IMMUNITY BOOSTING PLANT SPECIES

Department of Forests and Wildlife
Government of National Capital Territory of Delhi

गोपाल राय
GOPAL RAI
पर्यावरण, वन एवं वन्य जीव, विकास,
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MESSAGE

The crippling aftermath of the Covid -19 Pandemic has left behind a trail of morbidity like that of a war. With an invisible microscopic enemy looming in the environment we have to equip ourselves to the best in terms of larger systemic provisions, adjusted social behavior and individual habits which include strengthening of our natural immunities. Greater attention to the nutritional aspect of diet and regular use of medicinal plants is known to improve the general health and overall immunity of people.

Delhi Forest Department has always been distributing seedlings free of cost to the public and from the year 2020 onwards 13 species of medicinal plants have been included in the list. Members of the public have been enthusiastically taking these medicinal plants and growing in their homes. Saplings were distributed in the previous year and this year we have a target of seedlings for distribution to the public.

I am happy to see that the Delhi Forest Department has compiled this booklet to help people have basic information regarding the thirteen medicinal plants, their cultivation and their uses.

GOPAL RAI

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AMLA *Phyllanthus emblica*

Amlaki • Indian gooseberry • Anola • Amlika

CLIMATE: Grows well in tropical conditions. Young plants require protection from hot winds of summer, but mature plants can tolerate temperature up to 46°C. Annual rainfall of 630-800 mm gives a good yield.

SOIL: Well drained fertile loamy soil is best, however, Amla can be grown in light as well as heavy soils except purely sandy soil. The plant has capacity for adaptation to dry regions like Delhi NCR.

PROPAGATION AND PLANTATION: Amla is generally propagated through seeds, but seed propagated trees bear inferior quality fruits and have a long gestation period. For effective result, shield budding is done on one year old seedlings with buds collected from superior strains yielding big size fruits. The older trees of inferior types can be rejuvenated and easily changed into superior type in this way.

During May-June, before planting the grafted seedlings, pits at at a distance of 4.5 m spacing with a size of $1m^3$ need to be prepared and should be left for 15-20 days exposed to sunlight. The pits should be filled with surface soil mixed with 15 kg farm yard manure and one kg of super phosphate before planting the seedlings in per hectare.

PLANT PROTECTION: Medicinal plants should be grown without chemical fertilizers and use of pesticides. Organic manures like, farmyard manure, vermicompost, green manure, etc. may be used as per requirement of the species. To prevent diseases, bio-pesticides could be prepared (either single or mixture) from neem (kernel, seeds & leaves), chitrakmool, dhatura, etc.

IRRIGATION: Young plants require watering during summer months at 15 days interval till they have fully established. For mature fruit bearing plants it is advised to water at bi-weekly intervals during summer to increase fruit set and to reduce fruit drop. In summer the plant responds very well to drip irrigation, as the water directly placed at root zone. Hence, also minimize evaporation.

Amla plants hardly require irrigation during monsoon. After the monsoon rains, during October-December about 25-30 litres of water per day per tree through drips should be given to mature plants.

HARVESTING: Amla seedlings start bearing fruits 7-8 years after planting, while the grafted seedlings start bearing fruits from the 5th year onwards. The fruits are light green at first, but when they mature become dull greenish yellow. Best harvesting time for fruits is February when the fruits have maximum Vitamin C content. The mature fruits do not fall for gentle touch and therefore vigorous shaking is required. Fruits can also be harvested using long bamboo poles attached to hooks.

USES

Amla has great importance in traditional medicine, not only as an antiscorbutic, but also for the treatment of diverse ailments, especially those associated with the digestive organs. It is a good source of Vitamin C, alleviates common cold symptoms, improves digestion and overall immunity. It also improves skin and eyesight, reduces fat, relieves pain, use in hair care therapies etc.

Apart from medicinal uses, amla fruits can be eaten raw, can be cooked as pickle or lentil dishes. Sometimes the unripe seeds are used for preparation of black salt. The bark, as well as the roots, leaves and immature fruits, are highly valued as a source of tannins. The branches are often used as green manure. The leaves are used as dyeing substance.

AMROOD *Psidium guajava*

Guava • Madhuri aam

CLIMATE: Grows in tropical and sub-tropical regions upto 1500 m above sea level. Guava can tolerate heat and drought conditions of north Indian summers. Severe frost can kill the young plants. An annual rainfall of about 100 cm is sufficient.

SOIL: Heavy clay to very light sandy soils having pH between 4.5-8.2 are suitable for cultivation of guava. The crop is sensitive to water-logging.

PROPAGATION AND PLANTATION: Amrood is vegetatively propagated by budding, inarching, or air layering. Monsoon is the ideal time for planting the layers and seedling. Soil must be prepared during the summer by ploughing, harrowing, leveling and removing weed. Pits of $1m^3$ are dug at a standard spacing of 6x6m before the monsoon and filled with a mixture of manure and soil.

PLANT PROTECTION MEASURES: Time of fertilizer application depends on the region and crop variety. In northern India, fertilizer shall be applied in the first week of May for rainy season crop and in first week of July for winter season crop. The fertilizer dose for Northern Region of India is 600 g. Nitrogen, 400 g. Potassium per hectare.

IRRIGATION: Amrood is mostly grown under rainfed condition. During winter season, irrigation is provided at an interval of 20-25 days and in the summer months it is provided at an interval of 10-15 days by the ring method. However, drip irrigation can be very effective in these plants too.

HARVESTING: The plants start bearing fruits at an early age of 2-3 years but they attain full bearing capacity at the age of 8-10 years. Guavas are harvested throughout the year (except during May and June) in different parts of the country. However, peak harvesting periods in north India are August for rainy season crop, November-December for winter season crop and March-April for spring season crop.

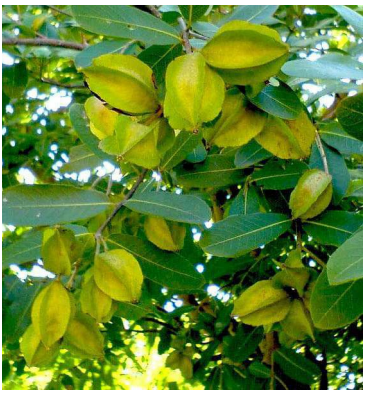
USES

The guava fruit is a good source of Vitamin C, Pectin, calcium and phosphorus. It can be used to treat colic, diarrhea, diabetes, cough, high cholesterol, cancer, heart diseases and cataract.

Leaves of guava are used for for dyeing and tanning. The fruit is used for the preparation of processed products like jams, jellies and nectar, cakes etc. Fruits can be preserved by canning as halves or quarters, with or without seed core (shells). Good quality salad can be prepared from the shell of ripe fruits.

ARJUN *Terminalia arjuna*

Arjan



CLIMATE: The plant naturally occurs in subtropical and tropical moist regions of the country.

SOIL: The tree prefers alluvial loamy or black cotton soils, which are loose, moist, fertile, and have good drainage and water holding capacity.River bank soils, streams, and ravines are its natural habitat.

PROPAGATION AND PLANTATION: Propagation gives best results when seeds are used. Seeds can be collected in early summer from trees that are more than 6 years old. The seeds are viable for at least one year when stored in sealed tins. Seeds may be sown in nursery beds in early summer, usually just after collection.

The seeds should be soaked in cool water for 48 hours or put in boiling water and allowed to cool for 24 hours prior to sowing for better germination. The germination rate of pretreated seeds is up to 90%, while that of untreated seeds is 50 - 60%. Germination commences in 8–12 days and is completed in 7-8 weeks.

Germinated seeds may be transplanted in polybags with clay, manure, and sand in equal ratio. Alternatively, the pre-treated fruits are directly put in polythene bags in April, with half of the fruit above the soil. Pre-germinated seeds are preferred to save time and ensure uniform germination. The seedlings are sensitive to drought during the germination stage as well as during the growth stage.

Pits of size 45 cm^3 shall be dug at a spacing of 6 × 6 m for seedling plantation. About 10 kg Farm Yard Manure and NPK (Nitrogen, Phosphorus, Potassium) at a ratio of 75:50:30 g needs to be added per pit per ha land and thoroughly mixed with soil as basal dose. In July-August about 10-month-old seedlings shall be planted in these pits.

PLANT PROTECTION: The medicinal plants have to be grown without chemical fertilizers and use of pesticides. Organic manures may be used as per requirement of the species. To prevent diseases, bio-pesticides like Azadirachtin can be applied.

IRRIGATION: Irrigation shall be done at 15-day intervals in the summer season for young plantations. Irrigation is generally not done during the winter season in the peninsular region.

HARVESTING: The Arjun tree starts flowering from sixth year onwards. Lifespan of the tree is 50 years and above. Bark is repeatedly scrapped in winter season. The bark is removed from well grown trees, preferably 10th year onwards, in spiral or vertical strips of not more than 5 cm width and 25 cm length.

USES

The bark and gum are highly valued in Ayurveda as a tonic and cure for a host of cancer, heart, skin, urinary, and gynaecological disorders.

The bark was once used to produce a brown dye and is used as a tanning agent. It can be used for fuel, and for building in rural areas. The leaves are a choice feed for silkworms.

BAEL PATRA *Aegle marmelos*

Stone Fruit • Apple Wood • Apple Bengal • Quince • Shirphal

CLIMATE: Warm humid climate and sunny condition is ideal for cultivation of this plant. Young plants cannot survive temperature below 4°C or tolerate hot winds.

SOIL: These plants thrive well in swampy, alkaline, sandy loamy soil having pH range of 5.0-10.0.

PROPAGATION AND PLANTATION: Bael is generally propagated by seeds. Sowing is done in June or July. The seedlings require at least a year in the nursery to be fit for transplantation. They should be transplanted in monsoon. Other than seeds the plants also may propagated by root cuttings and stem cuttings treating with IBA (4000 ppm) using quick dip method.

Seedlings or budded plants shall be transplanted in the field during rainy season at a spacing of 10-12 m in one ha land. Budded plants start bearing fruits at the age of 4-5 years, whereas seedling trees require 7-8 years.

PLANT PROTECTION: The plants shall be grown without chemical fertilizers and use of pesticides. Organic manure is recommended.

IRRIGATION: The field after plantation should be irrigated periodically as and when required weekly or fortnightly as per the soil moisture condition.

HARVESTING: The fruits are deep green initially and become yellow gradually at ripening. The fruits are harvested along with a portion of fruiting stalk as it serves as a signal of ripening as it is easily detached only in the ripe fruits. The fruits require about a year for ripening.

USES

Bael is good for heart, reduces cholesterol, purifies blood, treats cancer, removes gastric problems and constipation, cures acidity and diarrhoea, improves immunity and cools the body.

The fruit is used for preparing summer drinks, jams, toffees and other edible products. The leaves are used in religious purposes all over India, for which the tree is also called as Holy fruit tree.

BAHERA *Terminalia bellirica*

Myrobalan

CLIMATE: The bahera plant has a wide ecological range, succeeding in tropical and subtropical climates. These plants can tolerate an annual precipitation ranges from 1,000 - 3,000 mm. Though it can tolerate 5°C to 45°C, it grows best in temperatures ranges within 20°C to 33°C.

SOIL: Though the plants flourish in any moderately fertile, well-drained soil with full sunlight, it prefers periodically dry soils, and is moderately drought tolerant. Soils with pH ranges between 5.5 to 6.5 is ideal.

PROPAGATION AND PLANTATION: Propagation can be done by seeds, pre-soaked in cold water for 24 hours to improve germination rates. But germination rate rapidly declines when seeds have been stored for longer than that. Germination needs much moisture, and usually takes 2 to 5 weeks from sowing.

The seeds are usually sown in a nursery seedbed, however, they can also be sown directly in the field when conditions are favourable. When seedlings are raised in the nursery, transplantation to the field shall be done before the taproot has developed. The seedlings become ready for transplantation within 10-40 days.

The pit for transplantation shall be dug before the onset of monsoon at a distance of 1 x 6 m in one ha land. In degraded areas pits shall be dug of larger size for good growth and development of plant. The plantation needs to be done in monsoon.

IRRIGATION: In summer (March to May) 3 times irrigation in one week shall be applied.

HARVESTING: Harvesting is mainly done in the month of November-February when fruits start turning greenish grey in color.

USES

The fruit is anthelmintic, astringent, digestive, tonic and laxative. It is also used to treat eye diseases, dyspepsia, liver disease, leprosy. The fruit helps cure upper respiratory tract infections. The fruits are among ingredients of Triphala, an Ayurvedic rejuvenative.

The bark and leaves are used for making a dye. The seeds produce a clear yellow oil which used for hair-oil and in the manufacture of soap.

CURRY PATTA *Murraya koenigii*

Curry Tree • Meetha Neem

CLIMATE: The ideal temperature for cultivation of these plants is around 16°C-37°C. The growth of the plant gets affected beyond this temperature range.

SOIL: Any light texture soil is suitable for these plants. However, red sandy loamy soil is the best suited one provided with good draining properties.

PROPAGATION AND PLANTATION: The propagation of these trees can be done through stem cuttings or seeds. The seeds from mature fruits need to be collected during July-August and may be sown immediately in nursery beds for germination just before the onset of monsoon. The seeds required for plantation must not be over 3 days old. Seedlings from the nursery beds can be transplanted to the main field only after one year. The pits shall be of 30 cm^3 size and at a distance of 90-120 cm in one ha land.

The other way of cultivation is stem cutting. A stem around 3 inches long with a petiole and several leaves must be obtained from a tree for the propagation. The leaves from bottom of the stem need to be removed and placed in a soil-less medium to grow. Under warm and moist conditions the stem shall generate roots in 3 weeks. Once the plant is rooted it shall be placed in the main plantation site with rich compost and fertilizer mixtures.

PLANT PROTECTION: The plants shall be grown without chemical fertilizers and use of pesticides. Organic manure and pesticide is recommended.

IRRIGATION: Moisture conservation in the soil is essential for successful cultivation of curry patta trees. In non-rain fed area the plants shall be irrigated in 3-5 days interval for better growth.

HARVESTING: First harvest may be done after 10-12 months of plantation.

USES

The leaf of the plant is rich in organic compounds and contains alkaloids, flavonoids, carbohydrates, sterol etc. Curry leaves help in weight loss, constipation and dysentery, good for diabetes, reduces stress, anti-bacterial problems, improves eyesight and improves immunity.

Apart from medicinal uses, the leaves are widely used in different cuisines allover the World. The leaves may be used in fresh, dried or powdered from according to the purpose of use.

GHRIT KUMARI *Aloe vera*

Medicinal Aloe • Burn Plant

CLIMATE: Aloe vera can be grown in almost all the parts of the country, even under extreme drought conditions, except in temperate climate. As its water requirement is very low it can be cultivated in aird and semi-aird regions.

SOIL: The plants grow successfully in marginal to sub marginal soils with low fertility. The plants can tolerate high soil pH with high potassium and sodium salts. However, it grows faster in black soils.

PROPAGATION: Suckers, (shoots growing from the base of the herb) are the best propagating material for these plants. Nearly 3-4 months old suckers having 4-5 leaves and about 20-25 cm in length suckers are best suited.

Suckers shall be planted in July-August, however, under adequate irrigated conditions can be done any other time also except winter. Suckers shall be planted in about 15 cm deep pits at a distance of 60 x 60 cm per ha land. After planting of suckers the soil around the root zone needs to be firmly pressed and care needs to be taken to avoid water stagnation.

PLANT PROTECTION: The plants shall be grown without chemical fertilizers and use of pesticides. Organic manure and pesticide is recommended.

IRRIGATION: Just after plantation of the suckers the plants shall be irrigated. 2-3 subsequent irrigation shall be applied to get the plants established. 4-6 irrigation per year is adequate for its proper growth.

HARVESTING: Plants can be harvested from second to fifth year of transplantation. Depending upon the growth plants may be harvested 3-4 times an year.

USES

Aloe is a rich source of antioxidants & vitamins, improves skin health, improves digestion and boosts immunity. Aloe is used to treat burns, and the gel can also be used as a toothpaste and mouthwash; it is a natural option for improving oral hygiene and reducing plaque.

Apart from medicinal uses, Aloe is used commercially in many cosmetics and skin care products. The gel is also used in soaps.

GILOY *Tinospora cordifolia*

Giloy • Guruc • Guduchi • Gulvel

CLIMATE: The plant grows in subtropical and tropical climate. It does not tolerate high rainfall or waterlogged conditions.

SOIL: Giloy grows well in light medium sandy loam soil, rich in organic matter and with proper drainage.

PROPOGATION AND PLANTATION: These plants are cultivated by stem cutting. The cuttings may be obtained from mother plants during June-July. Seed sowing may also be used for cultivation. However, it takes double the time required in stem cutting.

The stem cuttings with nodes shall be sown directly in the field within 24 hours of their removal from mother plant. Meanwhile, they should be half-dipped in the water vertically. An optimum spacing of 3 x 3 m in one ha land shall be maintained in the filed for better yield. Since these are climbers, require some support to grow. This can be done by preparing wood stakes or alike structures.

PLANT PROTECTION: The medicinal plants have to be grown without chemical fertilizers and use of pesticides. Organic manures like, farmyard manure, vermi compost, green manure, etc. may be used as per requirement of the species. To prevent diseases, bio-pesticides could be prepared (either single or mixture) from Neem (kernel, seeds & leaves), Chitrakmool, Dhatura, etc.

IRRIGATION: These plants are grown under rain-fed conditions, however, occasional irrigation in extreme hot or cold climate may help them to withstand.

HARVESTING: When the leaves begin to fall in August and September, the stems should be cut 30 cm above the ground and collected. Pale green coloured stems are cut into small pieces, dried and used for various purpose.

USES

Giloy has huge medicinal value for its immune boosting properties. It improves digestion, treats chronic fever, diabetes, resolves stress and anxiety, reduce asthmatic and respiratory problems, treats arthritis. It is also a natural aphrodisiac.

Apart from medicinal uses, the plant may be used as animal fodder for its nutritional values.

JAMUN *Syzygium cumini*

Black Plum • Malabar plum • Java plum • Jambolan

CLIMATE: Jamun rhrives well under both tropical and subtropical climates. The plants can tolerate both short periods of drought as well as heavy rainfall. It can be grown successfully with an annual rainfall varying from 350 to 500 mm. It requires dry weather at the time of flowering and fruit setting. Young plants are susceptible to frost.

SOIL: Jamun trees can tolerate sodic and saline soils and can also be grown in ravines and degraded lands. However, vigorous growth and high yield may be achieved when grown on deep loam and well drained soils that have the capacity to retain good soil moisture. These plants can survive alkaline soils with pH upto 10.5. Plantations in very heavy and light soils should be avoided to achieve better results.

PROPOGATION AND PLANTATION: Jamun can propagated both by seeds and grafting techniques, though the most common being by seeds. The seeds have no dormancy, hence fresh seeds can be sown within 10-15 days of collection in 4-5 cm deep nursery beds at a distance of 25 ×15 cm. The seed germinates 10-15 days after sowing. The seedlings become ready for transplanting in spring or next monsoon. As seedling plants bear fruits of variable size and quality, therefore, vegetative method is desirable for propagation of improved or selected types. Budding is the most successful technique for this. It is done on a rootstock aged about 1 year having about 10 mm thickness.

For plantation, pits of $1m^3$ size shall be dug at a distance of 10 m for seedling trees and 8 m for budded plants in one hectare land. Pits should be filled with a mixture of top soil and well rotten farmyard manure or compost in a 3:1 ratio. Monsoon season is ideal time of planting. But it can also be planted with a good survival rate in spring in presence of adequate irrigation system.

PLANT PROTECTION MEASURES: In pre-bearing period, 20-25 kgs well rotten farmyard manure per plant per year should be applied. For bearing trees, this dose shall be increased up to 50-60 kg/ plant/year. The ideal time for giving the organic manure is a month before flowering.

IRRIGATION: Young plants require 6-8 times irrigation for better growth. In fruit bearing trees, irrigation shall be done from September to October for better fruit bud formation and from May to June for better development of fruits.

HARVESTING: The seedling plants start bearing fruits after 8-10 years, while grafted ones after 4-5 years of planting. The fruits ripen in the month of June –July depending upon the variety and agroclimatic condition. The ripe fruit at full size is deep purple or black in colour and picked immediately once ripens, as it cannot be retained on the tree at that stage.

USES

Jamun fruit is a source of vitamin-A and vitamin-C, can works as immunity booster. The seed is used to control diabetes and digestive ailments. The pulp of the fruit, extracts from the bark and seeds is of great benefit when it comes to lowering of blood glucose level. Taking dried extract of the seeds orally, greatly reduces the blood sugar and glucosuria.

Jamun bark is used for treating sore throat, bronchitis, asthma, thirst, diabetes, diarrhea, dysentery, ulcers and blood impurities. Stem bark powder is externally applied to prevent hemorrhage and leaves burnt ash in gum and teeth disorders. Root decoction helps in liver and spleenic disorders. Root powder is helpful for skin infections.

Wine and vinegar can be made from the fruits. The wood is water resistant. Because of this it is used in railway sleepers and for building furniture. The leaves are used as fodder, as they have good nutritional value.

NEEM *Azadirachta indica*

Margosa • Indian lilac • Nim

CLIMATE: Neem tree grows well in all regions having average annual rainfall of 350 to 1200mm. It is a very robust in warm climatic condition, can tolerate high temperature upto 50°- 52°C. The plants cannot withstand intensive shade or frost.

SOIL: Neem can grow in wide range of soils, however, black cotton soils are best suitable form them. These trees can even grow in rocky soils where water availability is a major concern.

PROPAGATION AND PLANTATION: Usual way of propagation for these trees is by sowing seeds. However, grafting of rootstocks are also possible. The seeds can be sown directly to the main field or seedlings can be raised primarily in nursery beds before transplanting. Planting or transplanting before or during rainy season is the best suitable period for establishment of the plants.

The seeds shall be collected from the fruits at the stage of yellow-green colour and immediately depulped. The germination probability from fresh seeds is about 90%. The seeds may be soaked in cold water for 24 hours for better germination. The germination of seeds start after 6-7 days.

Transplantation of seedlings shall be done once they reach at a hight of 8-10 cm tall with a taproot of 15 cm long. However, in dry areas, more aged seedlings give better survival rate. 25-30 cm long seedlings shall be transplanted in pits of 30 cm3 at a distance of 3 m x 3 m in per ha land.

PLANT PROTECTION: The plants shall be grown without chemical fertilizers and use of pesticides. Organic manure and pesticide is recommended.

IRRIGATION: These plants survive with little water. Therefore, conditions like water logging, poor drainage shall be avoided.

HARVESTING: Neem trees start bearing fruits after 4-5 years of plantation and come to full bearing at the age of 10-11 years.

USES

Neem boosts immunity, improves skin health, oral health and is very effective for dental treatment, reduce diabetes, treats malaria and aids blood detoxification. Leaves of Neem are used for treating leprosy, eye disorders, stomach ulcers, loss of appetite, skin ulcers, liver problems, gum diseases and anti-fungal problems.

Neem kernel and neem oil are used as pesticide. The de-oiled neem cake and green manure, which is produced from the plant, is used as fertiliser and helps in neutralising acidity of the soil. The leaves are eaten fresh and also used in cooking. The plant also provides fuelwood, timber and fodder.

NIMBU *Citrus limon*

Lemon • Champra

CLIMATE: Lemons grow best between a temperature range of 13°C to 37°C. High humidity favours spread of many diseases and frost is highly injurious to these plants. Hot wind during summer results in desiccation and drop of flowers and developing fruits.

SOIL: Lemons can grow in a wide range of soils, viz., from sandy loam or alluvial soils to clay loam or deep clay loam or in lateritic/acidic soils. The plant flourish well in light soils with good drainage properties and in deep soils with pH range of 5.5 to 7.5.

PROPOGATION AND PLANTATION: The best propagating techniques for lemons is through rootstocks. For grafting the bud-woods into the rootstocks, the selection shall be from disease free mother plants only.

For preparation of the seedlings, primary nursery beds may be prepared on light fertile soils. Secondary nursery seedlings may be raised in polythene bag and replanted after attaining the height of about 30-40 cm, which generally takes one year.

The best season for planting is June to August. $1m^3$ pits at a distance of 6 x 6 m should be dug for plantation. 15-20 kg of farm-yard manure and 500 g of super phosphate needs to be applied in pits while planting per ha land.

PLANT PROTECTION: The plants shall be grown without chemical fertilizers and use of pesticides. Organic manure and pesticide is recommended.

IRRIGATION: Lemon plants require critical stage watering in the initial year. It reduces fruit drop and increases the fruit size. Diseases like root rot and collar rot occur in flooded conditions. Light irrigation with high frequency is beneficial. Irrigation water containing more than 1000 ppm salts is injurious.

HARVESTING: Lemons take 150-160 days for maturity, hence the fruits may be harvested 2-3 times in a year from one lemon tree.

USES

The lemon fruit is rich in Vitamin C which helps the body to fight off infections, to boost up immunity, to improve digestion, removes constipation and prevents or treat scurvy, soar throats, heavy weight, rheumatic conditions etc. It also has many skin caring properties.

The fruits can be eaten raw, and are frequently used in cooking, aromatherapy. The dried fruit rind is used as an insect repellent in the clothes cupboard, the juice is used for polishing metals, as wells as to remove ink stains for bleaching.

SAHJAN *Moringa oleifera*

Drumstick tree • Horseradish tree • Soanjna • Sajna

CLIMATE: Sahjan can tolerate a wide range of annual rainfall (250-3000 mm). It is a sun and crop that cannot tolerate frost and thrives well where the daily temperature ranges between 25° to 35°C.

SOIL: Sahjan grows in almost all type of soils with pH ranging from 5.0-9.0. It grows well in the vicinity of the sandy beds of rivers and streams. However, stiff soils are not suitable for the plant. Deep sandy loam soil with pH of 6.5 to 8 is most suitable for cultivating this crop.

PROPAGATION AND PLANTATION: Sahjan can be propagated by seeds as well as through stem cutting during July to October. Seeds may be sown at a depth of 2.5-3.0 cm in pits of 453 cm size at 2 x 2m distance; or after grafting, the seedlings may be raised in poly bags and transplanted after 35-40 days in the field at 5 x 5m distance.

Before plantation the pit must be filled with 10-15 kg manure and NPK (Nitrogen, Phosphorus and Potassium) in a ratio of 135:23:45 g/pit/ha land after mixing with top soil.

PLANT PROTECTION: The plants should be grown without chemical fertilizers and use of pesticides. Organic manure and pesticide is recommended.

IRRIGATION: Before sowing and on the 3rd day after sowing and subsequently at 10-15 days interval, water may be applied according to soil type.

HARVESTING: The crop becomes ready for first harvest after 180 days of sowing. After harvest of main crop, trees may be cut back 90 cm from ground level for ratooning. In another 4-5 months, trees again mature for harvest. Likewise, ratoon crops can be taken for 3 years.

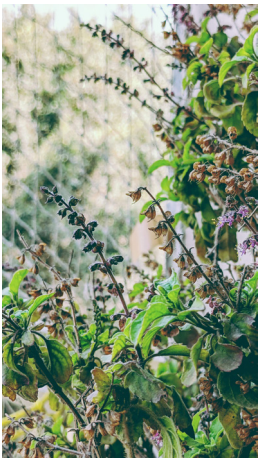
USES

Sahjan leaves provide antioxidants, carotene, protein, Vitamin C, calcium and potassium. The flowers act as hypocholesterolemic, and the anti-arthritic agents can alleviate urinary problems. Pods are used to treat infections of the liver and spleen, and also in treating articular pains. Leaves and pods are also helpful in increasing breast milk in the breastfeeding months.

The leaves can be eaten fresh, cooked or stored as dried powder for many months without refrigeration. The leaves may also be used as animal fodder. The entire young and pliable pod is cooked and eaten or used in the preparation of curries.

TULSI *Ocimum tenuiflorum*

Basil • Krishna Tulsi • Manjari • Brinda



CLIMATE: The plant flourishes well under fairly high rainfall and humid conditions. Long days and high temperatures have been found favourable for plant growth and oil production. Topical and sub-topical climate (at altitudes upto 900m) are suited for Tulsi.

SOIL: Tulsi plants thrive well on variety of soils from rich loam to poor laterite, saline and alkaline to moderately acidic soils. Well-drained soil helps better vegetative grown. Water logged condition can cause root-rot and result in stunted growth.

PROPAGATION AND PLANTATION: The plant is propagated by seeds and seedlings may be raised in manured seed bags. The seed sowing time starts by mid of February. The seed should be sown 2cm below in the nursery beds. The seeds germinates in 8-12 days and the seedlings are ready for transplanting in about 6 weeks time. Transplantation shall be done in the mid of April. Before transplanting

the seedlings, land shall be prepared with application of manure. The seedlings shall be transplanted at a distance of 40 x 40cm and 40 x 50cm to get high herbage and oil yield per hectare.

IRRIGATION: Irrigation depends upon the moisture content of soil. In summer 3 irrigation per month are necessary, in rainy season no irrigation is required. About 12-15 irrigation are enough during the year.

HARVESTING: The crop is harvested at full bloom stage. The first harvest is obtained at 90-95 days of planting.

USES

Tulsi cures asthma, bronchitis, cough, fluw, sore throat, lowers blood pressure, improves digestion, reduces blood sugar and is antiseptic. Tulsi leaves are used in cooking, religious purposes, garlands are prepared by Tulsi seeds that are also used for religious activities.

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