Medicinal plants for Home herbal gardens, Institutional gardens and animal health

Composed in the framework of the KB project: Nature-based solutions (NBS) climate resilient and circular food systems within the topic Nature-based solutions & Food + Biodiversity.

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Contents

1. Introduction

In this report the herbs that are grown for animal and human health in herbal gardens in villages in India are described. These gardens are a source of natural remedies that can keep both humans and animals healthy, or treat common diseases.
Ayurveda is an ancient traditional system of medicine, which is considered to be the oldest system of health care, with literature going back 5000 years and an oral tradition that is much older. This healing system has been practiced in daily life in India for more than 5000 years. 'Ayur' means 'Life' and 'Veda' means 'Science'. Thus Ayurveda is the 'Science of Life'.
It aims to help us lead a life where Mind, Body and Spirit stay in a State of Balance, with each other and with the Environment. Ayurveda believes disease is caused when Life Balance is disturbed. Disease is expelled by the restoration of that balance.
This holistic healing system therefore does not work on the symptoms of a disease. It goes to root causes- trying to understand why an individual has lost physical, mental or emotional balance. This is why in Ayurveda each person needs a different line of treatment. The cause of each person's imbalance is unique. So, necessarily, the Ayurvedic intervention too is unique to each individual.
Ayurveda does not create dependence. Its goal is to help each person attain, a balanced way of Life and the ability to correct imbalances when they occur. The way to do this is through knowledge and altered behaviour. This is why part of the Ayurveda practitioner's healing effort is to counsel and teach the people who come to him for healing.
In Ayurveda, health is a state of spiritual and physical attainment. It is a medical, metaphysical healing life science - the mother of all healing arts. The practice of Ayurveda is designed to promote human happiness, health and creative growth. It is the science of daily living and this system of knowledge evolved from the sage's practical, philosophical and religious illumination which was rooted in their understanding of the creation. Ayurveda helps the healthy person to maintain health and the diseased person to regain health.
The body is made up of Tridoshas (Tri' means 'Three' and 'Doshas' mean 'Humours') Vata (wind), pitha (bile) and Kapha (phlegm)'. Good health means a normalcy in the Tridoshas, balance of metabolic, systemic and excretory functions, all five senses and in the mind and spirit.

The plants are described according to the following format: Plant name and family, description, native to, properties, uses, traditional use, side effects and propagation. In this report the 26 of the most used herbs are described.

2. Description of herbs

Acalypha indica L. Family - Euphorbiaceae

Small annual herbs, erect, at times diffuse, 30-120 cm high. Stem : Simple or branched, deep-green, hirsute, angular, hairy and deeply grooved in younger parts, more or less terete, glabrous and faintly strait in older. Leaves: Alternate, ovate, rhomboid-ovate, sometimes obovate, subacute or obtuse at apex, cuneate or tapering at base, serrate only in the upper part along the margins, dark-green above, pale-green below, glabrous or thinly hairy, petioles 3-8 cm long, hairy, stipules small. https://www.efloraofgandhinagar.in/plant-details.php?cateUrl=herb&plantUrl=acalypha-indica

Native to: It occurs in Nigeria, Sudan, Somalia DR Congo, East Africa, southern Africa and South Africa. Widespread in the Indian Ocean islands, India, South-East Asia and Oceania. It was introduced into the warmer parts of the New World. In India the plant is cultivated for its edible shoots, which are eaten as a cooked vegetable.

Properties
Anti-cancer, anti-diabetic, anti-oxidant, anti-bacterial, antifungal hepatoprotective, anti-inflammatory, and also used to check anti-ulcers and wounds healing.
https://www.researchgate.net/publication/343397844_Acalypha_indica_L_-_an_Important_Medicinal_Plant_A_Brief_Review_of_Its_Pharmacological_Properties_and_Restorative_Potential

Uses
- Asthma and pneumonia,
- Antibacterial and antifungal
- Maggot-infested wounds,
- Skin parasites and other skin problems
- Joints Pain
- Sores and swellings

Propagation and planting
Acalypha indica is only propagated by seed. Although Acalypha indica is cultivated in India for its edible shoots, not much information is available on its management. The plants need fair amounts of water and nutrients to grow quickly and stay tender. *Acalypha indica* is often considered a noxious weed.
https://www.prota4u.org/database/protav8.asp?g=pe&p=Acalypha+indica+L.

Acorus calamus L. Family - Acoraceae

Acorus calamus (sweet flag) grows at the edges of small lakes, ponds and rivers, marshes, swamps, and wetlands. The rootstock is medicinal and yields oil used in the manufacture of soap, cosmetics and in the liquor industry; it is also medicinal, being used in stomach complaints, snake bite, as an insect repellent, and for remittent fevers.

Native to: Sweet flag grows in India, central Asia, southern Russia and Siberia, Europe and North America.

Extinct in: District of Columbia, Illinois, Indiana, New Jersey, Newfoundland, North Dakota, Rhode I., Virginia

Introduced into: Alabama, Albania, Andaman Is., Arkansas, Austria, Baltic States, Belarus, Belgium, Bulgaria, California, Cape Provinces, Central European Rus, Colorado, Czechoslovakia, Delaware, Denmark, East European Russia, Finland, France, Free State, Føroyar, Georgia, Germany, Great Britain, Hungary, Iceland, Ireland, Italy, Kentucky, Krym, Louisiana, Maryland, Mississippi, Missouri, Netherlands, New Guinea, North Carolina, North Caucasus, North European Russi, Northwest European R, Norway, Oklahoma, Oregon, Pakistan, Poland, Romania, Sicilia, South Carolina, South European Russi, Svalbard, Sweden, Switzerland, Tennessee, Texas, Transcaucasus, Turkey, Turkey-in-Europe, Ukraine, West Virginia, Yugoslavia.

Properties
Appetizer, indigestion, abortefacient, lactation. Pacifies vata and kapha humour, purifies excretory systems, digestive, smoothening of throat, anthelmenthic, emetic, and improves intellect.

Uses
The rhizome is used to make medicine. Despite safety concerns, calamus is used for gastrointestinal (GI) problems including ulcers, inflammation of the stomach lining (gastritis), intestinal gas (flatulence), upset stomach and loss of appetite (anorexia) and as insect repellent.

Propagation
Landscape uses: Container, Ground cover, Massing, Rock garden, Seashore. It prefers growing in shallow water or in a very moist loamy soil. The plant requires a sunny position and prefers a pH in the range 5.5 to 7.5. Plants are hardy to about -25°C. The sweet flag has a long history of use as a medicinal and culinary plant. It has been cultivated for this purpose but was more commonly allowed to naturalize and was then harvested from the wild. The plant seldom flowers or sets seed in Britain and never does so unless it is growing in water. It can spread quite freely at the roots however and soon becomes established. Special Features: Attractive foliage, North American native, Edible, Fragrant foliage, Naturalizing, Wetlands plant, inconspicuous flowers or blooms.
(https://pfaf.org/user/plant.aspx?latinname=Acorus+calamus)

Allium cepa L. Family - Amaryllidaceae

Allium is one of the largest monocot genera comprise about 850 species. It is a biennial plant with adventitious and fibrous roots. The bulb is made of enlarged fleshy leaf bases arranged concentric. The shape and size of the bulb varies depending on the cultivar.


Native to

- *A. cepa* is widely cultivated in almost every country of the world
- the top producers were China (23,849,053 tonnes)
- India (19,415,425 t),
- Egypt and USA (about 3,000,000 t),
- Iran, Turkey, Russian Federation, Pakistan, Bangladesh and Brazil (from 2,345,768 to 1,657,441 t).
- European countries 10.9% of the world production,
- Asia (65.5%) the most important producer.
- At present, approximately 13,000 onion accessions are held in gene banks worldwide.
- A high genetic variability can be observed regarding the morphological features

Properties

Acidifier, antioxidant, anti-inflammatory, antibacterial, antiviral, radical-scavenging, gastroprotective, immune-modulatory activities, potential anti-obesity activity, antimicrobial.

Uses

Research shows that onions may help guard against many chronic diseases. That's probably because onions contain generous amounts of the flavonoid quercetin. Studies have shown that quercetin protects against cataracts, cardiovascular disease, and cancer. In addition, onions contain a variety of other naturally occurring chemicals known as organosulfur com-pounds that have been linked to lowering blood pressure and cholesterol levels. Although rarely used specifically as a medicinal herb, the onion has a wide range of beneficial actions on the body and when eaten (especially raw) on a regular basis will promote the general health of the body. The bulb is anthelmintic, anti-inflammatory, antiseptic, antispasmodic, carminative, diuretic, expectorant, febrifuge, hypoglycaemic, hypotensive, lithontripic, stomachic and tonic. When used regularly in the diet it offsets tendencies towards angina, arteriosclerosis and heart attack. This is used particularly in the treatment of people whose symptoms include

running eyes and nose. The onions ability to relieve congestions especially in the lungs and bronchial tract is hard to believe until you have actually witnessed the results. The drawing of infection, congestion and colds out of the ear is also remarkable. The onion will relieve stomach upset and other gastrointestinal disorders and it will also strengthen the appetite. https://www.jocpr.com/articles/allium-cepa-a-traditional-medicinal-herb-and-its-health-benefits.pdf

Propagation and planting

Onion prefers a sunny sheltered position in a rich light well-drained soil and a pH of at least 6.5. It tolerates a pH in the range of 4.5 to 8.3. Onions are best grown in a Mediterranean climate, the hot dry summers ensuring that the bulbs are ripened fully. For best growth, however, cool weather is desirable at the early stages of growth. Plants are frost-tolerant but prolonged temperatures below 10°c cause the bulb to flower. Optimum growth takes place at temperatures between 20 and 25°C. Bulb formation takes place in response to long-day conditions. Plants are perennial but the cultivated forms often die after flowering in their second year though they can perennate by means of off-sets The onion was one of the first plants to be cultivated for food and medicine. It is very widely cultivated in most parts of the world for its edible bulb and leaves; there are many named varieties capable of supplying bulbs all the year round. Most forms are grown mainly for their edible bulbs but a number of varieties, the spring onions and everlasting onions, have been selected for their edible leaves. https://pfaf.org/user/plant.aspx?LatinName=Allium+cepa

Allium sativum Family - Amaryllidaceae

Allium sativum, commonly called garlic, is a bulbous perennial of the onion family. It is native to the Mediterranean area. Foliage consists of aromatic, linear, flattened, grass-like green leaves.

Native to: Central Asia and north eastern Iran. Close relatives include the onion, shallot, leek, chive, and Chinese onion. It grows wild in Italy and southern France. It is used for common seasoning worldwide, several thousand years of human consumption and use.

In the Old World, Egyptian and Indian cultures referred to garlic **5000 years ago** and there is clear historical evidence for its use by the Babylonians 4500 years ago and by the Chinese 2000 years ago. Some writings suggest that garlic was grown in China as far back as 4000 years ago.
There are a range of beliefs as to the exact origin of garlic such as that it originates from West China, around Tien Shan Mountains to Kazakhstan and Kyrgyzstan. The Egyptians were familiar with many medicinal, aromatic, spicy and poisonous plants.
In 1916, the British government issued a general plea for the public to supply it with garlic in order to meet wartime needs. Garlic was called Russian penicillin during World War II because, after running out of antibiotics, the Russian government turned to this ancient treatment for its soldiers.

Garlic can be grown at elevation of 1200–2000 m from the mean sea level. It requires short days, cool (12–18 °C) moist period during vegetative growth.

List of Countries by Garlic Production

Country	**Production (Tons)**	**Yield (Kg / Hectare)**
China	21.263.237	26.685,5
India	1.400.000	5.364
Bangladesh	381.851	6.282,9

Egypt	280.216	23.598

Properties

Garlic has Anti-hypertension, anti-atherosclerosis, antibacterial, antiviral, anthelmintic. It is known that garlic (*Allium sativum*) possesses antimicrobial, antiprotozoal, antimutagenic, antiplatelet and antihyperlipidemic properties. Thus, raw garlic can be a source of antioxidant based on the results of the DPPH scavenging analysis.

Uses

Possibly effective for

- Hardening of the arteries (atherosclerosis). Taking garlic powder by mouth, alone or with other ingredients, seems to help slow hardening of the arteries.
- Diabetes. Taking garlic powder by mouth seems to reduce pre-meal blood sugar levels by a small amount in people with or without diabetes. It seems to work best if it is taken for at least 3 months. It's unclear if garlic reduces post-meal blood sugar levels or HbA1c levels.
- High levels of cholesterol or other fats (lipids) in the blood (hyperlipidemia). Taking garlic by mouth daily for at least 8 weeks might reduce total cholesterol and low-density lipoprotein (LDL, "bad" cholesterol) in people with high cholesterol levels. But any benefit is probably small. And taking garlic doesn't help increase high-density lipoprotein (HDL, "good" cholesterol) or lower levels of other blood fats called triglycerides.
- High blood pressure. Taking garlic by mouth seems to reduce systolic blood pressure (the top number) by about 7-9 mmHg and diastolic blood pressure (the bottom number) by about 4-6 mmHg in people with high blood pressure.
- Build-up of fat in the liver in people who drink little or no alcohol (non-alcoholic fatty liver disease or NAFLD). Taking garlic powder by mouth seems to help to improve liver health in people with NAFLD. People who eat more garlic also seem to be less likely to be diagnosed with NAFLD.
- A serious gum infection (periodontitis). Taking aged garlic extract by mouth twice daily for 18 months can help improve gum health in people who have mild or moderate periodontitis.
- Fevers, diabetes, rheumatism, intestinal worms, colic, flatulence, dysentery, liver disorders, tuberculosis, facial paralysis, high blood pressure, and bronchitis
- Garlic may help lower blood pressure
- Garlic may help quell inflammation
- Garlic may help lower cholesterol
- Garlic may support immune function
- Garlic may reduce blood clotting
- Garlic provides a host of antioxidants

Throughout history in the Middle East, East Asia, and Nepal, garlic has been used to treat bronchitis, hypertension (high blood pressure), TB (tuberculosis), liver disorders, dysentery, flatulence, colic, intestinal worms, rheumatism, diabetes, and fevers.

There is interest in using garlic for a number of other purposes, but there isn't enough reliable information to say whether it might be helpful.

Side Effects

When taken by mouth: Garlic is likely safe for most people. Garlic has been used safely for up to 7 years. It can cause side effects such as bad breath, heartburn, gas, and diarrhoea. These side effects are often worse with raw garlic. Garlic might also increase the risk of bleeding and cause allergic reactions in some people.

When applied to the skin: Garlic products are possibly safe. Gels, pastes, and mouthwashes containing garlic have been used for up to 3 months. But garlic might cause skin damage that is similar to a burn. RAW garlic is possibly unsafe when applied to the skin. It might cause severe skin irritation.

Propagation and planting

It is conventionally propagated by daughter bulbs ("cloves") and bulbils from the flower head. Micropropagation is used for speeding up the vegetative propagation mainly using the advantage to produce higher numbers of healthy plants free of viruses, which have higher yield than infected material. https://experiments.springernature.com/articles/10.1007/978-1-62703-074-8_28

Aloe vera L. Burm.f. Family - Asphodelaceae

Aloe vera is a herb with succulent leaves that are arranged in a rosette. The leaves are grey to green and sometimes have white spots on their surfaces. They have sharp, pinkish spines along their edges and are the source of the colourless gel found in many commercial and medicinal products. Aloe vera has yellow, tube-like flowers that cluster on a stem.

***Native to*:** At present *Aloe vera* is widely distributed throughout the tropics and subtropics. It is widely grown as a cash crop in dry regions in the Americas, Asia and Australia. *Aloe vera* was already used as a drug by the Greeks as early as 400 B.C. E and later by Arabian physicians.

The succulent has a long history of being used for medicinal purposes, dating back to ancient Egypt. The plant is native to North Africa, Southern Europe, and the Canary Islands.
Today, *Aloe vera* is grown in tropical climates worldwide. *Aloe vera* is native to North Africa and the SW Arabian Peninsula, but presently found worldwide.

Properties
Wound healing, anti-inflammatory, antimicrobial, and anti-oxidant.

Uses
- Heals burns.
- Improves digestive health
- Promotes oral health
- Clears acne
- Relieves anal fissures
- *Aloe vera* is antibacterial, antiviral, and antiseptic
- Cure Mastitis
- Internal worms
- Accelerates the healing of mouth ulcers, reduces the pain associated with them

Propagation and planting
Cultivation: Grow under glass in loam-based potting compost with added extra grit. Water them moderately during growth and very sparingly when dormant. Apply a balanced liquid fertiliser 2 or 3 times in the growing season. Propagate by seed sown with heat as soon as ripe or from offsets. Suggested planting locations of *Aloe vera* is places with Mediterranean climate.
- It is very drought tolerant and hardy to -2°C (28°F).
- It grows naturally in hot dry sunny locations ,
- Humid climates with high rainfall, in well drained soils with high organic matter and also in poor soil
- It does best with an annual rainfall of 500mm or more.
- When growing in a pot or container, use a very well-draining potting mix and terracotta pots
- Grown as an indoor plant near a window with bright natural light
- *Aloe vera var. barbadensis miller* variety is the edible one.
- Non-edible *Aloe vera* is referred to as *Aloe vera var. chinensis*


Aloe vera var. barbadensis


Aloe vera var. chinensis

Andrographis paniculata Wall Family - Acanthaceae

A. paniculata is an annual, branched, erect, and herbaceous plant which grows in hedgerows throughout the plane lands, hill slopes, waste ground, farms, moist habitat, seashores, and roadsides. It also can be cultivated in garden. Moist shady places, forests, and wastelands are preferable for their well development.

Native to: This plant grows abundantly in Southern and South eastern Asia including India, Java, Sri Lanka, Pakistan, and Indonesia, while it is cultivated in India, China, Thailand, Brunei, Indonesia, the West Indies such as Jamaica, Barbados, and Bahamas, Hong Kong, and the tropical areas in America and also in southwestern Nigeria.
https://www.hindawi.com/journals/tswj/2014/274905/

Properties
It is antiviral, anti-inflammatory, cholagogue, hepatoprotective, immune support. The leaf and underground stem are used to make medicine. Andrographis might work by stimulating the immune system. It might also prevent influenza viruses from binding to cells in the body. *Andrographis* is also used as astringent, bacteria killing agent, painkiller, fever reducer, and treatment for worms.

Uses
Andrographis is used for the common cold, osteoarthritis, infection of the throat and tonsils (tonsillopharyngitis), and a type of inflammatory bowel disease (ulcerative colitis).

- Allergies
- Sinus infections
- HIV/AIDS
- Anorexia
- Heart disease
- Liver problems
- Parasites
- Infections
- Skin diseases
- Ulcers
- Fever
- Other conditions

Side effects
Andrographis is **LIKELY SAFE** when taken by mouth appropriately, short-term. It also appears to be safe when taken as a specific combination product containing *andrographis* extract and Siberian ginseng (Kan Jang, Swedish Herbal Institute) for up to 3 months. *Andrographis* can cause side effects such as loss of appetite, diarrhoea, vomiting, rash, headache, runny nose, and fatigue. When used in high doses or long-term, *andrographis* might cause swollen lymph glands, serious allergic reactions, elevations of liver enzymes, and other side effects.

Propagation and planting
It is a plant of the tropics, where it is found at elevations up to 1,600 metres. It grows best in areas where annual daytime temperatures are within the range 20 – 30 C., but can tolerate 14 – 38 C. It prefers a mean annual rainfall in the range 2,000 - 3,000mm, but tolerates 1,500 - 4,000 mm, prefers a position in light shade, but can tolerate deeper shade and sunnier

positions. The plant has escaped from cultivation and become naturalized in many areas of the tropics. In shading experiments, the optimal proved to be 20% shade with average dry-matter production of 13.2 g per 5-month-old plant. Seed - should be soaked for 24 hours and then dried before being sown. Germination starts after 1 week and the mean germination rate is about 80%. Cuttings consisting of 3 nodes taken from the upper third of 1-year-old plants have given the best results in vegetative propagation, with 80-90% rooting.
https://pfaf.org/User/Plant.aspx?LatinName=Andrographis+paniculata

Cinnamomum verum J.Presl Family - Lauraceae

Cinnamon is an evergreen tree characterized by oval-shaped leaves, thick bark, and a berry fruit. When harvesting the spice, the bark and leaves are the primary parts of the plant used Cinnamon is cultivated by growing the tree for two years, then coppicing it.

***Native to*:** Sri Lanka
Cultivated in India at lower elevations of Western Ghats in Kerala and Tamil Nadu.

Properties
Astringent, warming stimulant, carminative, blood purifier, digestive, antiseptic, antifungal, antiviral, antibacterial, antioxidant, anti-inflammatory and immunomodulatory properties and also helps to reduce cholesterol and blood sugar levels. Antimicrobial, anticancer, lipid-lowering, and cardiovascular-disease-lowering compound, cinnamon has also been reported

to have activities against neurological disorders, such as Parkinson's and Alzheimer's diseases.

Uses

Indigestion, diarrhoea, diabetes, obesity, reduce spasms, flatulence, stimulate the appetite, and fight bacteria and fungi, decrease blood pressure and blood lipids. It has rich in immune-boosting antioxidants. Benefits heart health, protect brain health, gut health and fight infections.

Propagation and planting

You can make new cinnamon plants from stem cuttings. Take a cutting roughly 6 inches long, and strip off the lower half of the leaves. Plant the cutting in moist potting mix, and keep it warm ideally on a sunny windowsill. Cuttings are often slow to form roots and might not be ready to plant outdoors for several months. Birds relish the fruits of cinnamon plants. But if you're able to save some, you can start new plants from seed. Clean the pulp of the berries away from the seeds, and dry them thoroughly. Plant the seeds while they're fresh, as they lose viability quickly. Plant them about an inch deep in pots filled with a sterile seed-starting mix. Keep them moist and warm at around 75 degrees Fahrenheit. Germination should occur in about three weeks. https://www.thespruce.com/cinnamon-plant-care-and-growing-guide-4690725

Cissus quadrangularis L. Family - Vitaceae

Cissus quadrangularis is a perennial herbaceous climber. Stem thick, succulent, quadrangular, angles winged, constricted at nodes, glabrous or slightly downy, almost leafless when old. Tendril is long, slender and simple. Petiole 6-12 mm long, glabrous. Leaves simple ovate, entire or cordate, serrulate dentate, or crenate-serrate, 3-lobed, terminal lobe triangular or sub-spathulate, subacute or ± cuspidate, membranous, glabrous on both sides, 3-5 x 5-3 cm; stipules ovate or cuneate, obtuse, deciduous. Inflorescence a compound umbelliform cyme, peduncle 1-2.5 cm long. Flower pink and white, 2 mm long, hypanthium cup-like, truncate or obscurely lobed, green, ca. 2 mm wide. Petals 4, distinct, ovate-oblong, acute, hooded at apex, ca. 1.5 mm long. Disc longer than the ovary. Ovary glabrous, style slender subulate, stigma small. Berry globose, red, succulent, very acidic, 6-10 mm in diameter, 1 seeded. Seed obovoid smooth, 4-8 mm across (Flora of Pakistan, 2018).

***Native to**: Cissus quadrangularis* is distributed throughout tropical Africa and is only absent in a few countries of West and Central Africa where rainfall is too high. It is also absent from Cape Verde and the Seychelles. Outside Africa it occurs naturally in Arabia, India and Sri Lanka, and it is naturalized in Thailand, Vietnam, Indonesia and the Philippines. In temperate regions it is grown as a pot plant.

Properties

Radical scavenging, anti-microbial, anti-bacterial, antioxidant, bone healing, anti-ulcer, anti-inflammatory, analgesic and diuretic.

- Bone healing activity, contains vitamins and steroids, which are found to have specific effect on bone fracture healing.
- Anti-obesity activity:
- Anti-ulcerative activity:
- Anti-diabetic activity:
- Antioxidant and free radical scavenging activity:
- Gastro protective Activity:
- Central nervous system activity

- Analgesic, anti-inflammatory and stimulatory activity: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7649020/

Uses

- The fibres are used in East Africa for wound dressing.
- Throughout its range the stems and leaves are used for skin troubles such as wounds, burns and ulcers.
- In Ayurvedic medicine it is used as an anti-inflammatory and anti-diarrhoeal, and against headache.
- To treat patients with fever and malaria in Senegal
- In northern Kenya a root infusion is used against chest pain.
- In East Africa juice from the stem is dripped into the ear against earache.
- In West and Central Africa an infusion of the leaves is drunk as a cure for sexually transmitted diseases (STDs).
- In South Africa a decoction of the root is applied for swellings and muscle pain.
- In Java, Thailand, India and southern Africa juice from the stem is applied for rheumatism and to ease the pain of broken bones and hasten recovery.
- In India and Indonesia, the powdered root is also used in the treatment of fractured bones, as well as for indigestion.
- The juice of the plant is applied for scurvy, asthma or nosebleed, and used as an alternative for amenorrhoea.
- The Turkana of northern Kenya use a root infusion as a pesticide against termites.
- The Maasai grind the stems in water and wash calves with the liquid as a fly repellent and to kill fleas.
- In Zimbabwe the pulped whole plant is applied to maggot infested wounds.
- In India stem and leaf extracts have been successfully applied for the control of leafhoppers and mites.
- It is used for curing hard udder in chronic mastitis
- It is used for preventing and cure of calcium deficiency in animals
- In Guinea stems and leaves are fed to livestock and are supposed to stimulate lactation.

Production and international trade

Cissus quadrangularis is mainly used on a local scale. In Asia capsules containing extracts are produced and marketed for the treatment of haemorrhoids. As an Ayurvedic medicine it is for sale through internet in different formulations. Several formulations containing *Cissus quadrangularis* are promoted and sold in the western world through internet as a cure for osteoporosis and to bodybuilders for increased muscle building. The justification for these uses needs verification through independent research.

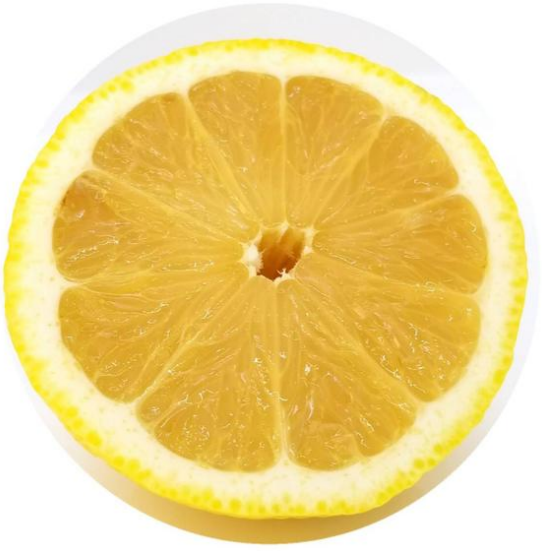
Propagation and planting

Cultivation as a garden ornamental is common and in temperate regions it is grown as a pot plant. It is also used as a live fence and in Somalia it is planted to stabilize dunes. *Cissus quadrangularis* can be propagated with stem cuttings but for large scale multiplication seeds are more appropriate. Cuttings are made of 3 internodes, they are left to dry for a few days and then planted in a sandy substrate.

Citrus limon L. Burm. f. Family- Rutaceae

Citrus includes evergreen plants, shrubs or trees (from 3 to 15 m tall) in the flowering plant family Rutaceae. Gives rise to numerous varieties, cultivars and hybrids, Citrus limon trees are found in tropical and subtropical climates (temperature 16 to 29 degrees Celsius). Cultivated varieties the branches have stout, stiff thorns.

Native to: Asia, primarily Northeast India (Assam), Northern Myanmar or China.



Properties
Antibacterial, antifungal, antidiabetic, anticancer and antiviral, anti-inflammatory, antiparasitic. Chemo-protective neuroprotective, cardioprotective, gastroprotective, reduces asthma, wheezing and morning sickness.

Uses
- Oil from skin used in fevers like measles, smallpox, and chickenpox
- Fruit use used for itching skin

- Irritation due to insect bites (juice)
- Increase appetite
- Helps secretion of digestive juices
- Digestive, mild laxative, cholagogue
- Blood purifier
- ailments of throat, cough

https://www.planetayurveda.com/library/lime-citrus-limon/

Traditional use

According to Ayurveda, the intake of Lemon with salt is a common remedy to help manage nausea as it helps to promote digestion. Lemon essential oil mixed with some other carrier oil like olive oil helps to reduce stress.

Propagation and planting

The first step in propagating lemon seeds is to select a good tasting, juicy lemon. Remove the seeds from the pulp and wash them to remove any clinging flesh and sugar that can foster fungal disease, which will kill off your seed, by the way. You want to use only fresh seeds and plant them immediately; letting them dry out will decrease the chance that they will germinate. Fill a small pot with pasteurized soil mix or a mix of half peat moss and half perlite or sand and pasteurize it yourself. Pasteurization will also aid in removing any harmful pathogens that can kill your seedling. Plant several lemon seeds about ½ inch (1 cm.) deep to increase the chance for lemon seed propagation. Moisten the soil lightly and cover the top of the pot with plastic wrap to aid in water retention. Keep the soil moist, but not soggy.
Read more at Gardening Know How: Propagating Lemon Seeds: Can You Grow A Lemon Tree Seed https://www.gardeningknowhow.com/edible/fruits/lemons/propagating-lemon-seeds.htm

Corindrum sativum L. Family - Apiaceae

Coriander, (*Coriandrum sativum*), also called cilantro or Chinese parsley, feathery annual plant parts of which are used as both an herb and a spice. The plant produces a slender hollow stem 30 to 60 mm (1 to 2.5 inches) high with fragrant bipinnate leaves.

Native to: Grows wild over a wide area of Western Asia and Southern Europe. The Ebers Papyrus, an Egyptian medical text dated to around 1550 BCE, describes coriander's medicinal and culinary uses. Mericarps were found in Pre-Pottery Neolithic B level of the Nahal Hemar Cave in Israel. It is cultivated in Greece since at least the second millennium BCE.




Coriander seeds are used in brewing Belgian wheat beers. Coriander essential oil inhibits Gram-positive and Gram-negative bacteria, including Staphylococcus aureus, Enterococcus faecalis, Pseudomonas aeruginosa, and Escherichia coli. Leaves are particularly rich in vitamin A, vitamin C and vitamin K,

Properties

Antimicrobial, antioxidant, hypoglycemic, hypolipidemic, anxiolytic, analgesic, anti-inflammatory, anti-convulsant and anti-cancer, appetizer, anti-indigestion, carminative.

Uses

- Reduces skin inflammation

Coriander contains both Cineole and linoleic acid. These elements pose antirheumatic and antiarthritic properties which help reduce skin inflammations.

- Controls blood pressure

Consuming coriander has been shown to positively reduce blood pressure in many patients suffering from hypertension. It helps reduce the chances of having a heart attack.

- Rich source of calcium

Coriander is a rich source of calcium which is an important element for bone health. It helps with bone regrowth and increases bone durability.

- Controls diabetes

Coriander benefits include controlling diabetes. It helps stimulate the endocrine glands increasing the secretion of insulin. This whole process helps in the proper breakdown of sugar in the body controlling diabetes.

- Diuretic properties

Dhaniya is also diuretic in nature which means that it helps increase the volume and frequency of urination flushing out the toxins from the body.

- Treats wounds & mouth ulcers

Dhaniya contains Citronellol which is a great antiseptic. It helps speed up the healing process of mouth ulcers and also prevents bad breaths.

- Aids digestion

Coriander is rich in borneol and linalool which helps digestion. It is also useful in the prevention of diarrhoea.

- Treat osteoporosis

contains vitamin A, riboflavin, niacin, folic acid, vitamin C, vitamin K, and carotene. All these elements help prevent Osteoporosis.

- Prevents anaemia

Coriander seeds are a rich source of iron. Deficiency of iron causes anaemia and hence it is recommended to include coriander seeds in your daily diet.

- Reduces cholesterol

Coriander uses also include reducing bad cholesterol from the body without affecting the good cholesterol minimizing the risk of heart-related disorders.

- Prevents arthritis

https://www.dabur.com/in/en-us/about/science-of-ayurveda/herbal-medicinal-plants/dhaniya-coriander-benefits

Traditional use: as anti-inflammatory, analgesic, and antibacterial. Its essential oil is also used as a natural fragrance with some medicinal properties. *C. sativum* has recently been shown to have antioxidant, antidiabetic, hepatoprotective, antibacterial, and antifungal activities.
https://www.researchgate.net/publication/235672010_Phytochemistry_pharmacology_and_medicinal_properties_of_Coriandrum_sativum_L

Propagation and planting

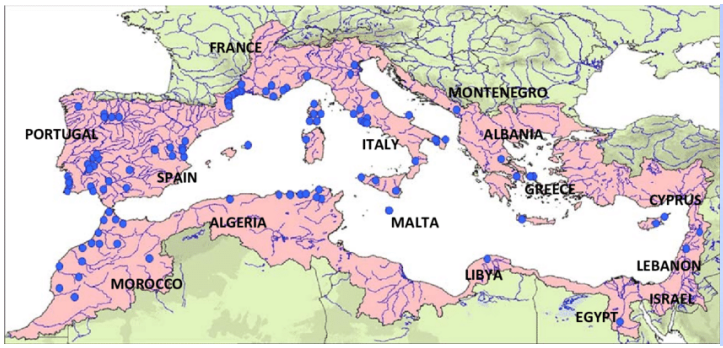
Propagation Coriander is propagated directly from seeds and should be sown after the last frost. The seeds should be planted in a prepared bed by planting seeds 0.6 to 1.2 cm (0.25-0.5 in) deep allowing 5cm (2 in) between seeds and 30 to 38 cm (12-15 in) between rows.

Cuminum cyminum L. Family - Apiaceae

Cumin or *Cuminum cyminum* is a flowering plant native to Pakistan and India. It is a well-branched, erect, annual plant that usually grows up to 30 cm in height. The leaves are long. The flowers are small and white or pink in colour. Cumin seed is well-known food flavouring especially in tropical Asia. It has a hot and aromatic flavour and is often used in curries. The essential oil obtained from the seed is used as flavouring as well. Cumin is also used medicinally. In particular, it is used to stimulate the sexual organs and to treat minor digestive conditions, coughs, pain, and rotten teeth.
https://pfaf.org/user/Plant.aspx?LatinName=Cuminum+cyminum

Native to the Mediterranean region, cultivated in India, China and Mexico (Cumin seeds are actually dried fruits). To the east, It travelled down the Persian Gulf where it was spread to India by traders from the Arabian Peninsula and from there throughout South Asia, those that surround the Mediterranean Sea. Twenty sovereign countries in Southern Europe, the Levant and North Africa regions border the sea itself, in addition to two island nations completely located in it (Malta and Cyprus). Countries not having coastline with the Mediterranean sea Portugal, Andorra, San Marino, Serbia, Kosovo, North Macedonia and Jordan included on the list.

Their geographical, economic, geopolitical, historical, ethnic, climate and flora, and cultural ties to the region as a whole



Properties
Cumin is an aromatic, astringent herb that benefits the digestive system and acts as a stimulant to the sexual organs. It has been used in the treatment of minor digestive complaints, chest conditions and coughs, as a pain killer and to treat rotten teeth. Cumin is seldom used in Western herbal medicine, having been superseded by caraway which has similar properties but a more pleasant flavour. It is still widely used in India, however where it is said to promote the assimilation of other herbs and to improve liver function. The seed is antispasmodic, carminative, galactagogue, stimulant and stomachic. A general tonic to the whole digestive system, it is used in the treatment of flatulence and bloating, reducing intestinal gas and relaxing the gut as a whole. In India it is also used in the treatment of insomnia, colds and fevers and to improve milk production in nursing mothers. Ground into a powder and mixed into a paste with onion juice, it has been applied to scorpion stings. The herb has been used externally as a poultice to relieve stitch and pains in the side. The essential oil obtained from the seed is antibacterial and larvicidal.
https://pfaf.org/user/Plant.aspx?LatinName=Cuminum+cyminum

Uses

- Cumin is used as a spice for its distinctive flavour and aroma
- Cumin can be found in some cheeses, such as Leyden cheese, and in some traditional bread from France.
- Cumin can be an ingredient in chili powder (often Tex-Mex or Mexican-style).
- Found in achiote blends, adobos (distinctive menu templates).
- Sofrito (a mixture of lightly fried onions and garlic, usually with tomatoes and other vegetables, used as a base for soups and stews.
- Garam masala, curry powder, and bahaarat (Spice mix coriander seeds 2 tsp., cumin seeds 1 tbsp., whole cloves 1 tsp., black pepper corns 1 tbsp, cinnamon ½ stick, cardamom pods 1 tsp, seed only nutmeg a good grating, paprika – Red chilli powder (not smoked) 2 tbsp.)
- Seeds in kashaya (decoction), arishta (fermented decoction), and vati (tablet/pills), and processed with ghee.
- Cumin seeds contain naturally occurring substances that work as antioxidants.
- Anti-cancerous, treat diarrhoea, control blood sugar, antibacterial, anti-parasitic, anti-inflammatory, lower cholesterol, help in weight loss.

Side effects

The cumin seeds oil is highly volatile and can lead to liver and/or kidney damage consuming excess amounts of the seeds. It is advised to keep the consumption limited to moderate amounts.

Propagation and planting

As an annual plant, it is cultivated from low elevations in the warm temperate to higher elevations in tropical zones. It does not do well in lowland areas of the tropics, but is successful at higher elevations, being grown up to 2,200 metres. It grows best in areas where annual daytime temperatures are within the range 17 - 26°C, but can tolerate 9 - 30°C. The plant is intolerant of frost. It prefers a mean annual rainfall in the range 1,200 - 1,800 mm, but tolerates 800 - 2,700 mm. Tolerant of most well-drained soils, though it prefers a warm fertile well-drained sandy loam in a sheltered sunny position. It prefers a pH in the range 5 - 6.5, tolerating 4.5 - 8.3. The plant can be harvested for its seed about 60 - 110 days after sowing. Seed yields can be 500 - 1,200 kilos per hectare. When bruised, the plant has a pungent aroma.

Production

Main producers of cumin are China, India and Mexico. China and India produces 70% of the world supply and consumes 90% of that South Asia consumes 63% of the world's cumin Around 300,000 tons of cumin per year is produced worldwide

Curcuma longa L. Family - Zingiberaceae

Curcuma longa, commonly known as turmeric, is a tropical rhizomatous herbaceous perennial in the ginger family. It typically grows to 3-4' tall in a foliage clump of ornamentally-attractive, canna-like, pleated, elliptic to lanceolate green leaves (each to 3 1/2' long). Short dense spikes of pale yellow flowers are produced in summer. This plant is most noted for its thick, branched rhizomes which are the source (after unearthing, boiling, drying and grinding) of the bright yellow-orange powdery spice known round the world as turmeric. It has a pungent somewhat bitter flavour (https://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?taxonid=287580).

Native to

It is native to India, and now extensively cultivated in the tropical and subtropical regions of South and Southeast Asia including China, Indonesia, and India, and some areas of Africa with a warm and wet tropical climate.

Properties

Antioxidant, anti-inflammatory, anticarcinogenic, hepatoprotective, antimicrobial.

- It is powerful anti-inflammatory
- Strong antioxidant.
- Prevent heart disease, Alzheimer's and cancer
- Generally recognized as safe (GRAS) US FDA

Uses
Turmeric is used for sprains, bruises, inflammations, piles, vomiting, allergies, snakebites, centipedes, spiders and scorpions, arthritis, wounds and other skin ailments.

Propagation and cultivation.
Turmeric can be grown from sea level to 1500m in the hills, at a temperature range of 20-30^{0}C with a rainfall of 1500-2250mm per annum. It is also grown as an irrigated crop. It thrives best in a well-drained sandy or clayey loam rich in humus content.

Ferula assa-foetida L. Family - Apiaceae

Asafoetida is herbaceous, monoecious, perennial plant. Asafoetida is obtained chiefly from the plant *Ferula assa-foetida* of the carrot family Apiaceae. The whole plant is used as a fresh vegetable, the inner portion of the full-grown stem being regarded as a delicacy. The plant may grow as high as 2 metres (7 feet). After four years, when it is ready to yield asafoetida, the stems are cut down close to the root, and a milky juice flows out that quickly sets into a solid resinous mass. A freshly exposed surface of asafoetida has a translucent pearly white appearance, but it soon darkens in the air, becoming first pink and finally reddish brown. https://www.britannica.com/topic/asafetida.

Native to: It is native to central Asia, eastern Iran to Afghanistan, grown chiefly in Iran and Afghanistan. It is exported from Iran and Afghanistan to the rest of the world
In India it is grown in Kashmir and in some parts of Punjab.
It is not native to India, but has been used in Indian medicine and cookery for ages.

a) Stoning after cutting

b) Conventional cutting method

c) Sunshade making after cutting

d) Superficial cutting method

About 130 species of Ferula found in the world
Raw asafoetida, an oleo-gum resin, is extracted from the fleshy roots. Only *Ferula assa-foetida* is an economically important species used for the production of asafoetida.

Properties
Its properties are antispasmodic, expectorant, stimulant, emmenagogue and vermifuge. Asafoetida has also been used as a sedative. It also thins the blood and lowers blood pressure. It is widely used in India in food and as a medicine in Indian systems of medicine like ayurveda. Asafoetida has been held in great esteem among indigenous medicines, particularly in Unani system from the earliest times.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3459456/

Uses
It improves digestion and expels wind from the stomach, thereby providing relief from flatulence, acidity, bloating and other Irritable Bowel Syndrome (IBS) symptoms.
Asafoetida is good for hypertension (compound coumarin help manage blood pressure)
It is anti-inflammatory properties help fight cold, cough and respiratory issues like asthma and bronchitis. Asafoetida may act as a blood thinner and prevent blood clotting.
Asafoetida may also good for diabetes patients. Its antibacterial properties play a significant role in warding off common health issues, and also boost skin and hair health.

Propagation and planting
Asafoetida plant prefers cold and dry conditions for its growth. The cold desert areas of the Indian Himalayan region are suitable for cultivation of asafoetida. It takes five years for the production of oleo-gum resin in its roots. It succeeds in most soils. It prefers a deep fertile soil in a sunny position. This species is not hardy in the colder areas of the country; it tolerates temperatures down to between -5 and -10°C. Plants have a long taproot and are intolerant of root disturbance. They should be planted into their final positions as soon as possible. Monocarpic, the plant takes some years before it flowers and dies after flowering.
https://pfaf.org/user/Plant.aspx?LatinName=Ferula+assa-foetida

Lawsonia inermis L. Family - Lythraceae

Lawsonia inermis, is also known as henna, the henna tree. Henna is a heavily-scented, much-branched, slender, evergreen shrub or small tree. It is only species of the genus *Lawsonia*. It is the source of the dye henna used to dye skin, hair and fingernails, as well as fabrics including silk, wool and leather.

Native to: The origin of is unknown. Linguistic evidence supports an origin in the area of Baluchistan (Iran/Pakistan) to western India, where it can still be found growing in the wild. It is native to northern Africa, Asia and northern Australia, in semi-arid zones and tropical areas.

Properties
Colouring agent, tattoo. Biological activities such as antioxidant, antimicrobial, antiviral, antifungal, antidiabetic, antidiabetic, anticancer, anti-inflammatory, antiparasitic, anticancer, anti-dermatophytic, antiviral, wound healing, immunomodulatory, hepatoprotective, tuberculostatic, anti-amoebiasis.

Uses
Traditional reddish-brown henna has been used for 6,000 years to dye hair, fingernails, and to ornament the skin. Traditional, pure, henna from the plant *Lawsonia inermis* is very safe.

Traditional use
Used as a coagulant for open wounds, poultice to sooth burns and eczema.
Fresh leaves may be used as a topical antiseptic for fungal or bacterial skin infections, including ringworm.


Medicinal uses

- Relief from headaches
- Eases arthritis pain
- Treats a variety of skin conditions
- Promotes healthy hair
- Draws out fever
- Promotes healthy gums
- Reduces pitta in the mind
- Natural treatment for diaper rash
- A cure for dysentery
- A powerful detoxifier
- Regulates blood pressure




Propagation and planting

Plant of the dry to moist tropics and subtropics, it is found at elevations up to 2,000 metres. It grows best in areas where annual daytime temperatures are within the range 19 - 27°c, but can tolerate 13 - 33°C. It prefers a mean annual rainfall in the range 500 - 1,500 mm, but tolerates 250 - 4,200 mm. It prefers a fertile, well-drained or dry soil in a sunny position. A very greedy plant, and remove large quantities of nutrients from the soil. The plant is tolerant of poor, stony and sandy soils, but is also well adapted to heavy, fertile clay soils. It prefers a pH in the range 5 - 7, tolerating 4.3 – 8. Established plants are very drought tolerant. Henna can grow to the size of a large shrub or even small tree, but in cultivation is normally treated as a short-lived perennial crop and then grows up to 70cm tall. Plants produce their best yields during the first 4 - 8 years after planting, but are often left in the field for 12 - 15 years, sometimes for as long as 40 years. Under irrigation, yields of dry leaves may be 2 - 4 tonnes per hectare, while under rain fed conditions in northern India yields of 700 - 1,500 kilos per hectare are obtained. Under intensive cultivation the plants are usually harvested twice a year from the second year onwards.

https://tropical.theferns.info/viewtropical.php?id=Lawsonia+inermis

Mimosa pudica L. Family - Fabaceae

Touch me not is a prickly, long-lived (perennial), herbaceous plant or small shrub with creeping (prostrate or decumbent) or sprawling habit. It usually only grows 15-50 cm tall, but can reach up to 1 m or more in height when supported by other vegetation. *Mimosa pudica* is not the only member of the legume plant family (Leguminosae) to move in response to stimuli. More species of Mimosa show sensitivity to touch, known as seismonasty. Sensitive plant, (*Mimosa pudica*), also called humble plant, plant in the pea family (Fabaceae) that responds to touch and other stimulation by rapidly closing its leaves and drooping. *Mimosa pudica* (from Latin: pudica "shy, bashful or shrinking"; also called sensitive plant, sleepy plant, action plant, touch-me-not, shameplant) is a creeping annual or perennial flowering plant of the pea/legume family Fabaceae.

Native to: South and Central America, the plant is a widespread weed in tropical regions and has naturalized elsewhere in warm areas. It is commonly grown as a curiosity in greenhouses. It is a weed of wetter coastal areas. It is mostly found in plantation crops, disturbed sites, pastures, waste areas, parks, lawns, gardens and along roadsides. Introduced, naturalised or invasive in East Africa *Mimosa pudica* is invasive in Kenya (A.B.R. Witt pers. obs.), Tanzania (Tropical Biology Association 2010) and Uganda (A.B.R. Witt pers. obs.).

Properties
It majorly possesses antibacterial, antivenom, antifertility, anticonvulsant, antidepressant, aphrodisiac, and various other pharmacological activities. The herb has been used traditionally for ages, in the treatment of urogenital disorders, piles, dysentery, sinus, and also applied on wounds.

Uses
- Powerful gut scrubber
- Kills parasites
- May support mental health
- Rich in antioxidants
- May help regenerate the sciatic nerve
- May prevent liver damage
- Kills harmful microbes
- Used in wound healing

It helps in the treatment of many disorders like piles, dysentery, sinus, insomnia, diarrhoea, alopecia and is also applied to cure wounds since ages. Touch-me-not plant helps as it has antibacterial, antivenom, antidepressant, aphrodisiac, anticonvulsant, anti-fertility and anti-asthmatic properties.

Mimosa pudica is listed as a non-toxic plant for humans on the University of California's list of safe and poisonous garden plants. It is also listed as safe for humans and pets on the University of Connecticut College of Agriculture and Natural Resources website

Propagation and planting

This plant reproduces by seeds. Each plant can produce over 700 bristled seeds which can be carried on animal fur, feathers or on people's clothing.

Environmental and other impacts

Mimosa pudica is a serious weed of crops and pastures throughout the tropics. It can also increase the incidence of fires. *M. pudica* has been included in the Global invasive Species Database (GISD 2010). It has been listed as a noxious weed in the Northern Territories Australia.

Momordica charantia L. Family - Cucurbitaceae

It is an annual climber, now widely distributed throughout tropical and subtropical regions on all continents. *M. charantia* is a tropical and subtropical species belonging to the family Cucurbitaceae, and is widely grown for its edible fruit, which is among the most bitter of all fruits. Various names exist for the plant and its fruit, including bitter melon, bitter gourd, goya from the Japanese or Karela from Hindi, ampalayá from Tagalog, and cerasee (Caribbean and South America; also spelled cerasse) (Maiti et al., 2012).
This herbaceous, tendril-bearing vine grows up to 5 m (16 ft) in length. It bears simple, alternate leaves 4–12 cm (1.6–4.7 in) across, with three to seven deeply separated lobes. Each plant bears separate yellow male and female flowers. In the Northern Hemisphere, flowering occurs during June to July and fruiting during September to November. The flowers occur singly in the upper leaf axils on 2-10 cm long stalks with a small leaf-like bract towards the base. Male flowers have a slender basal swelling which is continuous with the base of the sepal tube, which ends in five blunt sepals. There are five oval yellow petals 10-20 cm long, and five central stamens. Female flowers are similar to the male flowers but have a distinct warty swelling well below the base of the sepal tube and three stigmas. Male flowers appear first and usually exceed the number of female flowers by about 20:1. The flower opens at sunrise and remains open for only one day.
https://www.cabi.org/isc/datasheet/34678

Native to: tropical and subtropical Africa and Asia.
Bitter gourd is of old world origin and is a native of tropical Asia, particularly in the Indo Burma region. It is widely grown in India, Indonesia, Malaysia, China and tropical Africa.





Properties

Antidiabetic, anti-cholesterol, antiulcerogenic, antimicrobial, antiviral, antitumor. Works against diabetes mellitus, abdominal pain, kidney (stone), fever, and scabies.
P-insulin is similar to insulin significantly lower blood glucose levels in diabetic patients.
It also contains steroidal saponins called charantin, act like peptides and certain alkaloids that effectively control sugar level in blood.
It is effective against helminthic infection which is caused by nematodes, cestodes, and trematodes.
The main target of helminthic infection is GI system that affects human and livestock's in the world. Anthelmintic action is due to the presence of saponins, i.e. momordin, momordicoside, momordicin, kuguacin, karavilsodie, and karavilagenin.
Saponins paralysis the worms and lead their mortality by inhibiting the acetyl cholinesterase.
Saponins affect the permeability of the cell membrane of worms and lead disintegration and vacuolization of tegument

Uses

In Turkey, it has been used as a folk remedy for a stomach complaints.
In traditional medicine of India, different parts of the plant are used as claimed treatments for diabetes (particularly Polypeptide-p, an insulin analogue), and as a stomachic, laxative, antibilious, emetic, anthelmintic agent, for the treatment of cough, respiratory diseases, skin diseases, wounds, ulcer, gout, and rheumatism.

Propagation and planting

Bitter gourd is often sown directly. The weight of 1000 seeds of cultivated types is 180–200 g. Seed of wild types may be smaller. Farmers need about 3 kg seed per ha for direct sowing. In South-East Asia farmers often raise seedlings of hybrid cultivars in pots for transplanting at a wide spacing; they then use 1.2–1.5 kg seed per ha. The use of pre-germinated seeds, soaked in moist cloth or tissue overnight or until radicle appearance, results in better plant establishment. Spacing is 50–60 cm in the rows and 120–250 cm between the rows; final plant density is 6,000–20,000 plants per ha, depending on cultivar and trellis system. Planting is generally done on raised beds to prevent waterlogging.

Moringa oleifera Lam. Family - Moringaceae

Moringa oleifera is a small, graceful, deciduous tree with sparse foliage, often resembling a leguminous species at a distance, especially when in flower, but immediately recognized when in fruit. The tree grows to 8 m high and 60 cm girth. Bole crooked, often forked from near the base. http://apps.worldagroforestry.org/treedb2/AFTPDFS/Moringa_oleifera.PDF
It is a fast-growing, drought-resistant tree of the family Moringaceae, native to the Indian subcontinent. Common names include moringa, drumstick tree (from the long, slender, triangular seed-pods), horseradish tree (from the taste of the roots, which resembles horseradish) and ben oil tree or benzolive tree. The bark has a whitish-grey colour and is surrounded by thick cork. Young shoots have purplish or greenish-white, hairy bark. The tree has an open crown of drooping, fragile branches; the leaves build up feathery foliage of tripinnate leaves.

Native to: Moringa, is native to parts of Africa and Asia

- It is the sole genus family Moringaceae
- The name is derived from murungai, the Tamil word for drumstick
- The plant is commonly referred to as the drumstick tree

Genus Moringa has 13 species (*M. arborea*, indigenous to Kenya

- *M. rivae* indigenous to Kenya and Ethiopia
- *M. borziana*, indigenous to Somalia and Kenia
- *M. pygmaea* indigenous to Somalia
- *M. longituba* indigenous to Kenya, Ethiopia and Somalia
- *M. stenopetala* indigenous to Kenya and Ethiopia
- *M. ruspoliana* indigenous to Ethiopia
- *M. ovalifolia* indigenous to Namibia and Angola
- *M. drouhardii*, *M. hildebrandi* indigenous to Madagascar
- *M. peregrine* indigenous o Red sea and Horn of Africa
- *M. concanensis*, *Moringa oleifera* indigenous to sub-Himalayan tracts of Northern India

Moringa trees have been used to combat malnutrition, among infants and nursing mothers
It provide a versatile, nutritious food source throughout the year in various geographic regions.. Some 140 organizations worldwide have initiated moringa cultivation programs to lessen malnutrition, purify water, and produce oils for cooking. It has numerous applications in cooking throughout its regional distribution. Edible parts of the plant include the whole leaves (leaflets, stalks and stems) the immature, green fruits or seed pods; the fragrant flowers; and the young seeds and roots.
It is used as forage for livestock, a micronutrient liquid, a natural anthelmintic, and possible adjuvant
M. oleifera is often referred as a panacea and can be used to cure more than 300 diseases. The bark, sap, roots, leaves, seeds and flowers are used in traditional medicine
Useful in the treatment of rheumatism, venomous bites, and for enhancing cardiac function

Moringa seed cake, obtained as a by-product of pressing seeds to obtain oil, is used to filter water using flocculation to produce potable water for animal or human consumption
The leaves have 7 times more vitamin C than oranges, 15 times more potassium than bananas, It also has calcium, protein, iron, and amino acids, which help your body heal and build muscle. It's also packed with antioxidants that can protect cells from damage and may boost your immune system.

Moringa powder is generally well tolerated with a low risk of side effects. No adverse effects in humans who consumed 50 grams of moringa powder as a single dose or 8 grams per day for 28 days. It is best to avoid moringa if you are breast-feeding.

Properties
Leaves, roots, seed, bark, fruit, flowers and immature pods act as cardiac and circulatory stimulants, possess antitumor, antipyretic, antiepileptic, anti-inflammatory, antiulcer, antispasmodic, diuretic, antihypertensive, cholesterol lowering, antioxidant, anti-diabetic,
It reduces liver damage and even helps prevent liver injury. It may also help in restoring liver enzymes.

Uses
- Leaves improve male sexual dysfunction induced by stress and nourishing skin and hair
- Treating oedema
- Preventing and treating cancer
- Treating stomach complaints
- Fighting against bacterial diseases
- Making bones healthier
- Treating mood disorders

Propagation and planting
Moringa grows in the wild or is cultivated in Central America and the Caribbean, (Antigua and Barbuda, Bahamas, Barbados, Cuba, Dominica, Dominican Republic, Grenada, Haiti) northern countries of South America, Africa, South and Southeast Asia, and various countries of Oceania (14 countries: Australia, Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, New Zealand, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu).

Moringa can be propagated by direct seed planting, seedling transplanting and mature stem cuttings. Direct seeding is preferable when the germination rate is high. Seeds must be sown at a maximum depth of 2 cm as deeper seeding might reduce the germination rate.

Murraya koenigii L. Spreng Family - Rutaceae

Murraya koenigii, called curry leaf, is a small, tropical to sub-tropical tree or shrub that typically grows to 6-15' tall and is noted for its pungent, aromatic, curry leaves which are an important flavouring used in Indian/Asian cuisine. This tree is native to moist forests in India and Sri Lanka. Each odd-pinnate leaf typically has 11 to 21, thin, ovate, shiny, dark green leaflets (1-2" long). Fragrant white flowers (each to 5/16" across) in many flowered panicles (terminal cymes) bloom irregularly throughout the year. Flowers are followed by 1-2 seeded, ovoid to oblong, bluish-black fruits (each to 2/3" diameter). Fruits are edible but the seeds are not.
https://www.missouribotanicalgarden.org/PlantFinder/PlantFinderDetails.aspx?kempercode=d441
The curry leaf tree is a tropical to sub-tropical tree in the family Rutaceae. There are 14 species globally. *M. koenigii* and *M. paniculate*, are available in India. Different parts of *M. koenigii,* such as its leaves, root, bark, and fruit, are known to promote various biological activities. *M. koenigii* leaves are slightly bitter in taste, pungent in smell, and weakly acidic *M. koenigii* have been accredited to several chemical constituents of different carbazole alkaloids and other important metabolites, like terpenoids, flavonoids, phenolics, carbohydrates, carotenoids, vitamins, and nicotinic acid from different parts of the *M. koenigii* plant.

Properties
Antimicrobial, antifungal, anti-inflammatory, antiulcer, anticancer, cytotoxic, hepatoprotective, antidiarrheal, anti-amnesic, inotropic activity, anti-diabetic. Antibacterial activity (Effective against the bacterial strains, *E. Coli, Staphylococcus, Streptococcus*, and *Proteus. Pseudomonas*), radioprotective, chemoprotective anthelminthics, analgesics, appetizers in Indian cookery and wound healing. The essential oil extracted from *M. koenigii* leaves is reported to possess anti-oxidative, hepatoprotective antimicrobial, antifungal anti-inflammatory, and nephroprotective activities in animal models.

Uses
- The green leaves of *M. koenigii* are used in treating piles, fresh cuts, dysentery, bruises, and oedema
- The roots are purgative to some extent
- They are stimulating and used for common body aches.
- The bark is helpful in treating snakebites
- Seasoning food items and preparing ready-to-eat foods.
- Tonics for inducing digestion and flatulence or as antiemetics
- Helpful in reducing fever
- The juice of the root is given to manage renal pains
- Cure for piles, body heat reducer,
- Thirst quencher
- reducing inflammation and itching
- Managing leucoderma and blood disorders
- Cure for dysentery
- Curing poisonous bites and eruptions

Propagation and planting
Curry leaf plants may be grown from cuttings or seed. The seed is the pit of the fruit and can either be cleaned or the entire fruit may be sown. Fresh seed shows the greatest rate of germination. Sow the seeds in potting soil and keep them damp but not wet. They will need a warm area of at least 68 degrees Fahrenheit (20 C.) to germinate. Growing curry leaf tree from seed is not an easy task because germination is fickle. Other methods are more consistent. You can also use fresh curry leaves with petiole or stem and start a plant. Treat the leaves as a cutting and insert them into a soilless potting medium. Take a piece of stem from the tree that is about 3 inches (7.5 cm.) long and has several leaves. Remove the bottom 1 inch (2.5 cm.) of leaves. Immerse the bare stem into the medium and mist thoroughly. It will root in about three weeks if you keep it warm and moist. Growing curry leaves to produce a new plant is the easiest method of propagation.

Read more at Gardening Know How: Curry Leaf Care – Growing Curry Leaf Tree In Your Garden https://www.gardeningknowhow.com/edible/herbs/curry/growing-curry-leaf.htm

Ocimum basilicum L. Family - Lamiaceae

Ocimum basilicum, commonly referred to as sweet basil, is an herb. It is an aromatic, annual herb, 0.3-0.5 metres tall, but some cultivars can reach up to 1 m. The plant is almost hairless. Some cultivars, such as the 'Dark Opal', have leaves and stems deep purple in colour. Basil is used to flavour soups and sauces and is the main ingredient of pesto sauce.

Native to: the tropical regions of Africa and Asia, Sweet basil prefers full sun and moist, well-drained soils. It plays a role in many Mediterranean, and particularly Italian, cuisines, adds a distinctive flavour to salads, pasta, pizza, and other dishes. Indonesian, Thai, and Vietnamese cuisines also use this herb. The leaves can be harvested throughout the growing season and are used fresh or dried.

Properties
Antihypertensive, hepatoprotective, hypo-lipidaemic, antioxidant, anti-inflammatory, anti-ulcererogenic, anticonvulsant, antimicrobial, antiparasitic. *Ocimum basilicum*, has reputed medicinal uses, antifungal, antiviral, cytoprotective, anticonvulsant, hypoglycaemic, hypolipidemic, hepatoprotective, nephroprotective, neuroprotective, spermicidal, dermatologic and insecticidal.

Uses
- The mucilaginous seed is given in infusion in the treatment of gonorrhoea, dysentery and chronic diarrhoea
- It is said to remove film and opacity from the eyes
- The root is used in the treatment of bowel complaints in children
- Extracts from the plant are bactericidal and are also effective against internal parasites
- The essential oil is used in aromatherapy

- Sweet basil has been used for thousands of years as a culinary and medicinal herb
- Easing flatulence, stomach cramps, colic and indigestion
- The leaves and flowering tops are antispasmodic, aromatic, carminative, digestive, galactogogue, stomachic and tonic
- They are taken internally in the treatment of feverish illnesses (especially colds and influenza), poor digestion, nausea, abdominal cramps, gastro-enteritis, migraine, insomnia, depression and exhaustion
- Externally, they are used to treat acne, loss of smell, insect stings, snake bites and skin infections
- In Chinese medicine for kidney disease and gum ulcers
- In Indian medicine foe earache, rheumatoid arthritis, anorexia, itching, menstrual disorders, and malaria
- Basil extracts in topical skin creams might improve skin hydration and reduce roughness and wrinkling.
- Commonly recommend basil to help manage blood sugar levels.
- Basil extracts could prove useful for people with diabetes.
- Alleviate stress, anxiety, and depression
- Increase the ability to think and reason
- Prevent age-related memory loss
- Improve stress-related sleep and sex issues

Propagation and planting

Annual basil loves rich soil, water, fertiliser and sun. It grows about 30 to 60 cm tall. I sow the seed in late August, so that by the time the weather has warmed up sufficiently, the basil is ready to be transplanted outside. I find it best to grow it in a large tub. In my garden, basil is a martyr to the dreaded flea beetle, which disfigures and eventually ruins the foliage, so I place my tubs inside a wooden cage covered with a very fine mesh, which effectively excludes the beetles, as well as moths and butterflies (whose caterpillars also will defoliate basil very quickly), snails and aphids.

Ocimum tenuiflorum L. Family - Lamiaceae

Synonym *Ocimum sanctum* L.F. Lamiaceae, Tulsi
Herb or subshrub to 1 m high, much-branched, with a pungent aromatic odour, the branchlets and new growth pubescent with soft white hairs. Leaves with blades elliptic to elliptic-oblong, 3–6 cm long, 1–2.5 cm wide, cuneate to attenuate at base, obtuse to acute at apex, entire to remotely serrate at margins, pubescent on both surfaces but especially on the nerves beneath; petioles 1–2.5 cm long, softly pubescent. Flowers terminal, slender racemes or panicles 4–12 cm long, 1–1.5 cm wide, the bracteoles 2–3 mm long, ovate, acuminate, ciliate; flowers in verticils, on pedicels 2–4.5 mm long; calyx c 2.5 mm long at anthesis, in fruit up to 5 mm long, glabrous within, the upper lip suborbicular, reflexed, short-apiculate, the lower lip longer than the upper lip, the teeth 4, lanceolate; corolla pale pink, pale lavender or white, to 4 mm long; filaments of stamens exserted, slender, the upper pair of each with a small, bearded basal appendage. Fruit with nutlets purple-green to brown, broadly ellipsoid, 0.8–1.2 mm long, smooth to minutely pitted, swelling in water (Wagner and Lorence, 2014).

Native to: The plant is considered indigenous to the Indian subcontinent including the Himalayas, Malesia, and other tropical and subtropical parts of Asia, and is now widely cultivated and naturalized in places around the world, including the Caribbean, Pacific islands, and parts of Africa (Govaerts, 2014; USDA-ARS, 2014; Wagner and Lorence, 2014). Introduction of the species beyond Asia has primarily been for its medicinal and culinary use, as it has been used for these purposes for at least 3000 years. Commonly known as holy basil or tulsi. It is native to the Indian subcontinent and widespread as a cultivated plant throughout the South east Asian tropics. Tulsi is a sacred plant for Hindus, is worshipped as the avatar of Lakshmi. Planted in courtyards of Hindu houses or Hanuman temples. Tulsi is rightly called the ‘Queen of Herbs'.


There are different species.

- Rama tulsi (*ocimum sanctum*)
- Krishna tulsi (*ocimum tenuiflorum*)
- Amrita tulsi (*ocimum tenuiflorum*)
- Vana tulsi (*ocimum gratissum*)
- Sweet basil (*Ocimum basilicum*)
- Thai basil (*Ocimum thyrsiflora*)
- Purple basil (*Ocimum basilicum*)
- Lemon basil (*Ocimum citriodorum*)
- Vietnamese basil (*Ocimum cinnamon*)
- American basil (*Ocimum americanum*)
- African blue basil (*Ocimum kilimandscharicum*)
- Italian Genovese basil (*Ocimum basilicum*)
- Lettuce basil
- Green ruffles basil
- Cardinal basil
- Greek basil
- Spicy globe basil
- Summer long basil

Properties

Antioxidant, antidiabetic, antilipidemic, antitumour, antistressor, antifertility, wound healing, immunostimulant, anti-inflammatory, anti-ulcererogenic, anticonvulsant, antimicrobial, antiparasitic. This plant is well known for its medicinal and spiritual properties in Ayurveda which includes aiding cough, asthma, diarrhoea, fever, dysentery, arthritis, eye diseases, indigestion, gastric ailments, etc. Major phytoconstituents of *O. sanctum* are eugenol, ursolic acid, rosmarinic acid, apigenin, myretenal, luteolin, β-sitosterol, and carnosic acid (Pattanayak et al., 2010).

Uses

Different parts widely used by the traditional medical practitioners for curing various diseases

Tulsi has also been suggested to possess antifertility, anticancer, antidiabetic, antifungal, antimicrobial, hepatoprotective, cardioprotective, antiemetic, antispasmodic, analgesic, adaptogenic and diaphoretic actions. Steam distilled, petroleum ether and benzene extracts of various parts of Tulsi plant and eugenol on immune system, reproductive system, central nervous system, cardiovascular system, gastric system, urinary system. Its use is recommended as a first aid in the treatment of respiratory, digestive and skin diseases.

Tulsi essential oil

The oils, at concentrations of 4.5 and 2.25% completely inhibited the growth of *Staphylococcus aureus* (including MRSA) and Escherichia coli, while the same concentrations only partly inhibited the growth of *Pseudomonas aeruginosa*.

Tulsi protects organs and tissues against chemical stress. Tulsi also counters metabolic stress through normalization of blood glucose, blood pressure and lipid levels.

Tulsi's broad-spectrum antimicrobial activity, which includes activity against a range of human and animal pathogens, suggests it can be used as a hand sanitizer, mouthwash and water purifier as well as in animal rearing, wound healing, the preservation of food stuffs and herbal raw materials and traveller’s health.

Propagation and planting

Cultivation of Tulsi plants has both spiritual and practical significance. Tulsi can also be propagated by vegetative method using terminal cuttings with about 90-100 per cent success when planted during October-December months. For this purpose, cuttings with 8-10 nodes and 10-15 cm length are used. They are so prepared that except for the first 2-3 pair of leaves the rest are trimmed off.

Piper betel L. Family - Piperaceae

The betel pepper is an evergreen vine with heart-shaped leaves, grown in shady tropical conditions. The plants are dioecious (individuals are either male or female) and produce white flowers arranged in small spikes called catkins. The plant is most likely native to Malaysia but is widely cultivated in areas in which betel chewing is popular. Male plants are grown more frequently than female plants and are propagated asexually by cuttings. The harvested leaves are extremely susceptible to postharvest disease and rapid spoilage, and farmers frequently incur significant crop losses.
(https://www.britannica.com/plant/betel#ref1183851)

Native to: throughout wide areas of southern Asia and the East Indies.

Properties
Platelet inhibition activity, antibacterial activity, antidiabetic activity, anti-oxidant, antifertility activity, radioprotective activity, protective and healing activity. Analgesic, eases constipation, improves digestion: reduces respiratory issues, antiseptic and anti-fungal properties, maintains oral health, relieves joint pain.

Betel leaves: abundant repositories of cancer-fighting phytochemicals

The leaves are rich in vitamins like vitamin C, thiamine, niacin, riboflavin and carotene and are a great source of calcium. These include its powerful antioxidant and anti-inflammatory compounds like phytochemicals, including phenolic compounds, flavonoids, tannins, alkaloids, steroids and quinones. Owing to these, betel leaf has anti-microbial, anti-cancer and anti-diabetic properties.

Other betel phytochemicals include allylpyrocatechol (APC; 2-hydroxychavicol), 4-hydroxycatechol, β-caryophyllene, methyl eugenol, carotenes, starch, diastases, and an essential oil containing hydroxychavicol). Hydroxychavicol, a phenolic compound quantitatively present at approximately 26% in betel leaves, has been shown to exert

antiproliferative activity in prostate cancer. Hydroxychavicol has also been shown to impede cell-cycle progression of prostate cancer and oral KB carcinoma cells. Several reports indicate hydroxychavicol as an antimutagenic agent as well as an effective inhibitor of cyclooxygenase (COX), platelet calcium signalling, and thromboxane B2 production. Other studies suggest that hydroxychavicol also known as APC possesses antiulcerogenic activity and has been shown to alleviate indomethacin-induced stomach ulceration leading to gastric cancer. Hydroxychavicol also inhibits inflammatory response molecules like inducible nitric oxide synthase and COX-2, which are known to enhance tumour growth by down regulation of the NF-κB) pathway. Chavibetol (CHV), along with hydroxychavicol, acts as a radioprotectant and exhibits substantial immunomodulatory and free radical scavenging activities. It has been shown that CHV synergizes with hydroxychavicol to exert antiproliferative activity against human prostate cancer PC-3 cells.

Piper betel leaf extract: anticancer benefits and bio-guided fractionation to identify active principles for prostate cancer management. **https://pubmed.ncbi.nlm.nih.gov/23430955/**

Uses

The leaves, which are the most commonly used plant part, are pungent with aromatic flavor and are widely consumed as a mouth freshener. It is carminative, stimulant, astringent and is effective against parasitic worms. Experimental studies have shown that it possess diverse biological and pharmacological effects, which includes antibacterial, antifungal, larvicidal, antiprotozoal, anticaries, gastroprotective effects, free radical scavenging, antioxidant, anti-inflammatory hepatoprotective, immunomodulatory, antiulcer and chemo-preventive activities. (https://pubmed.ncbi.nlm.nih.gov/25159859/)

Propagation and planting

Growing betel leaf plant is not difficult but you need to be aware of its requirements. This rare, mildly stimulant herb can also be grown in containers, even indoors in the part sun!

It's a perennial herb, which can also be grown in containers and hanging baskets. You can grow it from cuttings and root division. It thrives well in a subtropical and tropical climate but growing betel leaf plant in a cold climate (as an annual, mostly) is also possible with extra care, in containers.

It's better if you buy a plant from a nursery, however, if you want to propagate it from cuttings, take about 18 cm long stem. Make 45 degrees cut using a sharp knife just below the leaf node. Remove all leaves from the cutting except the top 2 leaves. Put the cutting in a glass of freshwater and place it on a spot like a windowsill in indirect sunlight. Keep changing the water every 2 days. Once several roots appear, transplant it into a deep container or in the ground.

Requirements for Growing Betel Leaf Plant (Paan)

It prefers slightly acidic, sandy-loamy, and lightly damp soil but not waterlogged. Use the well-drained potting mix to plant it in a way that water will drain out from it quickly. Pick a less windy spot with partial shade for planting. *Choose a medium-sized deep planter, if you're growing it in the container.

1. It thrives well in a hot and humid environment in *partial shade*. The betel plant needs regular watering.
2. Prune regularly after it reaches 2-meter height to control the plant, regular pruning and plucking of leaves encourage new growth and sweet and tender leaves.

3. Occasional feeding every couple of months in the growing season of the plant with a nitrogen-rich fertilizer is recommended. Alternatively, you can side dress the plant with aged manure or compost 2-3 times in a year.
4. (In cold climate) Keep it indoors in winters when the temperature starts to fall below 41F (5C) in a warm and cosy room under grow light. It becomes dormant in brutal cold and sometimes shed its leaves too, but get to grow again in spring and remain in growth until fall. In such conditions keep care of watering, overwatering can cause root rot.

Pests and Diseases
It's not pest-free of course, and attacked by red mites occasionally, which can be treated with insecticidal soap. It also suffers from **fungal diseases**, especially in rainy season or when overwatering is done. To save the plant, watering should be reduced. Leaf blight is another problem which affects betel plant in which brown and black oily patches cover the leaf. Leaf blight can be treated by simply pulling off the infected leaf or stem.

Harvesting
Within four to six months after planting, it'll be ready for harvest. You can pick off the fresh aromatic leaves for various uses.

Piper nigrum L. Family - Piperaceae

A flowering vine in the family Piperaceae, cultivated for its fruit, known as a peppercorn. Dried and used as a spice and seasoning. Black pepper is native to present-day Kerala, a state on the south-western coast of India It is extensively cultivated there and in other tropical regions

Native to: Black pepper is native to South Asia and Southeast Asia, and has been known to Indian cooking since at least 2000 BCE. Its most important source was India, particularly the Chera dynasty, in the state of Kerala.

Properties

Carminative, hepatoprotective, indigestion, antifever, antibacterial activity, antifungal activity, anti-oxidant, Anti-inflammatory, immunomodulatory, Anticarcinogenic, anti-metastasis, anti-spasmolytic. *P. nigrum* for both human and veterinary medicine was India. It is used menstrual and ear-nose-throat disorders in human and gastrointestinal disorders in livestock. *Piper nigrum* also exhibited anticancer effect against a number of cell lines from breast, colon, cervical, and prostate through different mechanisms including cytotoxicity, apoptosis, autophagy, and interference with signalling pathways. Its anti-diabetic property has also been confirmed in vivo as well as hypolipidemic activity as evidenced by decrease in the level of cholesterol, triglycerides, and low-density lipoprotein. It has anti-inflammatory, analgesic, anticonvulsant, and neuroprotective effects.

- Black pepper is rich in a potent antioxidant called piperine, which may help prevent free radical damage to your cells.
- It has anti-inflammatory properties: Black pepper contains an active compound that has been shown to decrease inflammation in animals.
- Black pepper extract has improved symptoms of degenerative brain diseases in animal studies.
- Black pepper extract may improve blood sugar control, but more research is needed.
- Black pepper has demonstrated cholesterol-lowering effects in rodent studies and is believed to boost the absorption of potential cholesterol-lowering supplements
- Black pepper contains an active compound that has slowed the replication of cancer cells and induced cancer cell death in test-tube studies

Traditional use

Peppercorns were a much-prized trade good, often referred to as "black gold" and used as a form of commodity money. Black peppercorns were found stuffed in the nostrils of Ramesses II, placed there as part of the mummification rituals shortly after his death in 1213 BCE. Little else is known about the use of pepper in ancient Egypt and how it reached the Nile from South Asia.

Uses

- Boosts absorption of nutrients.

Black pepper may increase the absorption of essential nutrients like calcium and selenium, as well some beneficial plant compounds, such as those found in green tea and turmeric (Source, 44Trusted Source).

- Promote gut health.

Preliminary research suggests that black pepper may increase the good bacteria in your gut (45Trusted Source).

- Offer pain relief.

Studies in rodents suggest that the piperine in black pepper may be a natural pain reliever (93Trusted Source).

- Reduce appetite.

16 adults reported reduced appetite after drinking a black-pepper-based beverage compared to flavoured water. (97 Trusted Source).

Propagation and planting

Growing black pepper by seed: Soak in water for 24 hours (or more) until the seeds are visibly hydrated and plump. Plant the seeds about 1/4th inch in moist potting soil and keep the soil moist. Germination typically occurs within one month. Rooting lolot is easy, simply place a stem under some soil, preferably one that is already growing low to the ground. Burying a horizontal stem, or "runner", encourages root formation and once the roots are well established you may sever the stem from the parent plant. This effectively creates a clone that can be re-potted. https://www.edibletropicalplants.com/how-to-propagate-piper-black-pepper-and-lolot/

Raphanus sativus L. Family - Brassicaceae

This annual or biennial plant consists of a rosette of leaves; somewhat later, it bolts and produces flowering stems up to 2½' tall. The basal leaves are up to 7" long and 2½" across; they are oblanceolate, coarsely crenate, and pinnately lobed.
Radishes can be categorized into four main types, according to the seasons they are grown and a variety of shapes, lengths, sizes, and colours (red, pink, white, gray-black, or yellow radishes).
Raphanus sativus var. caudatus Green radish
Raphanus raphanistrum subsp. sativus (syn. Raphanus sativus var. longipinnatus (Daikon)
Raphanus sativus var. niger - Black radish





Native to: Radishes are grown and consumed throughout the world, being mostly eaten raw as a crunchy salad vegetable with a pungent flavour. Common smaller varieties being ready for consumption within a month. Larger daikon varieties take several months.
Radishes are a fast-growing, annual, cool-season crop. The seed germinates in three to four days in moist conditions with soil temperatures between 18 and 29 °C (65 and 85 °F).
Best quality roots are obtained under moderate day lengths with air temperatures in the range 10 to 18 °C (50 to 65 °F). Under average conditions, the crop matures in 3–4 weeks, but in colder weather, 6–7 weeks may be required.
The daikon varieties of radish are important parts of East, Southeast, and South Asian cuisine. In Japan and Korea, radish dolls are sometimes made as children's toys. Daikon is also one of the plants that make up the Japanese Festival of Seven

Herbs (Nanakusa no sekku) on the seventh day after the new year."Radi", a spiral-cut radish that is sprinkled with salt and occasionally chives, and eaten with the fingers, is traditionally served with beer at the Bavarian Oktoberfest.
Citizens of Oaxaca, Mexico, celebrate the Night of the Radishes (Noche de los rábanos) on December 23 as a part of Christmas celebrations.This folk art competition uses a large type of radish up to 50 cm (20 in) long and weighing up to 3 kg (7 lb). Great skill and ingenuity are used to carve these into religious and popular figures, buildings, and other objects, and they are displayed in the town square.
Daikon refers to a wide variety of winter oilseed radishes from Asia. Japanese name daikon has been adopted in English, it is also sometimes called the Japanese radish, Chinese radish, Oriental radish or mooli (in India and South Asia). One well-known variety is 'April Cross', with smooth white roots. 'Masato Red' and 'Masato Green' varieties as extremely long, well-suited for fall planting and winter storage. The Sakurajima radish is a hot-flavoured variety is grown to around 10 kg (22 lb), but which can grow to 30 kg (66 lb) when left in the ground.
The seeds of radishes grow in siliques (widely referred to as "pods"). The seeds are edible, and are sometimes used as a crunchy, sharp addition to salads. Some varieties are grown specifically for their seeds or seed pods, rather than their roots. The rat-tailed radish, an old European variety thought to have come from East Asia centuries ago, has long, thin, curly pods which can exceed 20 cm (8 in) in length. In the 17th century, the pods were often pickled and served with meat.The 'München Bier' variety supplies seed pods that are sometimes served raw as an accompaniment to beer in Germany
The seeds of radishes can be pressed to extract radish seed oil. Wild radish seeds contain up to 48% oil, and while not suitable for human consumption. This oil is a potential source of biofuel.
Using 2003-4 data, several sources report annual world production of radishes to be about 7 million tonnes, produced mainly by China, Japan, and South Korea, and representing roughly 2% of global vegetable production

Properties

- For indigestion, anti-oxidant (vit. C), hepatoprotective, mucolytic agent, anti-spasmodic, anti-gall stone (a).
- Saves those RBCs: Radish is known to control damage to our red blood cells, and in the process also increases oxygen supply to the blood.
- High on Fiber: Radish also provides your system with ample roughage and fibre, improving your digestion.
- Regulates bile production, safeguards your liver and the gall bladder, and is great for taking care of water retention, Support a healthy digestive system
- Guards the Heart: Radishes are a good source for anthocyanins that keep our hearts functioning properly, reducing the risk of cardiovascular diseases. Plus they are high on vitamin C, folic acid, and flavonoids too.
- Controls Blood Pressure: provides your body with potassium, which lower blood pressure, keep your blood flow in control, especially if you are known to suffer from hypertension.
- Improves Immunity: Radish has high vitamin C, it can protect you from common cold and cough, and improve your basic immunity system.
- Fortifies Blood Vessels: Radish plays an important role in the generation of collagen, which in turn boosts our blood vessels and decreases our chances of getting atherosclerosis

- Metabolism-Friendly: Radish is helps to fix acidity, obesity, gastric problems, and nausea
- Anticancer properties
- Antifungal properties . They contain the antifungal protein RsAFP2 that caused cell death in Candida albicans, a common fungus found in humans which cause vaginal yeast infections, oral yeast infections (thrush), and invasive candidiasis
- High on Nutrients: Red radishes are packed with Vitamins E, A, C, B6, and K. Plus it's high on antioxidants, fiber, zinc, potassium, phosphorous, magnesium, copper, calcium, iron and manganese. And each of these is known to keep our body in good working condition.
- Good for the Skin: If you drink radish juice every day, you're giving your skin special boosters to stay healthy, because of the Vitamin C, zinc, and phosphorus, keeps dryness, acne, pimples, and rashes at bay. Plus you can use radish paste to cleanse your face.
- Remove dandruff, prevent hair loss, and strengthens the root too.
- Good for Hydration: Eat in summer to keep the body hydrated because of its high water content.

Medicinal use

Dried ripe seed of radish is used as traditional Chinese medicine (TCM) to treat constipation, chronic tracheitis, and hypertension.
Radish is used for stomach and intestinal disorders, liver problems, bile duct problems, gallstones, loss of appetite, bronchitis, fever, colds, and cough.
It is also used for high cholesterol.
Radish root contains chemicals which might kill cancer cells and reduce levels of cholesterol and sugar in the blood**.**

Contraindications

Taking large amounts of radish can irritate the digestive tract. Diabetes: Large amounts of radish might lower blood sugar. Watch for signs of low blood sugar (hypoglycemia) and monitor your blood sugar carefully if you have diabetes and use radish.

Propagation and planting

Basic requirements Radishes are fast growing cool-season vegetables that grow very well in cool moist climates. The optimum temperature for the growth of radishes is between 10 and 18°C (50–65°F) and they grow best in well-draining sandy loams which are rich in organic matter with a pH between 5.8 and 6.8. Radish should be grown in full sun to part shade. Propagation Radish is propagated directly from seed into a prepared bed. Seeds should be planted in late winter to early spring for the first spring crop and plantings can be staggered to provide a continuous harvest. Seeds should be planted at a depth of 1 cm (0.5 in), allowing 2.5 cm (1 in) between individual plants and a further 30 cm (12 in) between rows. Commercial producers may drill seeds using planting rates of 30–40 kg per hectare. Radishes usually reach full maturity between 30 to 50 days after sowing. They should be harvested promptly as over-mature radishes become woody and develop a bitter taste. The plants may be topped by cutting back the leaves to a height of 7–10 cm (2.8–3.9 in) prior to harvesting, or whole plants can be pulled from the soil. Roots should be washed prior to storing to increase longevity. https://plantvillage.psu.edu/topics/radish/infos

Sesamum indicum L. Family - Pedaliaceae

Sesame (*Sesamum indicum*), also called benne, is an erect annual plant of the family Pedaliaceae, grown since antiquity for its seeds, which are used as food and flavouring and from which a prized oil is extracted. The aroma and taste of sesame seed are mild and nutlike.

Native to: is spread throughout the tropical and subtropical areas in Asia, Africa, and South America.

Properties

Apoplexia, anti-diabetes, tonicum, galactogogue, anti-oxidant. Fibre is well known for supporting digestive health. Fibre may play a role in reducing your risk of heart disease, certain cancers, obesity, and type 2 diabetes. Sesame seeds consist of 15% saturated fat, 41% polyunsaturated fat, and 39% monounsaturated fat. Sesame seeds may help reduce heart disease risk factors, including elevated triglyceride and “bad” LDL cholesterol levels.

Uses

- Sesame seeds supply 5 grams of protein per 3-tablespoon (30-gram) serving Sesame seeds — particularly hulled ones — are a good source of protein, which is a necessary building block for your body
- Sesame seeds are high in methionine and cysteine, two amino acids that legumes don’t provide in large amounts
- Sesame seeds are high in magnesium, which may help lower blood pressure
- Additionally, lignans, vitamin E, and other antioxidants in sesame seeds may help prevent plaque build-up in your arteries, potentially maintaining healthy blood pressure
- Three tablespoons (30 grams) of sesame seeds boast Unhulled sesame seeds are especially rich in nutrients vital to bone health, including calcium. Soaking, roasting, or sprouting sesame seeds can improve absorption of these minerals , RDI (Reference Daily Intake)
- Preliminary research suggests that sesame seeds and their oil may have anti-inflammatory properties
- This may be due to sesamin, a compound found in sesame seeds and their oil
- Sesame seeds are a good source of thiamine, niacin, and vitamin B6, which are necessary for proper cellular function and metabolism
- Sesame seeds supply iron, copper, and vitamin B6, which are needed for blood cell formation and function
- Sesame seeds may aid blood sugar control because they’re low in carbs and high in quality protein and healthy fats
- What’s more, they contain a plant compound that may help in this regard
- Plant compounds and vitamin E in sesame seeds function as antioxidants, which combat oxidative stress in your body
- Sesame seeds are a good source of several nutrients that are important for immune system function, including zinc, selenium, copper, iron, vitamin B6, and vitamin E.
- Sesamin, a compound in sesame seeds, may help reduce joint pain and support mobility in arthritis of the knee
- In a 2-month study, people with knee arthritis ate 5 tablespoons (40 grams) of sesame seed powder daily alongside drug therapy
- They experienced a 63% decrease in knee pain compared to only a 22% decrease for the group on drug therapy alone
- Sesame seeds are a good source of selenium, supplying 18% of the RDI in both unhulled and hulled seeds
- Sesame seeds are good sources of nutrients — such as selenium, iron, copper, zinc, and vitamin B6 — that support thyroid health.
- Your thyroid gland contains the highest concentration of selenium of any organ in your body
- This mineral plays a vital role in making thyroid hormones
- Phytoestrogens are compounds found in sesame seeds that may benefit women who are undergoing menopause

- Sesame seeds can perk up many dishes, including salads, granola, baked goods, and stir-fries
- Tahini and sesame flour are other products made out of sesame seeds

Propagation and planting
Cultivation
Sesame is the oldest indigenous oilseed crop, with longest history of cultivation in India. Sesame or gingelly is commonly known as til (Hindi, Punjabi, Assamese, Bengali, Marathi), tal (Gujarati), nuvvulu, manchi nuvvulu (Telugu), ellu (Tamil, Malayalam, Kannada), tila/pitratarpana (Sanskrit) and rasi (Odia). Sesame seeds are tiny, oil-rich seeds that grow in pods on the *Sesamum indicum* plant. Unhulled seeds have the outer, edible husk intact, while hulled seeds come without the husk. Three tablespoons (30 grams) of unhulled sesame seeds provide 3.5 grams of fibre, which is 12% of the Reference Daily Intake (RDI).
India ranks first in world with 19.47 Lakh ha area and 8.66 Lakh tonnes production. The average yield of sesame (413 kg/ha) in India is low as compared with other countries in the world (535 kg / ha).
The main reasons for low productivity of sesame are its rain fed cultivation in marginal and sub-marginal lands under poor management and input. A well-managed crop of sesame can yield 1200 - 1500 kg/ha under irrigated and 800 - 1000 kg/ha under rain fed conditions. The crop is grown in almost all parts of the country. More than 85% production of sesame comes from West Bengal, Madhya Pradesh, Rajasthan, Uttar Pradesh, Gujarat, Andhra Pradesh and Telangana. Sesame is grown in almost all the states in large or small areas. It is cultivated up to the latitude of 1600m (India 1200 m).

Sesame plant needs fairly high temperature during its life cycle 25 - 35 degree °C.
Season : Kharif in arid and semi-arid tropics and rabi/summer in cooler areas
Climate : Semi-arid climate of Western India, Central, Eastern and Southern part of India including lower Himalayas

Trigonella foenum-graecum L. Family - Fabaceae

Fenugreek, *Trigonella foenum-graecum*, is an herbaceous annual plant in the family Fabaceae grown for its leaves and seeds which are used as a herb or spice. The fenugreek plant may have a single stem or may be branched at the stem base. The plant has an erect growth habit and a strong, sweet aroma. Fenugreek is used as a herb (dried or fresh leaves), spice (seeds), and vegetable (fresh leaves, sprouts, and microgreens). Cuboid-shaped, yellow- to amber-coloured fenugreek seeds are frequently encountered in the cuisines of the Indian subcontinent.

Native to: southern Europe and the Mediterranean region, fenugreek is cultivated in central and south eastern Europe, western Asia, India, and northern Africa**.**

Properties
Anti-abscess, anorexia, Anti-pyretic, anti-inflammatory, depurative, anti-diabetes, anti-indigestion, antitussive, androgenic, expectorans. Fenugreek seeds have been known for a long time for their antidiabetic action.
Potential natural health product for the prevention and treatment of type II diabetes. provides soluble fibre along with other glucose-, cholesterol-, and triglyceride-lowering compounds. Daily management and stabilization of blood glucose and lipid levels for non-insulin-dependent diabetics. Unique properties of fenugreek to the prevention of hyperglycemia and hyperlipidemia. Clinical trials support beneficial effects of fenugreek seeds on glycemic control in persons with diabetes.

Uses
The *T. foenum-graecum* cold water extract, known as fenugreek tea, has been traditionally used against respiratory infections (bronchitis and pneumonia), and since it nourishes the body during illness, the herb has also been used to reduce fever, when taken with lemon and honey. *Trigonella foenum-graecum* has been shown to possess hypoglycemic, antihypertensive, and hypolipidemic activities (Micallef and Garg, 2009). Fenugreek also has a long history of use in the treatment of reproductive disorders, in inducing labour, treating hormonal disorders, increasing milk supply, and reducing menstrual pain. The plant has been known to have health potential with the ability to maintain blood glucose and cholesterol levels, and hence in the prevention and treatment of diabetes and heart disorders. *Trigonella foenum-graecum* has also been reported to exhibit pharmacological properties including antiviral, antimicrobial, hypotensive, antioxidant, anti-inflammatory, and antitumor activity (Mullaicharam et al., 2013). Al-Oqail et al. (2013) demonstrated a decrease in the cell

viability of cancerous cells exposed to seed oil of fenugreek.
https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/trigonella-foenum-graecum

Propagation and planting

Basic requirements Fenugreek is a sun-loving plant which is usually grown as a cool season crop. It grows optimally in well-draining loams or sandy loams with a pH between 5.8 and 8.2. it will not grow well in heavy clay. Fenugreek is moderately drought resistant and can be grown in areas with low amounts of rainfall. In areas where the summer temperatures are high it is grown as a cool season crop but can be grown over summer in more temperate climates. The plants can withstand light frost. Propagation Fenugreek is propagated from seed and it does not withstand transplanting. It should be direct seeded to a depth of 1–2 cm (0.4–0.8 in) allowing 7.5 cm (3 in) between individual plants and 20–45 cm (8–18 in) between rows. It may also be be spread by broadcasting. General care and maintenance The most important aspect of fenugreek cultivation is keeping the bed free from weeds. Beds should be weeded regularly to prevent competition with the developing plants. The plants will benefit from additional irrigation if rainfall is not adequate. In addition, productivity of fenugreek grown for seed will be increased with the addition of potash and phosphate fertilizer. Harvesting Fenugreek grown for seed is ready to harvest within 3 to 5 months after planting. The plants are harvested by uprooting and are then hung up to dry to allow seeds to be collected. In India, where the plant is grown as a vegetable crop, young shoots and leaves are harvested earlier and the plant is allowed to regrow before harvesting again.
India is a major producer, derived from numerous states. Rajasthan accounts for over 80% of India's output.

Zingiber officinale Roscoe, Family - Zingiberaceae

Ginger (*Zingiber officinale*) is a flowering plant whose rhizome, ginger root or ginger, is widely used as a spice and a folk medicine. It is a herbaceous perennial which grows annual pseudostems (false stems made of the rolled bases of leaves) about one meter tall bearing narrow leaf blades.

Native to: Ginger originated from Maritime Southeast Asia. The most ancient evidence of its domestication is among the Austronesian peoples. Ginger cultivated and exploited since ancient times including bitter ginger (Zingiber zerumbet). The first written record of ginger comes from the Analects of Confucius, written in China during the Warring States period (475–221 BC). Confucius was said to eat ginger with every meal.
In 406 AD, the monk Faxian wrote that ginger was grown in pots and carried on Chinese ships to prevent scurvy. During the Song Dynasty (960–1279), ginger was being imported into China from southern countries. Ginger was introduced to the Mediterranean by the Arabs. Described by writers like Dioscorides (40–90 AD) and Pliny the Elder (24–79 AD).

- In 150 AD, Ptolemy noted that ginger was produced in Ceylon (Sri Lanka). Raw and preserved ginger was imported into Europe during the Middle Ages. In 14th century England, a pound of ginger cost as much as a sheep.
- In 2018, global production of ginger was 2.8 million tonnes, led by India with 32% of the world total. China, Nigeria, and Nepal also had substantial production. Rhizome, is essential for the production of ginger
- Ginger is a very popular spice used worldwide. It is used to spice up meals. Also a medicine, the demand for ginger all over the world has been consistent throughout history. Ginger can be used for a variety of food or medicine items such as vegetables, candy, soda, pickles, and alcoholic beverages.

Ginger is a fragrant kitchen spice.
Young ginger rhizomes are juicy and fleshy with a mild taste.
Often pickled in vinegar or sherry as a snack or cooked as an ingredient in many dishes.
Steeped in boiling water to make ginger herb tea, to which honey may be added.
Ginger can be made into candy or ginger wine. South Asian cuisines for flavoring dishes such as seafood, meat, and vegetarian dishes

Properties
Antioxidant activity Ginger extracts contain polyphenol compounds (6-gingerol and its derivatives), which have a high antioxidant Activity
Antimicrobial activity: Ginger inhibits the growth of Escherichia coli, Proteus sp, Staphylococci, Streptococci and Salmonella
Antifungal activity: Ginger inhibits *Aspergillus* sp, a fungus known for the production of aflatoxin, a carcinogen *Aspergillus niger*, *Sacharomyces cerevisiae, Mycoderma* sp. and *Lactobacillus acidophilus*
Ginger is a normal ingredient of our routine food preparations can provide protection against bacterial and fungal pathogens.

Medicinal use
From ancient times ginger has been exploited both as Ayurveda and Chinese medicine
Ginger exhibits antimicrobial and antioxidant properties. The medicinal properties of ginger are due to the presence of gingerol and paradol, shogaols, Ginger is one of the most widely used natural products consumed as a spice and medicine for treating nausea, dysentery, heartburn, flatulence, diarrhoea, loss of appetite, infections, bronchitis, heart problems, menstruation disorder and cramps, food poisoning, osteoarthritis, epilepsy, inflammation, cough and cold, motion sickness, and cancer.
Gastrointestinal relief: Ginger reduces all symptoms associated with motion sickness including dizziness, nausea, vomiting, and cold sweating
Anti-Inflammatory: Ginger contains potent anti-inflammatory compounds called gingerols one of the mechanisms by which ginger exerts its ameliorative effects could be related to inhibition of prostaglandin and leukotriene biosynthesis
Effect on cardiovascular system: Ginger stimulates heart muscles, stimulates blood circulation throughout the body
Hypoglycemic and hyperglycemic activity: Treatment with aqueous extract (500 mg/kg body weight) for a period of 7 weeks significantly decreased the serum glucose, cholesterol and triacylglycerol levels in the treated diabetic rats compared with the control diabetic rats
Cancer preventive effects: Gingerol inhibited the growth of human colorectal cancer cells

Ginger induces Cell Death in Ovarian Cancer Cells: Gingerols, the active phytonutrients in ginger, kill ovarian cancer cells by inducing apoptosis (programmed cell death) and autophagocytosis (self-digestion).
Larvicidal activity: Larvicidal activity of isolated compounds from the rhizome of ginger was reported against Adese aegypti and Culex quinquefasciatus.

Propagation
Ginger is propagated by planting rootstalk cuttings and has been under this type of cultivation for so long that it no longer goes to seed. Harvesting is done simply by lifting the rhizomes from the soil, cleansing them, and drying them in the sun. The dried ginger rhizomes are irregular in shape, branched or palmate.