

MANGO

DESCRIPTION:

Mango, (*Mangifera indica*), member of the cashew family (*Anacardiaceae*) and one of the most important and widely cultivated fruits of the tropical world. Originated in India.



VARIETIES: Neelum, Bangalora, Alphonso, Rumani, Banganapalli, Kalepad, Peter, PKM 1, PKM 2, Sendura, Jahangir, Mulgoa, Himayuddin, Paiyur 1, Mallika, Amrapali and Salem Bangalora, Arka Anmol, Arka Aruna, Arka Neelkiran, Arka Puneeth.

PHYSICAL DESCRIPTION:

The tree is evergreen, often reaching 15–18 metres (50–60 feet) in height and attaining great age. The simple leaves, the flowers—small, pinkish, and fragrant. The fruit varies greatly in size and character. Its form is oval, round, heart-shaped, kidney-shaped, or long and slender. The smallest mangoes are no larger than plums. The single large seed is flattened, and the flesh that surrounds it is yellow to orange in colour, juicy, and of distinctive sweet-spicy flavour.

CULTIVATION:

Soil and Climate: Red loamy soil with good drainage is preferable. pH range 6.5 to 8.

Season of planting: July to December.

Planting material: Use plantable size grafts propagated through approach, soft wood or epicotyl grafting.

Field preparation: Dig pits of 1 m x 1 m x 1 m in size. Fill in with topsoil mixed with 10 kg of FYM and 100 g of Lindane 1.3% dust per pit.

Planting: Plant the grafts at the centre of the pits with ball of earth intact and keeping the graft union 15 cm above the ground level. Stake and water the plants immediately after planting.

Spacing: Adopt any one of the following spacing depending on requirements.

1. Under conventional system of planting: 7-10 m either way
2. High Density Planting: 5 m x 5 m (400 plants / ha)
3. Double hedge row system: Adopt a spacing of 5 m x 5 m within double rows and 10 m between successive double rows (266 plants / ha)

Irrigation: Regular watering till establishment. For cultivation under irrigated conditions, adopt drip system of irrigation.

Intercropping: Short duration crops like legumes, vegetables, groundnut etc. can be raised during pre- bearing age.

Manures and fertilizers may be applied during September – October, 45 – 90 cm away from the trunk upto the peripheral leaf tip and incorporated.

Canopy management:

Remove root stock sprouts and low lying branches nearer to ground to facilitate easy cultural operations. Remove overlapping, intercrossing, diseased, dried and weak branches in old trees to get good sunlight and aeration. Carry out judicious pruning of the internal branches during August – September, once in three years.

Plant Protection:

Pests

- Removal of criss-cross branches, infested shoots, dense branches and proper training and pruning reduces the hopper infestation
- Apply *Metarhizium anisopliae* @ 1x 10⁸ cfu/ml or *Beauveria bassiana* @ 10⁸ cfu /ml on tree trunk once during off season and twice at 7 days interval during flowering season

Insecticide	Dose
Buprofezin 25 % SC	1.5 ml/lit.
Dimethoate 30 % EC	1.6 ml/lit.
Imidacloprid 17.8 % SL	3.0 ml/10 lit.
Malathion 50 % EC	1.5 ml/lit.

Leaf galls and Aphids:

Spray monocrotophos 36 % SL @ 1.0 ml/lit

Mealy bug:

- Dissolve Fish oil rosin soap @ 25g /lit, initially in luke warm water, then in required quantity of spray fluid in the sprayer.
- Release Australian ladybird beetle, *Cryptolaemus montrouzieri* @ 10 beetles/tree or 1500/ha

Diseases

Powdery mildew: Apply Sulphur dust (350 mesh) in the early morning to protect new flush or spray Wetable sulphur 0.2% or Tridemorph 0.05%.

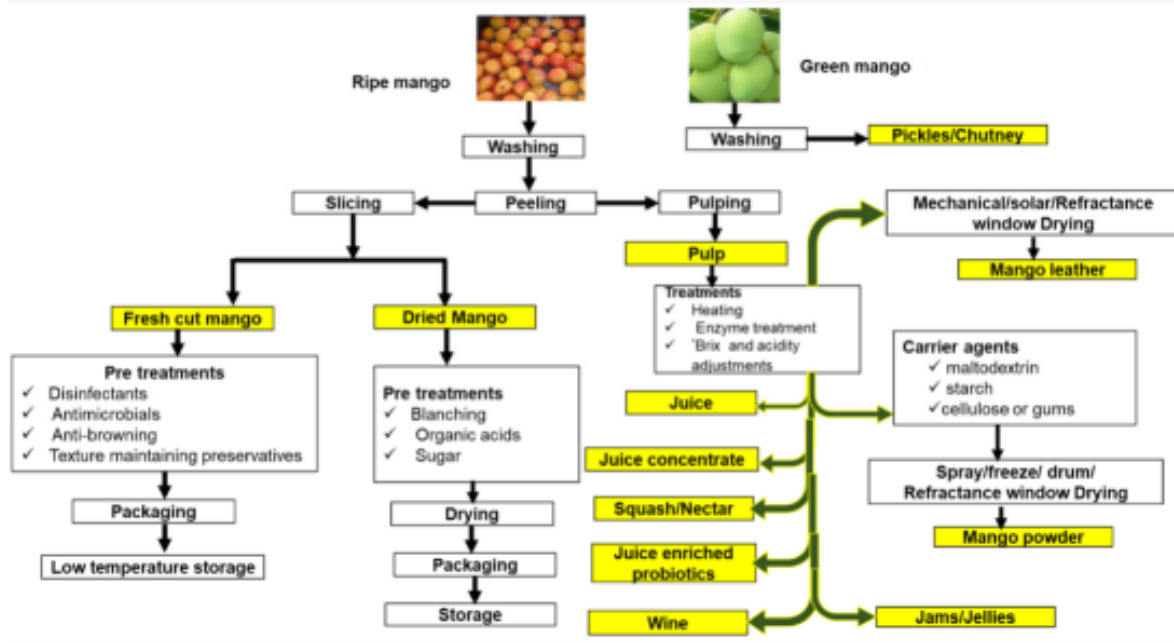
Harvest Season: March to June.

Harvest: Yield varies with varieties and spacing adopted. 8 -10 t / ha upto 15 years; 15-20 t / ha from 15-20 years.

PROCESSING:

1. Material selecting: Choose whole, plump mango fruit without mechanical damage, free of pests and fresh in appearance.
2. Washing: Trimmed mango on the belt would be conveyed to Fruit Vegetable Air Bubble Washing Machine Air bubble washing machine is suitable for soaking, washing and removing dirt/pesticide residue of mango fruit under the multiple functions of integrating bubble, blast and spray cleaning methods.
3. Peeling and coring: Mango needs to be peeled because its skin contains tannin which causes mango browning and affects product quality.
4. Cutting: In order to get a uniform quality, it's better to cut mango lengthways into 8-10mm-thick slices.
5. Blanching: Blanching helps to sterilize and color fixing mango slices. After blanching at 70-80°C hot water for 15 seconds, the enzyme activity is inhibited and mango is kept in its original color.

6. Drying: With the help of Hot Air Circulation Fruit Drying Machine, the initial temperature could be controlled at 70-75°C and the post-period temperature is 60-65°C.
7. Packing: After drying, place dried mango slices in the sealed container for 2-3 days so that all parts of mango has a balanced water content and soft texture for convenient packaging, usually in sealed bags.



USES:

1. Mango is a nutritious food and has huge health benefits. Mango is also preferred in various food processing industries because of its nutritional value.
2. Mango is a rich source of Vitamin A and Vitamin C.
3. A good mango variety contains 20% of total soluble sugars. Mango fruit has an acidic level ranging from 0.2 to 0.5% and protein content of about 1%.
4. Mango is used in the manufacturing of traditional products and also used in fruit processing industries.
5. Mango pulp is primarily used in the manufacturing of smoothies, fruit drinks, and other mango-based products.
6. Mango puree is a key ingredient in the dairy industry and is used in the manufacturing of milkshakes, mango-flavoured yoghurts, and Icecreams.
7. Alphonso mango pulp has a great aroma, pleasant taste, and sweetness. It is widely used in the beverage industry and confectioneries that include Puddings, cakes, and desserts.

ORANGE

DESCRIPTION:

Orange is a small trees or shrubs of the genus Citrus of the family Rutaceae and their nearly round fruits, which have leathery and oily rinds and edible, juicy inner flesh. A number of species and varieties of orange are economically important, namely the China orange, also called the sweet, or common, orange (*Citrus ×sinensis*); the mandarin orange (*C. reticulata*), some varieties of which are called tangerines; and the sour, or Seville, orange (*C. ×aurantium*), which is less extensively grown.



VARIETIES: Important mandarin orange varieties cultivated in India are Ngapur Santra, Coorg Santra, Khasi Santra, Mudkhed, Shringar, Butwal, Dancy, Kara (Abohar), SZ-IN-COM, Darjeeling Mandarin, Sumithra mandarin, Seedless-182 and Kinnow mandarin.

MORPHOLOGY:

The tree of the sweet orange often reaches 6 metres (20 feet) in height. The broad, glossy, evergreen leaves are medium-sized and ovate; its white five-petaled flowers are very fragrant. The fruit is a modified berry known as a hesperidium, and the flesh is divided into segments called carpels.

CULTIVATION:

Soil and Climate: Sub tropical climate with an elevation of 500– 1500 m above MSL. A rainfall of about 150 cm to 250 cm is required. The winter should be mild and there should be no strong, hot winds during summer. Deep well drained loamy soils are the best. Soil pH should be between 5.5 and 6.5.

Season: November – December.

Planting: Seedlings and budded plants.

Spacing: 6 x 6 m, pit size 75 x 75 x 75 cm. planting during May – June and September – October.

Manures and Fertilizers: Apply twice in a year during June and October.

Plant Protection Measures

Insect Pests: Devitalization of plants due to poor fruit set, fruit drop both at bearing and maturity stage, stem tunnelling, bark removal, girdling etc., on account of the attack of the different insect pests viz. citrus black fly, citrus psylla, citrus leaf miner, bark eating caterpillar, mealy bugs, citrus aphids, citrus thrips, fruit fly, mites etc. results in poor performance by the tree in terms of quality fruit production. Spraying with insecticides viz. monocrotophos, phosalone, dimethoate, phosphamidon, quinalphos etc. depending upon the type of pest infestation has been found to be effective in most cases.

Diseases: The main diseases reported are twig blight, gummosis, damping off, root and collar rot. The affected plants should be sprayed with Ridomil MZ 72, Bavistin, Benomyl etc. depending on the type of infection.

Harvest: Budded plants start bearing from 3 – 5 years after planting while seedlings take 5-7 years.

Yield: 15 – 20 t / ha / year.

PROCESSING

1. Grading: Fruits are graded on the basis of their size and colour. The fruits which are oblong, high collared, immature, puffy, blemished, deformed, deep green coloured, bruised and diseased are removed during the sorting operation.
2. Storage: Green or fully ripe fruits can be stored in evaporative cool chamber at 8-10°C & 90-95% relative humidity for a period of three weeks after post-harvest treatment with Bavistin (1000 ppm.). Yellowish green fruits develop attractive yellowish orange in this chamber.
3. Packing: The harvested fruits are usually washed with chlorine (1000 ppm.) and after removing the surface water they are coated with stayfresh high shine wax (2.5%) containing Bavistin (4000 ppm.) and finally dried at 50⁰-55⁰C in the tunnel dryer.

Fruits are usually packed in wooden boxes for distant markets, while for local marketing baskets of split bamboo and mulberry are used. Chopped straw and dry grass are mostly used for padding. The fruits should be cleaned and polished lightly with a piece of cloth, before wrapping them in tissue paper or newspaper. Use of ventilated corrugated fibre board cartons in place of wooden boxes is highly beneficial.

4. Transportation: Mandarins are generally transported by rail or road as ordinary cargos without refrigeration.

USES:

1. The major economic value of oranges lies in their fruits, but several fragrant oils can also be extracted from their flowers, or, more commonly, their peel as a byproduct of the orange-juice industry.
2. These fragrances were originally used in the manufacturing of perfumes and to scent potpourri, and they are still used for these purposes.
3. In addition, many household products, such as liquid detergents, shampoos, and soaps, are pleasantly scented using the aromatic oils extracted from citrus trees.

GRAPE

Grape, (*Vitis vinifera*), family Vitaceae, native to the north temperate zone, including varieties that may be eaten as table fruit, dried to produce raisins, or crushed to make grape juice or wine. Originated to Europe

VARIETIES: Muscat (Panneer), Pachadraksha, Anab-e-Shahi, Thompson Seedless, Arka Shyam,

Arka Kanchan, Arka Hans, Manik Chaman, Sonaka, Sharadh Seedless and Flame Seedless.

Muscat is the major variety grown in Tamil Nadu.

PHYSICAL DESCRIPTION

The grape is usually a woody vine, climbing by means of tendrils (modified branches) and when untrained often reaching a length of 17 metres or more. Leaves are alternate, and always tooth-edged. Small greenish flowers, in clusters, precede the fruit, which varies in colour from almost black to green, red, and amber. Botanically, the fruit is a berry, more or less globular, within the juicy pulp of which lie the seeds.

CULTIVATION:

Soil and Climate: Well-drained rich loamy soil with a pH of 6.5 - 7.0 with low water table with EC less than 1.0. Soil depth should be atleast 1 m.

Field preparation and Planting: Trenches of 0.6 m width and 0.6 m depth are to be dug at a distance of 3 m apart for Muscat and pits of 1m x 1m x 1m should be dug for other varieties. Well decomposed FYM or compost or green leaf manure has to be applied in the trenches or pits as the case may be and then covered with soil. Plant the rooted cuttings in June-July.

Spacing: 3 x 2 m for Muscat, 4 x 3 m for other varieties.

Irrigation: Irrigate immediately after planting and on the 3rd day and then once in a week. Withheld irrigation 15 days before pruning and also 15 days before harvest.

Training: The vines are trained with single stem upto pandal with a stalk on tipping at 2 m height.

The main arms are developed and trained on opposite directions. On further tipping, secondary and tertiary arms are developed for spreading all over pandal.

Pruning: In general four bud level of pruning for Muscat, Pachadraksha, Bangalore Blue, Anab- e- Shahi and Arka hybrids and two bud level for Thompson Seedless may be adopted. It is better to decide the level of pruning as per bud forecasting technique. Weak and immature canes should be pruned to one or two buds to induce vegetative growth.

Plant protection

Pests

Nematodes: Apply 60 g of Carbofuran 3 G or 20 g Phorate 10 G per vine a week before pruning

Thrips: Spray methyl demeton 25 EC or dimethoate @ 30 EC 2 ml/lit of water.

Diseases

Powdery mildew: Spray 0.3% Wettable sulphur or Dust sulphur @ 6-12 Kg / ha in the morning or Azoxystrobin @ 150 ai / ha (600 ml / ha) 30 days after pruning 5 sprays at 10 days interval.

Downy mildew: Spray *Pseudomonas fluorescens* @ 20 g / lit on 25th and 45th days after pruning followed by spraying of Azoxystrobin @ 1 ml / lit on 35th and 55 days after pruning.

Yield

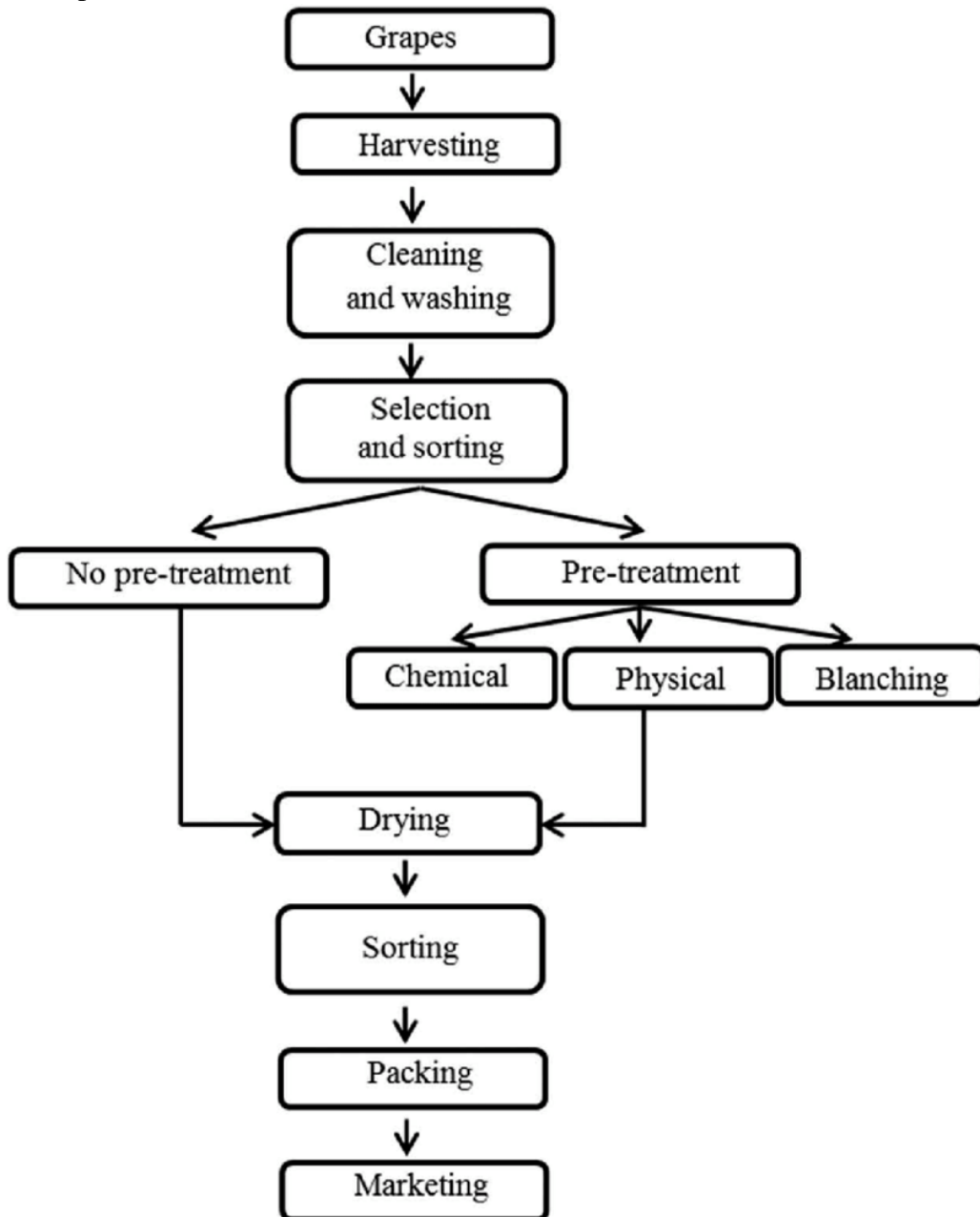
Seedless: 15t / ha / year

Muscat: 30t / ha / year

PROCESSING:

1. Washing of grapes: White and red grapes were washed in winery scale with 1 % citric acid solution or salt solution
2. Sizing: Size is determined by the weight of bunches (in gms), Large sized berries have more value compared to small size of grapes
3. Packaging: Packaging required to keep grapes in good condition until it sold and consumed. Different packaging materials.
 - a. Basket madeup of strips of leaves

- b. Sacs- Bags (small size sacs),Nets (Sacs made of open nets)
 - c. Fiber board boxes- Solid fibre board boxes & Corrugated fiber board boxes
 - d. Plastic trays
 - e. Biodegradable plastics
 - f. Pallet boxes & Shipping containers
4. Transportation of grapes: Transportation of grapes in many respects depends on a grade of grapes, durability of the skin, density of pulp, durability of an attachment of berries to fruit stems. In process of maturing and over ripeness, transportability of grapes decreases. Better to gather grapes for transportation somewhat immature, rather than overripe.



USES:

1. The juice is marketed as a beverage fresh, canned, or dehydrated as powder, or concentrated and frozen.
2. It can be made into an excellent vinegar or carefully fermented as wine.
3. **Factory waste:** The waste from grapefruit packing plants has long been converted into molasses for cattle.
4. **Seed hulls:** After oil extraction, the hulls can be used for soil conditioning, or, combined with the dried pulp, as cattlefeed. A detoxification process must precede the feeding of this product to pigs or poultry.
5. **Wood:** Old grapefruit trees can be salvaged for their wood. The sapwood is pale-yellow or nearly white, the heartwood yellow to brownish, hard, fine-grained, and useful for domestic purposes. Mainly, pruned branches and felled trees are cut up for firewood.
6. **Medicinal Uses:** An essence prepared from the flowers is taken to overcome insomnia, also as a stomachic, and cardiac tonic. The pulp is considered an effective aid in the treatment of urinary disorders. Leaf extractions have shown antibiotic activity.