

Mango Cultivation

Mango (*Mangifera indica*) is the leading fruit crop of India and considered to be the king of fruits. Besides delicious taste, excellent flavour and attractive fragrance, it is rich in vitamin A&C. The tree is hardy in nature and requires comparatively low maintenance costs.

Mango occupies 22% of the total under fruits comprising of 1.2 million hectares, with a total production of 11 million tonnes. Uttar Pradesh and Andhra Pradesh are having the largest area under mango each with around 25% of the total area followed by Bihar, Karnataka, Kerala and Tamil Nadu.

Mango fruit is utilised at all stages of its development both in its immature and mature state. Raw fruits are used for making chutney, pickles and juices. The ripe fruits besides being used for dessert are also utilised for preparing several products like squashes, syrups, nectars, jams and jellies. The mango kernel also contains 8-10 percent good quality fat which can be used for soap and also as a substitute for cola in confectionery.

Fresh mangoes and mango pulp are the important items of agri-exports from India. India's main export destinations for mango are UAE, Kuwait and other Middle East countries with a limited quantity being shipped to European market. Although, India is the largest mango producing country, accounting about 60% of world production, the export of fresh fruit is limited to Alphonso and Dashehari varieties. India's share in the world mango market is about 15 percent. Mango accounts for 40 percent of the total fruit exports from the country. There is good scope for increasing the area and productivity of mango in the country.

Climate :

Mango can be grown under both tropical and sub-tropical climate from sea level to 1400 m altitude, provided there is no high humidity, rain or frost during the flowering period. Places with good rainfall and dry summer are ideal for mango cultivation. It is better to avoid areas with winds and cyclones which may cause flower and fruit shedding and breaking of branches.

Soil :

Mango comes up on a wide range of soils from alluvial to laterite provided they are deep (minimum 6') and well drained. It prefers slightly acidic soils (pH 5.5 to 7.5)

Varieties :

Though there are nearly 1000 varieties of mango in India, only following varieties are grown in different states : Alphonso, Bangalora, Banganpalli, Bombai, Bombay Green, Dashehari, Fazli, Fernandin, Himsagar, Kesar, Kishen Bhog, Langra, Mankhurd, Mulgoa, Neelam, Samarbehist, Chausa, Suvarnarekha, Vanaraj and Zardalu.

Recently some mango hybrids have been released for cultivation by different institutes / universities. A brief introduction to such varieties is presented below :

Mallika - It is a cross between Neelam and Dashehari. Fruits are medium sized cadmium coloured with good quality, reported to be a regular bearer.

Amrapali - It is a cross between Dashehari and Neelam. It is a dwarf vigorous type with regular and late bearing variety. It yields on an average 16 t/ha and about 1600 plants can be accommodated in one hectare.

Mangeera : It is a cross between Rumani and Neelam. It is a semi vigorous type with a regular bearing habit. Fruits are medium sized with light yellow coloured skin, firm and fibreless flesh and sweet to taste.

Ratna : It is a cross between Neelam and Alphonso. It is a regular bearer and free from spongy tissue. Fruits are medium sized with excellent quality. Flesh is firm and fibreless, deep orange in colour with high TSS (19-21 Brix).

Arka Aruna : It is a hybrid between Banganapalli and Alphonso with regular bearing habit and dwarf in stature. About 400 plants can be accommodated per hectare. Fruits are large sized (500-700 gm) with attractive skin colour. Pulp is fibreless, sweet to taste (20-22 Brix). Pulp percentage is 73 and the fruits are free from spongy tissue.

Arka Puneet : It is a regular and prolific bearing hybrid of the cross between Alphonso and the Banganapalli. Fruits are medium sized (220-250 gm) with attractive skin colour, having red blush. Pulp is free from fibre, pulp percentage being 70 percent. Fruits are sweet to taste (20-22 Brix) with good keeping quality and free from spongy tissue. It is a good variety for processing also.

Arka Anmol : It is a semi-vigorous plant type from the cross between Alphonso and Janardhan Pasand. It is also a regular bearing and free from spongy tissues. Fruits ripen to uniform yellow colour. Keeping quality of the fruit is very good and it is suitable for export. It has got excellent sugar and acid blend and fruits weigh on an average about 300 g Pulp is orange in colour.

Propagation :

Farmers should always get vegetatively propagated, true to type plants from recognised nurseries. Inarching, veneer grafting, side grafting and epicotyl grafting are the popular methods of propagation in mango.

Planting : Land should be prepared by deep ploughing followed by harrowing and levelling with a gentle slope for good drainage. Spacing varies from 10 m x 10 m, in the dry zones where growth is less, to 12 m x 12 m, in heavy rainfall areas and rich soils where abundant vegetative growth occurs. New dwarf hybrids like Amrapali can be planted at closer spacing. Pits are filled with original soil mixed with 20-25 kg well rotten FYM, 2.5 kg single super phosphate and 1 kg muriate of potash.

One year old healthy, straight growing grafts from reliable sources can be planted at the centre of pits along with the ball of the earth intact during rainy season in such a way that the roots are not

expanded and the graft union is above the ground level. Plants should be irrigated immediately after planting. In the initial one or two years, it is advisable to provide some shade to the young plants and also stake to make them grow straight.

Training and pruning :

About one meter from the base on the main trunk should be kept free from branching and the main stem can be allowed thereafter spaced at 20-25 cm apart in such a way that they grow in different directions. Branches which cross over/rub each other may be removed at pencil thickness.

Fertiliser Application :

In general, 170 gm urea, 110 gm single super phosphate and 115 gm muriate of potash per plant per year of the age from first to tenth year and thereafter 1.7 kg, 1.1 kg, and 1.15 kg respectively of these fertilisers per plant per year can be applied in two equal split doses (June-July and October). Foliar spray of 3% urea is recommended before flowering in sandy areas.

Irrigation :

Young plants are watered frequently for proper establishment. In case of grown up trees, irrigation at 10 to 15 days interval from fruit set to maturity is beneficial for improving yield. However, irrigation is not recommended for 2-3 months prior to flowering as it is likely to promote vegetative growth at the expense of flowering.

Inter cropping :

Inter crops such as vegetables, legumes, short duration and dwarf fruit crops like papaya, guava, peach, plum, etc. depending on the agro-climatic factors of the region can be grown. The water and nutrient requirements of the inter crops must be met separately.

Plant Protection :

Mango is prone to damages by a large number of pests, diseases and disorders. The recommended control measures for most important and common among them are briefed below :

Mango hopper : Two sprays (at panicles emergency and at pea size of fruits) of carbaryl (0.15%), monocrotophos (0.04%) or phosphamidan (0.05).

Mealy bug : Ploughing inter spaces in November and dusting 2% methyl parathion @200 g per tree near the trunk and fixing 20 cm wide 400 gauge polythene strips around the trunk with grease applied on the lower edge in January as prophylactic measures and two sprays of monocrotophos (0.04%) at 15 days interval as control are needed.

Powdery mildew : Two to three sprays of wettable sulphur (0.2%) or Kerathane (0.1%) at 10-15 days interval.

Anthracrose : Two sprays of Baristin (0.1%) at fortnight interval.

Malformation : One spray of 200 ppm NAA in October followed by deblossoming at bud burst stage in December - January.

Fruit drop : Regular irrigation during fruit development, timely and effective control of pests and diseases and spraying 20 ppm NAA at pea size of fruits.

Harvesting and yield :

Graft plants start bearing at the age of 3 - 4 years (10-20 fruits) to give optimum crop from 10-15th year which continues to increase upto the age of 40 years under good management.

Post Harvest Management :

Storage : Shelf life of mangoes being short (2 to 3 weeks) they are cooled as soon as possible to storage temperature of 13 degree Celcius. A few varieties can withstand storage temperature of 10 degree Celcius. Steps involved in post harvest handling include preparation, grading, washing, drying, waxing, packing, pre-cooling, palletisation and transportation.

Packaging : Mangoes are generally packed in corrugated fibre board boxes 40 cm x 30 cm x 20cm in size. Fruits are packed in single layer 8 to 20 fruits per carton. The boxes should have sufficient number of air holes (about 8% of the surface area) to allow good ventilation.

Financial institutions have also formulated mango financing schemes in potential areas for expansion of area under mango. Individual mango development schemes with farm infrastructure facilities like well, pumpset, fencing and drip irrigation system etc. have also been considered.

Farm model for financing one hectare mango orchard is furnished in the Annexure I.

Unit Cost : The unit cost varies from state to state. The cost presented here is indicative only. The entrepreneurs and the bankers are requested to consult our Regional Offices for the latest information in this regard. The unit cost estimated for this model scheme is Rs.34400/- per ha capitalised upto the fifth year. The break-up details are given in Annexure I.

Financial Analysis : Results of financial analysis are indicated below :

NPW at 15% DF : Rs.59058 (+)

BCR at 15% DF : 2.34

IRR : 25.59%

Detailed analysis is presented in Annexure II.

Margin Money : The margin money assumed in this model scheme is 5% of the total financial outlay.

Interest Rate : Interest rate may be decided by the banks as per the guidelines of RBI.

Security : Banks may charge such security as permissible under RBI guidelines.

Repayment : The bank loan with interest is repayable within 14 years with 7 years grace period as shown in Annexure-III.

Annexure - I

Cost and Income from Mango Cultivation (Rs. per ha)

Spacing : 10m x 10m

Plant population : 100

Estimated cost:

Sr. No.	Particulars	Year					Total
		1	2	3	4	5	
1	Planting material	2200	--	--	--	--	2200
2	Manures & Fertilisers	3000	1100	1100	1400	1400	8000
3	Plant protection	1100	600	600	700	700	3700
4	Sprayer & implements	1500	--	--	--	--	1500
5	Fencing	2500	--	--	--	--	2500
6	Irrigation	1800	500	500	500	500	3800
7	Labour	3200	1200	1200	1500	1500	8600
8	Intercropping	1500	--	--	--	--	1500
9	Miscellaneous	600	500	500	500	500	2600
	Total	17400	3900	3900	4600	4600	34400

Projected income:

Annexure III

Repayment Schedule (Mango Cultivation)

Total Financial Outlay(Rs) 34400

Margin money @ 5% of TFO((Rs.) 1720

Bank Loan(Rs.) 32680

(Amount in Rs.)

Repayment period is 14 years including 7 years grace period.