The fruit resemble small bananas. They are 6 - 8 cm long and 3 cm thick. They have a yellow skin. The seeds are pea like and fill the fruit. The seeds are black and about 6 mm across.

**Distribution**: It grows in tropical Africa. It does best with a temperature of 18 - 28°C and a relative humidity of 60 - 80 %. In Ethiopia it grows between 1,500 and 3,000 m altitude but does best between 1,700 and 2,450 m altitude. In Malawi it is usually on the edges of forests or in sheltered gullies. It is damaged by frost or drought. It can grow in arid places. It suits hardiness zones 10 - 12.

**Use**: The fermented pulp (kocho) of the stem is eaten. It is used as a flour to make bread. The leaf bases and fresh corms are cut up and boiled as a vegetable. The milky white juice extract is allowed to ferment in pits lined with ensete leaves then cooked. The young flowers are eaten as a relish. The fruit are eaten only in times of food scarcity. It is the endosperm of the seeds that is eaten.

**Cultivation**: It can be grown by seed. It is normally grown by bud suckers or shoots. To get bud suckers, a 4 - 6 year old plant is cut off at 20 - 30 cm height. The central bud (which would normally grow one shoot) is removed and the hole filled with soil. The corm is then replanted into a manured pit about 5 days later. After 4 - 8 weeks this produces 40 - 200 buds. These can be separated and grown in a nursery for one year before being transplanted into the field. These plants are normally then transplanted to wider spacing after 2 years, and again after 4 years. Plants reach harvest maturity in 6 - 7 years. Suckers can be used for transplanting and reach maturity in 2 years. The final spacing for bud suckers is 3 m x 1.5 m. Large amounts of organic manure are often applied. Plants are harvested before the onset of flowering.

**Production**: An average family cultivates 200 - 400 plants per year and they eat about 10 - 20 plants per person per year. In Ethiopia, using 1,600 plants per hectare at a spacing of 2.5 m gave about 5,000 kg per hectare of refined product.

**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) | 12.4 | 1472 | 13.3 | - | - | - | - |
| pith | 56.3 | 715 | 1.2 | - | - | 5.3 | - |

## Starchy staples

**English**: Bullrush millet
**Local:** Muwemba (Luganda)

**Scientific name:** *Pennisetum glaucum*
**Plant family: POACEAE**

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

**Distribution**: A tropical plant that suits regions with a short growing season. It grows in areas with less than 600 mm of rainfall. It is replaced with sorghum between 600 - 1,200 mm rainfall and then by finger millet or maize above 1,200 mm rainfall. It is important in the drier areas of India and Pakistan. It can grow in arid places.

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

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

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

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 11.6 | 1442 | 10.5 | - | - | 6.5 | 1.7 |

## Starchy staples

**English**: Potato
**Local:** Obummonde obuzungu (Luganda)
Emondi (Runyankole)

**Scientific name:** *Solanum tuberosum*
**Plant family: SOLANACEAE**

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

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

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

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

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

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

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

## Legumes

**English**: Peanut
**Local:** Binyeebwa (Luganda); Ebinyobwa (Runyankole)

**Scientific name:** *Arachis hypogea*
**Plant family: FABACEAE**

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

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

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

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

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

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

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

## Legumes

**English**: Bambara groundnut **Scientific name:** *Vigna subterranea*
**Local:** Mpande (Luganda); Empande (Runyankole) **Plant family: FABACEAE**

**Description**: An annual plant that can be either a bunchy bush or a trailing plant. Often the creeping stems are near ground level. It often appears as if bunched leaves arise from branched stems near ground level. It has a well-developed taproot. The leaves have 3 leaflets. The leaf stalk is erect and thickened near the base. The end leaflet is slightly larger than the side leaflets. Leaflets are about 6 cm long by 3 cm across. The flowers are yellowish-white and occur in pairs. The flower/fruit stalk elongates after being fertilised and pushes into the soil. The fruit are pods which are round and have one seed. Some kinds have 3 seeds. This pod develops under the ground on a long stalk. The seeds are hard and are of many colours. Pods can be 3.7 cm long.

**Distribution**: It is a tropical plant that can grow in hot climates. It can also grow on poor soils. It does best with moderate rainfall and sunshine. It can tolerate drought. Long day-lengths can reduce or prevent pod development in some kinds.

**Use**: Seeds can be eaten fresh or roasted while immature. Mature seeds are hard so must be boiled before being used in cooking. Seeds can be dried and made into flour and used for baking. They can be popped like corn. The seeds are roasted as a coffee substitute. Young pods are cooked and used as a vegetable or in stews. The leaves can be eaten.

**Cultivation**: Plants are grown from seed. Plants are often put in rows 50 cm apart and with 15 cm spacing between plants. Ridges are formed to enable the pods to penetrate the soil. It is mostly grown intercropped with other plants. Soil should be light and friable and the seed bed loose and fine. Normally the whole plant is pulled up for harvesting. Any pods which become detached are harvested by hand. Pods are dried in the air before threshing.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 7.3 | 1572 | 18.4 | - | - | 4.6 | 2.2 |
| seed (boiled) | 66.4 | 578 | 7.7 | - | - | 1.4 | 1.1 |

## Legumes

**English**: Pigeon pea
**Local:** Mpinnamiti (Luganda); Entondiigwa (Runyankole)

**Scientific name:** *Cajanus cajan*
**Plant family: FABACEAE**

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

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

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

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

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

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

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

## Legumes

**English**: Lima bean
**Local:** Ebigaaga (Luganda); Ebihindihindi (Runyankole)

**Scientific name:** *Phaseolus lunatus*
**Plant family: FABACEAE**

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

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

**Use**: The leaves, young pods and seeds are all eaten. The seeds are eaten fresh or after drying. They are also fried in oil. Dried beans are boiled or baked. They can be used in soups and stews. The seeds are sometimes grown as bean sprouts then cooked and eaten. **Caution:** Some kinds have poison (hydrocyanic acid). This is destroyed by thorough cooking. The beans contain a protein inhibitor but this is also destroyed by cooking.

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

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

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 12.0 | 1407 | 19.8 | - | - | 5.6 | - |
| seed (young, cooked) | 67.2 | 515 | 6.8 | 37 | 10.1 | 2.5 | 0.8 |
| seed (young, raw) | 70.2 | 473 | 6.8 | 30 | 23.4 | 3.1 | 0.8 |

## Legumes

**English**: Java bean
**Local:** Yekeyeke (Luganda)

**Scientific name:** *Senna obtusifolia*
**Plant family: FABACEAE**

**Description**: An annual or perennial herb that grows 0.6 - 2.5 m tall. The leaf has leaflets in 3 pairs that are oval and 1 - 6 cm long by 0.5 - 3.9 cm wide. The top of the leaf is rounded but with a sharp tip. It is wedge shaped at the base. The flower stalks have 1 or 2 flowers. The stalk for the flower cluster is very short, but the stalk for the individual flowers is 1 - 3.5 cm long. The flower petals are orange-yellow and 1 - 2 cm long. The fruits are thin, slightly curved and tapering pods. They are 13 - 23 cm long and 4 - 7 mm wide. The seeds are brown. They are 4.5 - 6.5 cm long by 2 - 4mm wide.

**Distribution**: A tropical plant that grows throughout the tropics. It is mostly a weed of roadsides and waste places. It grows from sea level to 2,000 m altitude. It grows along rivers and near lakes. In Africa it grows up to 1,700 m altitude. It can grow in arid places.

**Use**: The young leaves are cooked and used as a vegetable. The leaves are fermented into a high protein supplement to meat. The juice during fermentation is made into a stew with okra, beef and salt. The seeds are occasionally dried and ground into powder and cooked and eaten. Seeds are also roasted and used as a coffee substitute. **Caution:** Older leaves can cause diarrhoea. The seeds are possibly poisonous and should be well cooked.

**Cultivation**: It can be grown from seed.

**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 | 79.7 | 251 | 5.6 | - | 113 | 5.9 | - |

## Legumes

**English**: Winged bean
**Local:** Omwitanjoka (Runyankole)

**Scientific name:** *Psophocarpus tetragonolobus*
**Plant family: FABACEAE**

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

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

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

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

**Production**: The first green pods are ready about 10 weeks after sowing. Tubers are ready after 4 - 8 months. Seed yields of 1.2 tons/ha and tuber yields of 4 tons/ha are possible. A single plant can produce up to 75 pods. Dry bean yields of 45 - 330 g per plant can be produced depending on variety. Tuber yields of 5,500 - 12,000 kg per hectare have been produced. Seeds can contain a trypsin inhibitor which reduces protein digestibility. This inhibitor is destroyed by soaking seeds then boiling them well. Tubers can also contain this chemical and need to be well cooked.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 8.5 | 1764 | 41.9 | - | - | 15.0 | 4.5 |
| pod (fresh) | 92.0 | 105 | 2.1 | - | - | - | - |
| leaf | 95.0 | 197 | 5.0 | 809 | 30 | 6.2 | 1.3 |
| seed (young) | 87.0 | 205 | 7.0 | 13.0 | 18.3 | 1.5 | 0.4 |
| root | 57.4 | 619 | 11.6 | - | - | 2.0 | 1.4 |

## Leafy Greens

**English**: Ethiopian kale
**Local:**

**Scientific name:** *Erucastrum arabicum*
**Plant family: BRASSICACEAE**

**Description**: An annual creeping herb that grows along the ground. It grows each year from seeds. It grows 1 m high. The slightly hairy leaves are in a ring and are grey-green. The leaves are divided and 18 cm long by 5 cm wide. The large lobe at the end is rounded. The flowers are yellow. They are on long slender shoots. The fruit is a long slender capsule. It can be 5 cm long. The seeds are brown.

**Distribution**: It is a tropical plant that grows in areas with an annual rainfall of 1,100 - 1,900 mm. It can grow in arid places. A cold tolerant plant that is able to grow in high altitudes with rainfall from 60 - 1,600 mm. In Ethiopia it grows in the highlands, while in Kenya it grows from sea level to 2,500m altitude.

**Use**: The young leaves and stalks are eaten after cooking. The roots are removed and the leaves and stalks are boiled for an hour. It can cause the skin to become dry and also produce sleepiness. The leaves are used in soups.

**Cultivation**: Ethiopian kale is grown from seeds that will germinate quickly in moist soil. It is short lived, taking 2 months to grow from seed to produce seed. Before planting, seeds can be mixed with ashes to reduce seedling disease. It responds well to soil fertilization and manuring.

**Production**: Foliage is harvested 35 - 40 days after planting. Tops are frequently cut off the plant at a height of 15cm to promote leaf enlargement. Seed is shed from the pod at maturity and can remain dormant in the soil for several seasons.

**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) | 84 | 200 | 4.0 | 500 | 120 | 1.5 | 0.6 |

Nutritional data obtained from
http://ndb.nal.usda.gov/ndb/foods/show/3030?fg=&man=&lfacet=&format=&count=&max=25&offset=&sort=&qlookup=Kale

## Leafy Greens

**English**: Jute
**Local:** Okura (Luganda); Okura (Runyankole)

**Scientific name:** *Corchorus olitorius*
**Plant family: MALVACEAE**

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

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

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

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

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

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

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

## Leafy Greens

**English**: Rocket
**Local:**

**Scientific name:** *Eruca vesicaria* subsp. *sativa*
**Plant family: BRASSICACEAE**

**Description**: A cabbage family herb. It is an annual plant. It grows to a height of 1 m and spreads to 0.5 m across. It has a taproot. The stem is erect and slender with few branches. The leaves are bright green and occur opposite each other. The leaves have deep lobes. The flowers are white or pale yellow with purple veins. There are 4 petals. The fruit are 1-4.5 cm long. They are beaked and erect. There are many seeds which are round and 1-2 mm across.

**Distribution**: It is native to Mediterranean regions. It will grow on most well-drained soils. It prefers an open, sunny position. It is drought and frost resistant. It can grow on poor soils and with low rainfall. It suits hardiness zones 7-10. In the tropics it grows up to 2,100 m altitude. It can grow in arid places.

**Use**: The young leaves are used as a salad vegetable. They are tender, bitter and slightly mustard flavoured. Older leaves can be pureed and used in soups and sauces. The seeds are eaten or used in pickle and Persian mustard. The seeds can be used for edible oil. The flowers are used as a garnish.

**Cultivation**: Plants are grown from seed. Seeds germinate in about 1 day at 25°.

**Production**: It should be grown using high nitrogen levels to assist rapid growth and reduce bitterness. Leaves are picked before flowering to give a milder taste. Leaves can be harvested after about 3-4 weeks.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed | 6.3 | 2023 | 17.8 | - | - | - | - |
| leaf | 91.7 | 105 | 2.6 | 35 | 15.0 | 1.5 | 1.5 |

Image sourced from: http://www.bbc.co.uk/gardening/plants/plant_finder/plant_pages/293.shtml

## Leafy Greens

**English**: Amaranth greens
**Local:** Doodo (Luganda); Doddo (Runyankole)

**Scientific name:** *Amaranthus hybridus*
**Plant family: AMARANTHACEAE**

**Description**: An upright annual herb that grows 80 cm - 2 m tall. It is often green but can be dark red. The leaves are simple and alternate, oval shaped and can be 15 cm long. The flowers can be red, yellow or white. They occur in spikes at the top of the plant and in the axils of leaves. The seeds are small, shiny and black.

**Distribution**: A tropical plant that grows well in fertile soil. It can grow in warm temperate places as well as the tropics. In Kenya it grows from 900 - 2,600 m above sea level.

**Use**: The leaves and young shoots are cooked and eaten. They are also dried.

**Cultivation**: Plants are grown from seeds.

**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 | 87.4 | 189 | 4.9 | - | 108 | 5.7 | - |

Image source from: https://en.wikipedia.org/wiki/Amaranthus_hybridus

## Leafy Greens

**English**: Edible hibiscus
**Local:**

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

**Description**: A branched shrub up to 2 m or more high. It has smooth, green, rounded twigs. The large leaves are simple and smooth, can vary in shape and have 3 - 5 lobes. They are normally very dark green, but pale green types can occur. The leaf stalks are 6 - 13 cm long and stalks can be green or have red colours on them. The hibiscus-like flowers are borne singly and are yellow with dark purple centres. They are produced on mature bushes. The fruit pods are a dry capsule with many small seeds, and are rather stiff or have bristly hairs. Plants can last for several years.

**Distribution**: It is grown in many Asian and Pacific countries. It is well-suited to the tropical lowlands, but grows only poorly at an altitude of 1,800 m. It needs fertile soil. Plants will withstand occasional short periods of temperatures, down to about -5°C, so long as they are in a very well-drained soil. It suits areas with high humidity. It suits hardiness zones 10 - 12.

**Use**: Young leaves are cooked and eaten. They are slimy unless steamed or fried. It is a very nutritious plant.

**Cultivation**: It is normally grown from cuttings. Lengths of about 25 cm (2 or 3 leaf joints or "nodes") of fresh, green, stem cuttings are used. These are stuck in the ground. It can be grown from seeds. The narrow-leafed types tend to compete less well with weeds. In some areas, people tend to put the narrow-leafed types in the middle of the garden cropped amongst sweet potato, and the broad-leafed types near stumps or logs and around the edges of gardens. The pale, green-leafed types grow slowly. A fertile soil is needed. It can be planted in good soil in a newly cleared garden site or near houses where the soil fertility can be built up by adding food scraps, compost and ashes. The growth and colour of the leaves can be improved greatly by spraying the leaves each 2 - 3 weeks with a very small amount of nitrogen fertiliser (urea), dissolved in water (0.5% solution). This uses less fertiliser than putting it on the ground where it can wash away in the rain. Picking the tips off branches of the plants encourages the plant to produce more branches and leaves. If too many leaves are picked off the one bush at the one time when harvesting, it slows down the growth of more leaves. If the soil is very fertile, older bushes, which are only growing a few leaves, can be chopped off and the stump will regrow into a new bush. It is a very fast growing and productive food plant in the hot, humid tropics.

**Production**: Leaves are ready to harvest after about 80 days. Yields of 6.7 - 7.3 t/ha/crop have been recorded.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| leaf | 88 | 120 | 3.4 | 1.0 | 7.0 | 1.5 | 1.2 |

## Leafy Greens

**English**: Silver beet
**Local:** Silivabbiiti (Luganda)

**Scientific name:** *Beta vulgaris* subsp. *cicla*
**Plant family: CHENOPODIACEAE**

**Description**: A broad-leaf, annual plant. Stalks are smooth and often white with a dark green leaf. A clump of stalks and leaves are produced from the base. Plants can also be blue. The leaves can be 12 - 25 cm long. The flowers are small and greenish and occur in slender clusters. The fruit are dry and spiny.

**Distribution**: It needs to be over at least 500 m altitude in the tropics, and is mostly grown from 1,000 - 2,600 m altitude. It can tolerate frost.

**Use**: The leaves and stalks are cooked and eaten. The stalks of leaves can be cut from the leaf and cooked separately as an asparagus substitute. They can be braised and served with buttered breadcrumbs. Some kinds have edible roots.

**Cultivation**: It is grown from seeds. Under tropical conditions it is not normally possible to save your own seed. In cold climates, plants need to be sown when conditions are warmer so that the plants do not go straight to flower. A spacing of 30 cm between plants is suitable. Seed is sown 2.5 cm deep.

**Production**: The first leaves are ready after 8 - 10 weeks and can produce for 2 years. Only the outer leaves are picked off.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| leaf (boiled) | 92.7 | 84 | 1.9 | 314 | 18 | 2.3 | 0.3 |
| leaf (raw) | 92.0 | 80 | 1.8 | 330 | 30 | 1.8 | 0.4 |

## Leafy Greens

**English**: Indian spinach
**Local:** Doodo (Luganda)

**Scientific name:** *Basella alba*
**Plant family: BASELLACEAE**

**Description**: An annual or perennial climbing herb with thick fleshy leaves. The vine is smooth and juicy and can be 10 m long. It branches freely. The vine and leaves can be red or green. The leaves are fleshy and pointed at the tip. They can be 8 - 18 cm long and 8 - 10 cm across. They are carried alternately along the vine. Leaves can be heart shaped or oval. It has white, pink or red flowers in short spikes which are in the axils of the leaves. The fruit are round and soft. They can be red, white or black and are 6 - 8 mm across. The seeds are round and black. They are 3 mm across. (Often the ones with heart shaped leaves are called *Basella cordifolia*, the ones with a red stem *Basella rubra* and the short day flowering dark green kind *Basella alba*.)

**Distribution**: A tropical plant. It occurs mostly in the tropical lowlands and is best below 500 m but will grow up to about 1,600 m. in the equatorial tropics. It will grow quite well in the temperature range 15 - 35°C. It does not like water-logging but can survive 4 - 12 weeks drought once well established. It requires adequate water during the growing season. The best pH is 5.5 - 7.0. It cannot tolerate salty conditions. Flowering does not occur when day lengths are over 13 hours.

**Use**: The young shoots and leaves are eaten cooked. They are somewhat slimy. In soups and stews the mucilage can be used as thickening. The purple colour of fruit is harmless and is used to colour vegetables and agar-agar. Some lemon juice added to the dye enhances the colour. The leaves can be eaten raw in salads or cooked like a vegetable. The leaves are used to make tea and can also be dried and stored. The seeds can be crushed to use as an edible dye for jellies.

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

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

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| leaf | 85.0 | 202 | 5.0 | 56 | 100 | 4.0 | - |

## Fruit

**English**: Chemedak
**Local:** Ffene (Luganda); Ekifenensi (Runyankole)

**Scientific name:** *Artocarpus integer*
**Plant family: MORACEAE**

**Description**: An evergreen tree up to 20 m tall. Trees form many branches but have one or two main trunks. Leaves of young trees have 1 or 2 lobes but mature leaves are long (15 cm) and entire. They are leathery, deep green and glossy. Flowers occur on spikes, on stalks from the trunk or main branches. Generally male flowers are on short stalks among the leaves, and female flowers are on trunks. Male flowers are 5 cm long by 2 cm wide and are dull green. Female flowers are bright green. The very large spiny fruit grow on main branches and the trunk.

**Distribution**: A tropical plant, jackfruit grows in the tropical lowlands and up to about 1,200 m altitude. It can stand some drought, but not water-logging. Trees do best where there is year round rainfall. It yields poorly where humidity is low. It does best in a well-drained, frost-free location that is warm and sunny. It suits areas with a temperature range 22 - 35°C. Trees can survive occasional frosts down to 0°C.

**Use**: The flesh of ripe fruits can be eaten raw, fried, preserved in syrup, dried, cooked in milk or made into alcoholic drinks. Unripe fruit can be cooked and eaten as a vegetable or pickled. Seeds in some varieties are boiled. The young leaves and flowers are edible and are eaten mixed with chilies, fish paste, sugar, salt etc.

**Cultivation**: Trees are usually sown from seeds, but it is best to sow them in their final location as the plants don't transplant easily. They have a long delicate taproot which makes transplanting difficult. Fresh seed (less than 4 weeks old) must be used. If fresh seeds are planted immediately they grow more quickly and more seeds germinate. It is better to use larger seed. The fleshy layer around the seeds should be removed. Seeds can be soaked in water for 24 hours to give better germination. Because trees vary in their growth rate, how quickly they flower, fruit and the fruit quality, it is best to grow plants by using vegetative parts from good trees.

**Production**: Jackfruit is a fast growing tree. They can be 7 m tall by 3 years old. Trees begin bearing fruit after about 8 years. The fruiting season lasts about 4 months in sub-tropical places, but fruit can be produced year round in the tropics.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| fruit (raw) | 68.8 | - | 1.8 | - | - | - | - |

Image sourced from: http://www.flickriver.com/photos/tags/artocarpusinteger/interesting/

## Fruit

**English**: Fe'i banana
**Local:** Ndiizi (Luganda)

**Scientific name:** *Musa troglodytarum*
**Plant family: MUSACEAE**

**Description**: A large herb that forms clumps. It keeps growing from year to year. It grows 4 - 5 m tall and has a stout false stem. This often has a purple tinge. It secretes blood red sap. The leaves are long and dark green. The flower is erect and bears thick, blunt, fleshy fruit. These may have a few or no seeds. The fruit are orange to orange-red when ripe and are 10 - 20 cm long. There are 5 - 30 fruit in a cluster.

**Distribution**: A tropical plant that suits the hot, wet tropical lowlands. It grows among inland mountain regions in Fiji.

**Use**: The starchy fruit are eaten cooked. **Caution:** The yellow flesh turns the urine red.

**Cultivation**: Plants are grown by division using suckers.

**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 |
|---|---|---|---|---|---|---|---|
| fruit | 70 | 526 | 1.6 | 12 | 0 | 0.5 | 0.3 |

## Fruit

**English**: Guava
**Local:** Mapeera (Luganda); Amapeera (Runyankole)

**Scientific name:** *Psidium guajava*
**Plant family: MYRTACEAE**

**Description**: A small evergreen tree 8 - 10 m tall with smooth, mottled bark which peels off in flakes. It is shallow rooted and branches close to the ground. 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 skin 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 humid and dry tropical climates and does best in sunny positions. It is killed by frost and fruits better where there is a cooler season. Temperatures near 30°C are best. It grows in open areas and secondary forests, and can become weedy in some conditions. It prefers a well-drained soil with good organic matter, but can stand 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 seed but seedling trees vary in quality. Seeds remain viable for a year or longer, and usually germinate in 2 - 3 weeks, but can take 8 weeks. Trees can be propagated by budding or grafting, and by layering, root cuttings or stem cuttings if hormones are used. Tips are used for stem cuttings and grown under mist at 28 - 30°C with bottom heat. Suckers can be used. Vegetative propagation preserves better fruit types. Trees self-sow in the lowland tropics. As fruit are produced on new season's growth, pruning does not greatly affect fruiting. Trees should be managed to give the maximum number of vigorous, new shoots and can be pruned for shape. Trees can be grown at 2.5 m within rows and 6 m apart between rows.

**Production**: Seedling trees begin to bear 2 - 3 years after transplanting. Pruning back the tips slightly increases fruit production. Tree-ripened fruit taste best. 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**: Governor's plum
**Local:**

**Scientific name:** *Flacourtia indica*
**Plant family: FLACOURTITACEAE**

**Description**: A shrub or small tree that grows 5 - 15 m tall. The trunk is crooked and low branched and armed with scattered slender spines. The leaves are alternate, pointed at the base and rounded at the tip. The edges of the leaves are toothed with rounded lobes. Leaves are dark green on top and pale green underneath. They are 6 - 17 cm long and 3 - 7 cm wide. Male and female trees occur. The flowers are small and white; occur singly or in pairs in the axils of leaves or near the ends of short branches. The edible fruit are rounded, fleshy, purple or nearly black. They are smooth and about 1 cm across. The flesh is yellowish, juicy and acid. There are 6 - 10 small flattened seeds inside.

**Distribution**: A tropical plant that grows in the lowlands. They thrive in dry, shrubby areas at low altitudes. Trees grow in coastal areas and up to 700 m or higher. In Africa it grows from sea level to 2,400 m above sea level. It grows in sub-tropical, broadleaved, evergreen forest. It can grow in arid places. It also grows on limestone.

**Use**: The fleshy pulp of the fruit is eaten raw when ripe or can be cooked and eaten or made into jelly. Fruit can be dried and stored.

**Cultivation**: Trees are normally grown from seed. Because the seeds have a hard seed coat it helps to scratch the seed to assist germination. Cuttings and air layering can be used. Groups of trees containing both male and female trees need to be grown from root suckers or by budding. Some kinds are self-pollinating. A spacing of 12 - 16 m apart is needed.

**Production**: Fruit matures in 60 - 90 days from pollination.

**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 | 69.5 | 452 | 0.5 | 15 | 14 | 12 | - |

## Fruit

**English**: Tamarillo
**Local:** Tugunda (Luganda); Ekitugunda (Runyankole)

**Scientific name:** *Cyphomandra betacea*
**Plant family: SOLANACEAE**

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

**Distribution**: A subtropical plant suited to tropical highlands. It grows at 750 - 2,200 m altitude in the equatorial tropics, and up to 3,000 m in the continental tropics. It is more cold hardy than tomato, and does best where average temperatures are 15 - 21°C. It cannot stand much frost, although mature trees will survive short periods of light frosts. It can't stand water-logging or drought. Trees can grow under shade but do better in sun, unless it is hot and dry. Deep, fertile, permeable, disease-free soil is best. Plants don't fruit at low altitudes in the tropics due to constant high temperatures. They need shelter from wind. It suits hardiness zones 9 - 11.

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

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

**Production**: Fruiting commences in the second year when grown from seed. Trees bear hundreds of fruit throughout the year. Yields of 20 kg per plant are possible. Trees live 5 - 6 years, although if infested with root knot nematodes, may live only 3 - 4 years. Fruit are ready to harvest when the red or yellow colour develops. Fruit can be stored above 3°C in a refrigerator for 10 weeks.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| fruit | 86.2 | 113 | 2.0 | 500 | 28 | 0.7 | - |

## Fruit

**English**: Sebastan tree
**Local:**

**Scientific name:** *Cordia myxa*
**Plant family: BORAGINACEAE**

**Description**: A shrubby, evergreen tree that grows to 12 m tall. The trunk can be 1 - 1.5 m wide. The leaves are broad and pointed and have teeth along the edges. The male and female flowers are white or cream and in loose panicles at the ends of branches. The fruit are small and nutlike. They are yellow, orange-pink or black and have sweet, sticky flesh.

**Distribution**: A tropical plant that grows on rocky soils.

**Use**: The leaves are boiled in water then mixed with salt and chilli peppers. The flowers, young and ripe fruit and seed kernels are eaten. They are mixed with honey to make a sweetmeat. The young fruit are pickled.

**Cultivation**: Plants can be grown from seed. Seeds are soaked in cold water for 6 hours before planting and then germinate in 40 - 60 days. Seedlings in a nursery can be planted out after 4 - 6 months. Stem cuttings can also be used to grow plants.

**Production**: It is fairly fast growing. It starts flowering when 3 - 5 years old. It flowers and fruits all year round. Fruit ripen in 30 - 45 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 |
|---|---|---|---|---|---|---|---|
| nut (dried) | 5.6 | 2103 | 34.8 | - | - | - | - |
| fruit | 66.4 | 577 | 2.1 | - | - | 0.3 | 0.6 |
| leaf | 64.0 | 272 | 5.1 | - | - | 7.2 | - |

## Fruit

**English**: Pineapple
**Local:** Naanansi (Luganda); Enanansi (Runyankole)

**Scientific name:** *Ananas comosus*
**Plant family: BROMELIACEAE**

**Description**: A perennial herb with a rosette of long, thick, spiky leaves, up to 1 m high and spreading 1 - 1.5 m. The leaves are arranged in spirals. Some kinds have thorns along the edges of the leaves. The plant produces suckers, both near the base of the stem and also higher up the stem near the fruit. These are called slips, or suckers, and are broken off and used for planting. The main plant dies after producing a fruit, but the suckers keep growing. The plant produces a flower and fruit at the end. The fruit is made up of about 150 berry-like fruitlets that are almost fused together. There is a small crown of leaves on top of the fruit. The fruit can be 25 cm long and weigh 0.5 - 4 kg. There are two main types of pineapples. The rough-leafed variety has spines on the leaves and produces a smaller but sweeter fruit. The smooth leaf variety has spineless leaves and larger fruit.

**Distribution**: The plant has been taken to most tropical and subtropical places. It is a tropical plant. It grows up to 1,800 m altitude near the equator. It can survive brief periods down to freezing, but cold retards growth, delays fruiting, and causes fruit to be more acid. A loose, well-drained soil with high organic matter is best. It can survive drought, but adequate soil moisture is necessary for good fruit production. Pineapples need an annual average temperature of 17.2 - 26.9°C. Growth ceases below 20°C. In the equatorial tropics, this is mostly between sea level and 1,800 m altitude. Pineapples need well-drained and fertile soil. It suits an acid soil and can develop roots in soils where lime has been added. The soil acidity can be between pH 3.3 - 6.0. The best range is pH 4.5 - 5.5. Soils which are not sufficiently acid can be treated with sulphur. It suits hardiness zones 9 - 10.

**Use**: The fruit is eaten fresh or used for juice. Unripe fruit are also cooked and eaten. The young, heart-leaves can be eaten. It is an attractive and popular snack food.

**Cultivation**: The suckers, slips, and the top of the fruit, can be used for planting. The time to maturity is the fastest for the suckers near the bottom of the plant and slowest when the top of the fruit is planted. Therefore, use suckers that grow from the stem near the ground for earliest yield. Pineapple flowering hormone can be used for fruit production with thorny varieties and calcium carbide for smooth varieties. Fruiting is less seasonal in the highlands than in the lowlands. Pineapples can be planted with 35,000 - 43,000 plants/ha or 3 - 4 plants per square metre. If plants are spaced more widely, they produce more suckers. Fruits become more acid where plants are closely spaced. If too many suckers are left growing from the main plant, then smaller fruit will be produced. They can grow in partial shade and, in this situation, the plants are normally more green. The red colouring of pineapple leaves is due to a deficiency of the nutrient nitrogen. This shows up more quickly in plants in full sunlight. When the plant is sufficiently large, it responds to changes, such as less available nutrients or water, and starts to produce a flower, then a fruit. The number of hours of sunlight, as well as reducing temperature and reduced sunlight, also help the flowers form. The result of this is that flowering and fruiting is often seasonal. This can easily be changed by using a fruiting hormone which allows fruit to be produced at times to suit the grower. Pineapples can grow in semi-arid conditions because the leaves can store some water. They also tend to lose only small amounts of water from evaporation through their leaves, but they can grow

well with plenty of water. The roots are very sensitive to water-logging, so the soil must be well-drained. Pineapples do not cover the soil well, so it is good to use a mulch of plant material to help weed control, provide some nutrients and to stop soil erosion.

**Production**: Plants usually produce for about 4 years. Fruiting is less seasonal in the highlands than in the lowlands in the tropics. The growth rate for pineapples slows at cooler temperatures. Plants grown in the highlands, or at higher latitudes, take longer to mature. It takes 60 days from when the flower starts to form until the fruit appears, then a further 5 months until the fruit is ready for harvest. The time from planting to harvesting ranges from 11 - 32 months, depending on temperature. The fruit are smaller, poorer shape and more acid where the temperatures are lower or there is less sunlight.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| fruit | 84.3 | 194 | 0.5 | 60 | 25 | 0.4 | 0.1 |

## Fruit

**English**: Buffalo thorn
**Local:** Enkenene (Luganda); Enkyereere (Runyankole)

**Scientific name:** *Ziziphus mucronata*
**Plant family: RHAMNACEAE**

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

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

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

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

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

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| fruit | 56.4 | 659 | 3.8 | - | 42.6 | 1.0 | 0.5 |

## Vegetables

**English**: Maize
**Local:** Kasooli (Luganda); Ekicoori (Runyankole)

**Scientific name:** *Zea mays*
**Plant family: POACEAE**

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

**Distribution**: A warm temperate plant. Seeds need a soil temperature of more than 10°C to germinate. It grows best at less than 1,800 m altitude in the equatorial tropics. It is grown in most areas of Asia and has been grown from sea level to 3,300 m in the Americas. It tends to be grown in areas too dry for rice but wetter than for millets. Maize must have over 120 days frost free.

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

**Cultivation**: It is grown from seeds. It is normal to plant one seed per hole at 1 - 2 cm depth. A spacing of about 30 cm between plants is suitable. Seed should be saved from gardens of over 200 plants and the seed from several cobs mixed to avoid inbreeding depression.

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

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed (mature) | 10.4 | 1528 | 10.0 | 100 | 4 | 4.9 | 2.2 |

## Vegetables

**English**: Spring onion
**Local:** Bukoola bwa butungulu (Luganda)
Obutunguru (Runyankole)

**Scientific name:** *Allium fistulosum*
**Plant family: AMARYLLIDACEAE**

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

**Distribution**: A temperate plant that prefers a sunny position and a light, well-drained soil. It prefers a soil pH in the range 6.5 - 7.5, but it tolerates a pH in the range 4.9 - 7.5. A hardy plant which produces leaves throughout the winter. They are also tolerant of high temperatures and can grow in the tropics. Plants yield better when grown above 1,000 m in the tropics. Temperatures above 25°C reduce production.

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

**Cultivation**: It can be grown from seed or division of the bulbs. Bulbs should be planted fairly deeply. These multiply, producing more bulbs. Seedlings are transplanted when 10 cm high. A spacing of 7 - 10 cm is suitable. In China, soil is heaped up around the bulb to make it elongated. Seed production in the tropics is possible above about 1,000 m above sea level.

**Production**: Plants are ready for harvest 50 - 60 days after planting.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| leaf (raw) | 90.1 | 147 | 1.9 | 328 | 19 | 1.5 | - |

## Vegetables

**English**: African eggplant
**Local:** Ntula (Luganda); Entuura (Runyankole)

**Scientific name:** *Solanum macrocarpon*
**Plant family: SOLANACEAE**

**Description**: An annual plant with dark green, glossy leaves. The leaf stalk is not well defined as the leaf blade runs down into the stalk. Leaves are generally not very hairy. The large flowers are purple or sometimes white. The fruit are round and greenish white but become orange-yellow or brown when fully ripe. They are hard or firm with long calyces around the fruit.
**Distribution**: A tropical plant that suits hot, humid climates. It grows up to 1,765 m above sea level. It can grow in arid places.

**Use**: The leaves are cooked and eaten. They are boiled or steamed and served as a side dish with rice. The fruit are eaten cooked. They are used in soups and sauces.

**Cultivation**: Seeds can be grown in a nursery and then transplanted.

**Production**: Plants produce fruit over 60 - 120 days from planting.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| leaf | 86.0 | 176 | 4.6 | - | 65 | 6.0 | - |
| fruit (mature) | 89.0 | 168 | 1.4 | - | - | - | - |

## Vegetables

**English**: Chinese taro
**Local:** Balugu (Luganda); Obutekyere (Runyankole)

**Scientific name:** *Xanthosoma sagittifolium*
**Plant family: ARACEAE**

**Description**: A herb that grows up to 2 m tall. It has a short stem with large leaves at the top. A corm grows at the base of the plant, and produces about 10 flask-shaped cormels, each about 15 - 25 cm long. They get wider towards the tip. The oval leaf blade is 50 - 75 cm long with a vein around the edge. The leaf has triangular lobes at the bottom. The flower is produced below the leaves. The large bract around the flower is pale green and about 20 cm long. The bases of the bract overlap. The closely arranged spike of flowers is about 15 cm long. The smaller female part is at the bottom of the spike and the larger male part towards the top.

**Distribution**: It grows in many tropical countries and suits tropical rainforest regions. It can tolerate high rainfall and light shade. It does well in regions with an annual average temperature of 26°C and a well distributed rainfall of 1,400 - 2,100 mm during the growing season. It grows from sea level up to about 2,000 m. Soils need to be well-drained, but moist with a pH of 5.5 - 6.8.

**Use**: Cormels, or small corms, are eaten roasted or boiled. Main corms are often fed to pigs. Young leaves can be eaten after cooking.

**Cultivation**: The top piece of the main central corm or stem is normally planted. Pieces weighing 1.5 kg are often used. It can also be grown by using the small side corms which may weigh 0.3 kg, or pieces of the corm can be used as long as they have some buds on them. These are often pre-sprouted before planting. To multiply large amounts of planting material and still achieve acceptable yields, the latter method of using sections of the main corm works well. In crop growth, an axillary bud is produced in the axil of each leaf but only some of these develop into cormels. Often 10 or more cormels develop per plant into cormels 15 - 25 cm long.

**Production**: The crop grows for about 9 months, although may be left for 12 months before harvest. Crops can be planted at any time of the year, but are often planted to make best use of natural rainfall. The middle of the dry season should be avoided. Naturally loose or well cultivated soils are needed. The water table must be at least 45 cm below the soil surface. *Xanthosoma* taro grows better in good soils with plenty of nitrogen. It can be grown in poorer soils and still give satisfactory yield. It can grow in shade and is inter-cropped under cacao and coconuts. Yield is reduced, but it is still worth doing if no other land is available. Weed control is important. The corms can be harvested without digging out the whole plant by carefully digging soil away from the plant and breaking off small corms. The main stem is then covered to produce a new crop. The corms store well under dry, cool, well-ventilated conditions. The corms will also remain in good condition if they are left growing in the ground and just harvested when needed.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| root | 67.1 | 559 | 1.6 | 5 | 13.6 | 0.4 | 0.5 |
| leaf | 90.6 | 143 | 2.5 | 160 | 37 | 2.0 | - |
| shoot | 89.0 | 139 | 3.1 | - | 82 | 0.3 | - |

## Vegetables

**English**: Angled loofah
**Local:** Ekyangwe (Luganda); Ekyangu (Runyankole)

**Scientific name:** *Luffa acutangula*
**Plant family: CUCURBITACEAE**

**Description**: A herb of the pumpkin family plant. It is an annual climber with square stems. They have 4 - 7 branched tendrils which attach to objects helping the plant to have a climbing habit. Leaves are pale green, hairy and shallowly five lobed. The leaves have a bad smell when rubbed. Male and female flowers are separate. Male flowers are in clusters, female flowers singly (ratio 43:1) Flowers open late in the afternoon and stay open during the night. The flowers are yellow. Fruit can be up to 40 cm long and with 10 long ridges. It is green-brown outside and white inside. Three varieties have been distinguished.

**Distribution**: A tropical plant. It grows from sea level to 500 m altitude in the hot humid tropics. It won't tolerate excessive rainfall so does best in drier areas or in the dry season in wetter areas. Day temperatures above 25°C are suitable. Some varieties require short day length. Adding additional nitrogen fertiliser can stimulate female flower formation in short day varieties. In Nepal it grows from 1,000 - 1,600 m altitude. It can grow in arid places.

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

**Cultivation**: Seeds are sown direct at 40 cm by 80 cm spacing and need stakes to climb. Because seeds can have a hard coating, soaking seed in water for 24 hours before planting can assist germination. 5 kg of seed per hectare are required. The plant benefits from full sunlight. Good soil fertility is beneficial. The soil needs to be well drained and adequate organic matter helps. Pinching out the growing tips when plants are 1.5 - 2 m long can promote fruit development. Hand pollination once female flowers develop helps fruit set. This is best done in the evening.

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

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| fruit | 94.6 | 71 | 0.7 | - | - | 0.5 | - |
| leaf | 89.0 | - | 5.1 | - | 98 | 11.5 | - |

## Vegetables

**English**: Okra
**Local:** Okra (Luganda); Okra (Runyankole)

**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**: Sesame
**Local:** Entungo (Luganda); Simusmu (Runyankole)

**Scientific name:** *Sesamum indicum*
**Plant family: PEDALIACEAE**

**Description**: A small, erect annual plant. It is very branched and grows 1 - 2 m tall. The stem is stout, 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 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 a light harrow, or sown 2 - 15 cm apart in rows 20 - 45 cm apart. Plants can be thinned or weeded during early growth to produce a better crop. Seeding rates of 9 - 11 kg/ha are used. 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 | - | 14.6 | 7.8 |
| leaf (raw) | 85.5 | 188 | 3.4 | - | - | - | - |
| oil | - | 3683 | 0.2 | - | - | - | - |

## Nuts, seeds, herbs and other foods

**English**: Horseradish tree
**Local:**

**Scientific name:** *Moringa oleifera*
**Plant family: MORINGACEAE**

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

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

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

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

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

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

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

## Nuts, seeds, herbs and other foods

**English**: Cashew
**Local:** Kashunati (Luganda)
Kashunati (Runyankole)

**Scientific name:** *Anacardium occidentale*
**Plant family: ANACARDIACEAE**

**Description**: An evergreen tree, with spreading branches, growing 7 - 14 m tall. The canopy can spread to 12 m. The roots grow deeply and spread widely. The shiny leaves are pale green and large. They are 10 - 15 cm long by 6 - 8 cm wide. They have fine veins. The flowers are produced on the ends of the branches. They are red in colour. The kidney-shaped nut is about 3 cm long and is borne below the "apple" which is really a fleshy stalk.

**Distribution**: It is a tropical plant that suits the lowland tropics but will grow up to about 1,200 m altitude. It only bears well in dry areas because of blight of the flowers. It grows best in temperatures of 22 - 26°C. A rainfall of 1,750 mm per year is considered suitable but good yields have been obtained with rainfall of 750 mm. It can grow on poor soils but needs good drainage.

**Use**: The fleshy "apple" is edible but acid until very ripe. It is used for jams, drinks, candy, chutney and pickles. The nut is eaten after roasting. The young shoots and leaves are edible. They are picked during the rainy season and eaten fresh with hot and spicy dishes. **Caution:** The oil of the nut can blister the skin until roasted. The apple is used to make spirits.

**Cultivation**: It is usually grown from seeds. Seeds germinate poorly and slowly. Only nuts which sink in water (or a solution of 150 g of sugar in a litre of water) should be planted. Seeds are sun dried for 2 - 3 days to improve germination. Seeds can be sown in a nursery then transplanted, or more commonly, are sown directly. Trees are spaced 7 -1 0 m apart. The crop is cross pollinated mostly by insects. For good production, complete fertiliser or appropriate organic material should be applied. Pruning to shape the tree is often undertaken in the first 2 - 3 years. Cashews are often planted scattered in gardens or amongst other trees. Clearing under the tree prevents fire and makes finding nuts easier. Allowing nuts to fall before harvesting ensures only ripe nuts are collected. Resin in the cashew nut shell can damage hands and discolour the nuts. Roasting the nuts before removing the kernel avoids this.

**Production**: Trees commence bearing after 3 years. Fruit production is seasonal, normally October - January. Mature nuts are produced in 2 - 3 months. Yields of 80 - 200 kg of nuts per hectare are normal. Trees reach maximum production after 10 years and last for about 100 years.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| nut | 4.0 | 2478 | 17.5 | - | - | 2.8 | 4.8 |
| leaf | 69.9 | 418 | 5.2 | - | - | - | - |
| fruit | 84.7 | 213 | 0.8 | 0.12 | 265 | 1.0 | 0.2 |

## Nuts, seeds, herbs and other foods

**English**: Safflower
**Local:**

**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 |

## Nuts, seeds, herbs and other foods

**English**: Sweet acacia
**Local:**

**Scientific name:** *Acacia farnesiana*
**Plant family: FABACEAE**

**Description**: An evergreen shrub. It grows 5 - 7 m tall and 3 m across. The stem is slender and erect. The crown is open. It is a spreading, densely branched shrub. The bark is smooth and brown. The leaves are branched and green. There are 4 - 6 pairs of larger leaves and 10 - 20 pairs of small leaflets. They have tiny leaflets and thorns up to 2 cm long, occur in pairs. The leaf stalk has a gland at or above the middle. The flowers are large orange balls. They are strongly perfumed. (The oil is used as a perfume in France.) The pods are long and dark brown to black. They are 5 - 8 cm long by 0.5 - 1 cm wide. They are inflated and sausage like. Often they are curved. They are marked with narrow lines. The pods have hard grey seeds imbedded in a pithy substance. The pods do not split open at maturity. The seeds are chestnut brown and 7 - 8 mm long by 5.5 mm wide.

**Distribution**: It is a tropical plant. This tree occurs naturally in Australia, Asia and Africa. It will grow on most soils. It is drought and frost resistant. It most commonly grows naturally on clay soils. In Papua New Guinea the plants are coastal below 60 m altitude. It grows in areas with an annual rainfall between 400 - 4,000 mm. It can grow in acid or alkaline soils. It can grow in arid places. It suits hardiness zones 11 - 12.

**Use**: The pods have been recorded as eaten after cooking. The gum is eaten. The ground-up seeds are eaten. The germinated seeds are claimed to be eaten. The gum is used to prepare sweets. The young leaves are used in India as a substitute for tamarind in chutneys.

**Cultivation**: It is grown from seed.

**Production**: It is fast growing. Flowering can occur almost continuously if watering is regular. In northern Australia, flowering is normally May to July, with pods available from September to November.

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

| Edible part | Moisture % | Energy kJ | Protein g | proVit A µg | proVit C mg | Iron mg | Zinc mg |
|---|---|---|---|---|---|---|---|
| seed (dry) | 8.1 | 1522 | 36.6 | - | - | 6.0 | 0.6 |

## Nuts, seeds, herbs and other foods

**English**: Awusa nut
**Local:**

**Scientific name:** *Plukenetia conophora*
**Plant family: EUPHORBIACEAE**

**Description**: A shrub or creeper that can grow 30 m long. It has many branches. The leaves narrow to the tip and are 18 cm long by 10 cm wide. The flowers are very small and white and grouped in clusters. The male flowers fall off leaving the female flowers. The fruit has 4 or 5 lobes. There are 4 - 5 large seeds. The seeds are eaten after roasting.

**Distribution**: A tropical plant that grows up tall trees in forests.

**Use**: The leaves, young shoots and fruit are eaten with rice. They are also dried. The seeds are boiled or roasted and eaten. The skin is removed. They are also used for edible oil.

**Cultivation**: Plants are grown from seed.

**Production**: Nut production is seasonal. The kernels can yield 50 - 60% 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 |
|---|---|---|---|---|---|---|---|
| seed (dry) | 8.1 | 1751 | 28.7 | - | - | - | - |

## Nutritional values of plants selected for the Uganda field guide

| Plant Family | Scientific name | Common name | Luganda | Runyankole | Edible part | Moisture % | Energy kJ | Protein g | Vit A µg | Vit C mg | Iron mg | Zinc mg | Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **AMARYLLIDACEAE** | Allium fistulosum | Spring onion | Bukoola bwa butungulu | Obutunguru | leaf (raw) | 90.1 | 147 | 1.9 | 328 | 19 | 1.5 | - | 43 |
| **AMARANTHACEAE** | Amaranthus hybridus | Amaranth greens | Doodo | Doddo | leaf | 87.4 | 189 | 4.9 | - | 108 | 5.7 | - | 29 |
| **ANACARDIACEAE** | Anacardium occidentale | Cashew | Kashunati | Kashunati | nut | 4.0 | 2478 | 17.5 | - | - | 2.8 | 4.8 | 50 |
| **ARACEAE** | Colocasia esculenta | Taro | Jjuuni | Ekitekyere | root | 66.8 | 1231 | 1.96 | 3 | 5 | 0.68 | 3.2 | 13 |
| **ARACEAE** | Xanthosoma sagittifolium | Chinese taro | Balugu | Obutekyere | leaf | 90.6 | 143 | 2.5 | 160 | 37 | 2.0 | - | 45 |
| **ASTERACEAE** | Carthamus tinctorius | Safflower | | | seed | 5.6 | 2163 | 16.2 | 5 | 0 | 4.9 | 5.5 | 51 |
| **BASELLACEAE** | Basella alba | Indian spinach | Doodo | | leaf | 85.0 | 202 | 5.0 | 56 | 100 | 4.0 | - | 32 |
| **BORAGINACEAE** | Cordia myxa | Sebastan tree | | | leaf | 64.0 | 272 | 5.1 | - | - | 7.2 | - | 38 |
| **BRASSICACEAE** | Erucastrum arabicum | Ethiopian Kale | | | leaf (fresh) | 84 | 200 | 4.0 | 500 | 120 | 1.5 | 0.6 | 26 |
| **BRASSICACEAE** | Eruca vesicaria subsp. sativa | Rocket | | | leaf | 91.7 | 105 | 2.6 | 35 | 15.0 | 1.5 | 1.5 | 28 |
| **BROMELIACEAE** | Ananas comosus | Pineapple | Naanansi | Enanansi | fruit | 84.3 | 194 | 0.5 | 60 | 25 | 0.4 | 0.1 | 39 |
| **CHENOPODIACEAE** | Beta vulgaris subsp.cicla | Silver beet | Silivabbiiti | | leaf (boiled) | 92.7 | 84 | 1.9 | 314 | 18 | 2.3 | 0.3 | 31 |
| **CONVOLVULACEAE** | Ipomoea batatas | Sweet potato | Lumonde. | Ekitakuri | tuber (baked) | 72.9 | 431 | 1.7 | 961 | 24.6 | 0.5 | 0.3 | 15 |
| **CUCCURBITACEAE** | Luffa acutangula | Angled luffa | Ekyangwe | Ekyangu | leaf | 89.0 | - | 5.1 | - | 98 | 11.5 | - | 46 |
| **DIOSCOREACEAE** | Dioscorea bulbifera | Potato yam | Ndaggu. | Ekiyuni | tuber | 70.8 | 357 | 2.7 | - | 78 | 3.1 | 0.4 | 12 |
| **EUPHORBIACEAE** | Manihot esculenta | Cassava | Muwogo | Muhoogo | tuber | 62.8 | 625 | 1.4 | 30 | 15 | 0.23 | 0.48 | 10 |
| **EUPHORBIACEAE** | Plukenetia conophora | Awusa nut | | | seed (dry) | 8.1 | 1751 | 28.7 | - | - | - | - | 53 |
| **FABACEAE** | Acacia farnesiana | Sweet acacia | | | seed (dry) | 8.1 | 1522 | 36.6 | - | - | 6.0 | 0.6 | 52 |
| **FABACEAE** | Arachis hypogea | Peanut | Binyeebwa | Ebinyobwa | seed (dry) | 4.5 | 2364 | 24.3 | - | - | 2.0 | 3.0 | 20 |
| **FABACEAE** | Cajanus cajan | Pigeon pea | Mpinnamiti | Entondiigwa | seed | 10.0 | 1449 | 19.5 | 55 | | 15.0 | - | 22 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **FABACEAE** | Phaseolus lunatus | Lima bean | Ebigaaga | Ebihindihindi | seed | 12.0 | 1407 | 19.8 | - | - | 5.6 | - | 23 |
| **FABACEAE** | Psophocarpus tetragonolobus | Winged bean | | Omwitanjoka | seed | 8.5 | 1764 | 41.9 | - | - | 15.0 | 4.5 | 25 |
| **FABACEAE** | Senna obtusifolia | Java bean | Yekeyeke | | leaf | 79.7 | 251 | 5.6 | - | 113 | 5.9 | - | 24 |
| **FABACEAE** | Vigna subterranea | Bambara groundnut | Mpande | Empande | seed | 7.3 | 1572 | 18.4 | - | - | 4.6 | - | 21 |
| **FLACOURTITACEAE** | Flacourtia indica | Governor's plum | | | fruit | 69.5 | 452 | 0.5 | 15 | 14 | 12 | - | 36 |
| **MALVACEAE** | Abelmoschus esculentus | Okra | Okra | Okra | fruit (cooked) | 90.0 | 134 | 1.9 | 58 | 16.3 | 0.5 | 0.6 | 47 |
| **MALVACEAE** | Abelmoschus manihot | Edible hibiscus | | | leaf | 88 | 120 | 3.4 | 1.0 | 7.0 | 1.5 | 1.2 | 30 |
| **MALVACEAE** | Corchorus olitorius | Jute | Okura | Okura | leaf (raw) | 80.4 | 244 | 4.5 | 574 | 80 | 7.2 | - | 27 |
| **MORACEAE** | Artocarpus integer | Chemedak | Ffene | ekifenensi | fruit (raw) | 68.8 | - | 1.8 | - | - | - | - | 33 |
| **MORINGACEAE** | Moringa Oleifera | Drumstick tree | | | leaf (boiled) | 87 | 189 | 4.7 | 40 | 31.0 | 2.0 | 0.2 | 49 |
| **MUSACEAE** | Ensete ventricosum | Ensete | Ekitembe | Ekizirakoma | seed (dry) | 12.4 | 1472 | 13.3 | - | - | - | - | 17 |
| **MUSACEAE** | Musa troglodytarum | Fe'i banana | Ndiizi | | fruit | 70 | 526 | 1.6 | 12 | 0 | 0.5 | 0.3 | 34 |
| **MYRTACEA** | Psidium guajava | Guava | Mapeera | Amapeera | fruit | 77.1 | 238 | 1.1 | 60 | 184 | 1.4 | 0.2 | 35 |
| **PEDALIACEAE** | Sesamum indicum | Sesame | Entungo | Simusmu | seed (dry) | 4.7 | 2397 | 17.7 | 1 | - | 14.6 | 7.8 | 48 |
| **POACEAE** | Pennisetum glaucum | Bullrush millet | Muwemba | | seed | 11.6 | 1442 | 10.5 | - | - | 6.5 | 1.7 | 18 |
| **PROACEAE** | Zea mays | Maize | Kasooli | Ekicoori | seed (mature) | 10.4 | 1528 | 10.0 | 100 | 4 | 4.9 | 2.2 | 42 |
| **RHAMNACEAE** | Ziziphus mucronata | Buffalo thorn | | Enkyereere | fruit | 56.4 | 659 | 3.8 | - | 42.6 | 1.0 | 0.5 | 41 |
| **SOLANACEAE** | Cyphomandra betacea | Tamarillo | Tugunda | Ekitugunda | fruit | 86.2 | 113 | 2.0 | 500 | 28 | 0.7 | - | 37 |
| **SOLANACEAE** | Solanum macrocarpon | African eggplant | Ntula | Entuura | leaf | 86.0 | 176 | 4.6 | - | 65 | 6.0 | - | 44 |
| **SOLANACEAE** | Solanum tuberosum | Potato | Obummonde obuzungu | Emondi | tuber (baked) | 71.2 | 456 | 2.3 | - | 12.9 | 1.4 | 0.3 | 19 |

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