MANGO

(Mangifera indica L.)
Mango is considered as king of fruits. Andhra Pradesh is the second largest mango growing state in the country with an area of about 4.31 lakh hectares and annual production of 43.5 lakh metric tons. In Andhra Pradesh mango occupies 68 per cent of the total area under fruits. 24 % of the total production of mango in India is from Andhra Pradesh. The mango is grown extensively in Krishna, Vijayanagaram, Vishakapatnam, West and East Godavari, Kadapa, Warangal, Nalgonda, Adilabad, Medak and Rangareddy district.

Climate
Mango is well adapted to tropical climate. High humidity and cloudy weather at the time of flowering are not favourable as they affect pollination and fruit set and encourage diseases. Rains during flowering are detrimental to the crop.

Soils
Alluvial and sandyloams are ideal for mango cultivation. It can be grown even on lighter soils like chalkas and dubbas when properly manured. Alkaline and saline soils should be avoided. The most desirable soils for mango should be of medium texture, deep (2 to 2.5 m) well drained with low water table (below 180 cms in all seasons) and have a pH range of 6.0 to 7.5. Mango cannot tolerate high soil salt content (not more than 0.05 %).

Varieties
Banganpalli (Baneshan)
Banganpalli is the leading commercial variety of the state. The tree is medium in size and regular in bearing. The fruit is large, with is golden yellow color. The flesh of fruit is firm, fibreless. The fruit quality is very good with good keeping quality. It is tolerant to hoppers and winds.

Totapari (Bangalora, Collector, Chittoor mamidi)
Totapari is better suited to dry regions, more regular and prolific yielder. The tree is medium size. Fruit medium to large, skin thick, golden yellow colour, flesh firm, fibre less, fruit quality poor to medium. The keeping quality is good. The bearing in Totapari is later than Banganpalli. Tree brittle and more susceptible to hoppers and cyclone damage compared to Banganpalli.

Suvarnarekha (Sundari, Lal Sundari)
This variety is popular in Srikakulam and Visakhapatnam districts. Fruit is medium in size, skin medium thick, light cadmium with a blush of red, flesh soft, fibreless. Fruit quality medium to good, bearing heavy and regular. Suvarnarekha is moderately tolerant to hoppers and susceptible to powdery mildew. The keeping quality of the fruit is good. This variety is suitable for export.

Neelum
Neelum is a late variety, more popular in Rayalaseema region. Fruit are medium in size. Skin medium thick, yellow in colour. The flesh is fibreless and fruit quality is good, Neelum is a regular and heavy bearer. However, the fruit does not attain good size in Telangana region.
**Dashehari**
Dashehari is a commercial variety of North India and found suitable for growing in North Telangana Zone. The tree is medium in size. Fruit is small to medium, skin medium thick and yellow in colour. The flesh is firm, fibreless with good fruit quality. However, Dashehari is irregular in bearer, susceptible to hoppers and powdery mildew.

**Peddarasam**
Peddarasam is popular in Godavari and Krishna districts. The tree is medium in height, with large fruit. The fruit turns greenish yellow when ripe. The fruit juice is abundant, fibrous and sub-acidic. The bearing is regular and early.

**Chinnarasam**
Chinnarasam is popular in Nuzividu area of Krishna district. The tree is medium in size. The fruit is medium in size with abundant juice, characteristic strong flavor with fairly good keeping quality. The fruit quality is very good. The bearing is regular and heavy.

**Navaneetham**
The tree is medium to large size. The fruit is medium with abundant juice and short and soft fiber. The fruit quality is good. The bearing is regular and heavy, midseason, susceptible to powdery mildew and moderately tolerant to hoppers. Fruit keeping quality poor.

**Mahmooda Vikarabad**
A dwarf variety suited for high density planting. The tree is small in size. The fruit is medium, skin thin, yellowish green, flesh moderately firm, fibreless. The fruit quality very good to best. The bearing is regular, heavy, midseason to late, susceptible to hoppers, tolerates wind. The fruit keeping quality is good.

**Chirutapudi Goa (Royal Special)**
Royal special gives second crop (September-October) apart from main season. Tree is medium in size. The fruit is medium, juice abundant with good fruit quality. The bearing is regular, mid-season to late, moderately tolerant to hoppers, less susceptible to winds.

**Jalal**
It is a pickle variety, regular bearer, fruit size is medium to large. It is a late variety.

**A.U.Rumani**
A hybrid between Rumani and Mulgoa. Fruit medium to large flesh melting, fibreless juice, fruit quality and bearing better than parents, stands transportation well. This hybrid was released from Horticultural Research Station, Anantharajupet.

**Neeleshan**
This hybrid was released from H.R.S., Anantharajupet. It is a hybrid between Neelum and Baneshan. The fruits are medium in size with firm fibreless flesh. The fruit matures 15 days later than Baneshan and catches the late market.

**Neeluddin**
It is a hybrid between Neelum and Himayuddin. The fruits are medium sized weighing on an average 200 g each and intermediate between the parents in shape. The skin is smooth, flesh is firm, melting and fibreless with characteristic flavor. It is abundantly juicy, very sweet in taste and rich in chemical constituents. Each tree bears 500 to 700 fruits
regularly and comes to harvest in the last week of May.

**Neelgoa**
This hybrid is developed by crossing Neelum with Yerramulgoa. The fruits are akin to Neelum but bigger in size and smooth skinned. The flesh is firm, melting, fibreless, moderately juicy and very sweet in taste with a delightful flavour. The fruit weighs 270 g and is rich in nutrients. It has a regular bearing habit and produces 1000 fruits just like Neelum and comes to harvest in the month of May.

**Swarna Jehangir**
It is a hybrid between Chinna Suvarnarekha and Jehangir and inherits the attractive colour of the former parent and the size and quality of the latter. The fruit resembles Jehangir in shape and skin characters, but slightly less in size weighing 230 g. The flesh is moderately firm, fibreless, abundantly juicy and very sweet with pleasant flavour. It excels both the parents in yield and bears 600 fruits. The fruits are harvested in the month of June and stands transport very well.

**Manjeera**
It is a hybrid of Rumani X Neelum released from Sangareddy. Fruits very attractive and large, looks like Rumani. It is a dwarf variety, suitable for high density planting. About 500 plants can be accommodated per hectare adopting a spacing of 4.5 m either way. Tolerant to powdery mildew and hoppers.

**Amrapali**
It is a cross between Dashehari and Neelum. Amrapali is precocious, distinctly dwarf, highly regular and prolific in bearing and has good fruit quality. Since Amrapali is a short statured variety, the planting distance can be reduced considerably.

**Ratna**
It is a cross between Neelum and Alphonso. It has good qualities of Alphanso in fruit characters with semi dwarf growing habit. The formation of spongy tissue is absent.

**Mallika**
It is a cross between Neelum and Dhashehari. The tree is medium in size and regular bearer. The fruits are large, elongated, good quality and bears in cluster.

**Arka Aruna**
It is a cross between Banganpalli and Alphonso released from IIHR, Bangalore. It is regular bearer. The fruit are large (500-700 g) and attractive, fibreless with sweet flesh.

**Arka Puneet**
It is a cross between Alphonso and Banganpalli released from IIHR, Bangalore. It is regular bearer with medium size fruit (200-300 g) with very attractive red colour, fibreless flesh.

**Arka Anmol**
It is a cross between Alphonso and Janardhan Pasand released from IIHR, Bangalore. The tree is semi dwarf, regular bearer with orange colour flesh. The fruit has long shelf life and hence suitable for export.
Sindhu
It is a back cross between Ratna and Alphonso. It has paper thin seed which weighs about 6.8 g.

Planting Material
Mango is commercially propagated by Veneer grafting. One or two year old veneer grafts should be collected from an authentic source. The grafts should have a minimum of 4 whorls of leaves with strong graft union.

Planting and spacing
The plantation of mango should be taken up at the beginning of the monsoon (June-July). In areas with heavy rainfall planting should be done at the end of rainy season. The pit of size 1m x 1m x 1m should be dug and filled with top soil, well mixed with 25 kg farmyard manure and 2 kg superphosphate and 100 gm of Folidol powder to avoid termite damage. Planting distances can be around 7 to 10 meters depending on soil depth and vigour of the variety planted. Even 12 meters spacing may be necessary in very deep and fertile soils. The graft should be planted with ball of earth and press the soil all around the base. The graft joint should be above ground level. Stake the plant to prevent wind damage. Remove root-stock sprouts below the graft joint.

Manures and fertilizers
To improve the texture of soils, add adequate tank silt and FYM. Sowing of the green manure crop (20 kg sun hemp/10 kg diancha/acre) with the onset of monsoon Fertilizer and incorporating 45 days after sowing. The fertilizers schedule for mango for different ages is as follows

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<th>Age of the tree</th>
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<th>Phosphorus</th>
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Fertilizers should be applied through placement in circular trenches around the trunk. For the 10 years age and above trees the fertilizer should be applied at 1.5 m away from the trunk.
· Manures and fertilizers should be generally done in the beginning of monsoon. Irrigation should be given after the application of fertilizers. Wherever irrigation is available it is advantageous to apply half of the recommended dose of fertilizers after fruit set.
· For the correction of micronutrient deficiency, spraying of ZnSO₄ 5 g , Boran 2 g and 10 g urea per liter of water is recommended at the onset of monsoon.
· Spraying of KNO₃ @ 10 g/l during November helps in opening of the flower bud and uniform flowering.
**Pruning**
Pruning to remove criss–cross branches may be done so that center of the tree is opened out and inner branches are exposed to sunlight. Pruning of the dried twigs and branches should be done with pruning saw during June-July. Pruning in mango encourages production of new shoots.

**Intercultivation**
Inter crops like vegetables, low growing field crops and fruits like Phalsa or Papaya can be profitably grown in alleys in young orchards. Red gram is not advisable as it is an alternative host to mealy bug. In old orchards shade tolerating crops like ginger, turmeric etc., can be taken.
Two ploughing in the inter spaces, once at the beginning and another at the end of the monsoon keep the orchard weed free and facilitate rain water percolation.

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**Irrigation**
Mango responds well to irrigation, particularly at fruit set and developmental phases. The young plants at bearing stage should be irrigated frequently.
· In bearing trees, for obtaining good flowering, irrigation must be stopped at least 2 months before flowering period. Stopping of irrigation creates stress and encourages flower bud formation.
· Irrigation should be given fruit set and thereafter at regular intervals during fruit development period, beginning from fruit set stage to full development stage.
· For better quality irrigation should be stopped 20-30 days before maturity/harvesting the crop.
· As far as possible irrigation should be given with drip system. Drip irrigation not only conservers water but also increases water use efficiency.
· For conservation of rain water, rows (in rectangular system of planting) should be along the contour in sloppy locations.

**Fruit Drop**
Fruit drop in mango occurs when the fruits are at pea stage of development. Moisture deficiency, nutrient deficiency and hormonal imbalance are the causes for the mango fruit drop. Fruit drop can be controlled by spraying 2,4 – D at 10 ppm or Naphthalene acetic acid (NAA) at 20 ppm twice at an interval of 15 days during the early stage (peanut stage) of fruit development.

**Irregular Bearing**
Irregular bearing in mango is due to imbalance in nutrient status of the plant. Balanced manuring and fertilizer application and irrigation will keep the tree healthy and vigorous and prevent the irregular bearing. Pruning of weak, dead criss cross shoots to open the canopy of the tree is suggested to regulate the bearing in old trees.

**Top Working**
Top working is done to replace the inferior seedling mango by know variety. The trees are beheaded upto 1.5 m height in August to September months i.e., after receding of heavy rainy. Allow 4-5 vigorous shoots to grow. Grafting on the shoots is done by veneer
grafting on the shoots of pencil thickness. Once the graft is successful, remove the shoots arising from the seedling tree. Prune the new shoots to get more branches. The young shoots arising from grafts should be protected.

**Harvesting and packing**
Early harvest of fully developed but not matured fruit starts in April to catch the early Northern markets. However, the fruits harvested without reaching maturity will not ripen properly. Normal harvest commences when few “Patukayalu” or “Shakh” fall from the tree. In case of pickle mangoes, time of harvest is relatively more flexible and any time between stone hardening and attainment of physiological maturity. Harvesting the fruits with a long poll having a net at the end (Gowka) or Dapol harvester and lowering them gently on a gunny cushion minimizes the injuries. The minimum total soluble content for harvesting without sacrificing the quality is 9.0 in case of Banganpalli and 8.5 for Dashehari. For judging the maturity, fruit samples from various directions of the tree are taken and dropped in a bucket of water, the dipped fruits being indicative of correct maturity. The fruits should be harvested with 7 cm stock and taken to the packhouse in plastic crates. Desapping of the fruits should be done by keeping the fruits in inverted position in the desapping nets for about 3-4 hours. Desapping of mango fruits prevent the sap injury on the fruits. After desapping the stock of the fruits are cut up to 1 cm. The desapped fruits are washed thoroughly in the running water to remove the dirt and other extraneous material. For export, the mango fruits are graded as per the international guidelines of the importing country. The fruits are then packed in the Corrugated fiber board baskets with stock end pointing upward to avoid injury to the fruits.

**Post Harvest Technology**
The mango fruits can be stored for 8-10 days at room temperatures. However, under cold storage the fruits can be stored up to 25 days at 12.5 °C and relative humidity of 80-90 %. Mango fruits cannot be stored below 12.5 °C as it causes the chilling injury.