

▶ Horticulture crops

This section will give you detailed information on Package of Practices of some crops in Andhra Pradesh. This information is categorised into Kharif crops, Rabi crops and Horticultural crops.

Depending on the nature of the information you require, just click on the relevant link to get relevant crop information.

- ▶ [Vegetables](#)
- ▶ [Chillies](#)
- ▶ [Onion](#)
- ▶ [Coriander](#)
- ▶ [Ajwan](#)
- ▶ [Acid Lime and Sweet Orange](#)
- ▶ [Mango](#)
- ▶ [Guava](#)
- ▶ [Sapota](#)
- ▶ [Seethaphal](#)
- ▶ [Ber](#)
- ▶ [Pomegranate](#)

Vegetables

Bhendi, tomato and brinjal are the major vegetable crops grown during Kharif and Rabi.

Varieties

- Bhendi : Parbhani Kranthi, Arka Anamika
- Tomato : Pusa Ruby, Pusa Early Dwarf and Arka Vikas.
- Brinjal : Pusa purple Long, Bhagyamathi, Green Spiny, Polur (local preferred variety)

Sowing time

- Bhendi is sown during June-July in kharif and January – February in Rabi, tomato and brinjal during June, September – October and January. The seed rate for bhendi is 18-20kg ha⁻¹ with a spacing of 45x20cm. In raising nurseries 500g ha⁻¹ tomato, 650g ha⁻¹ brinjal seed is required. For tomato adopt spacing of 50x50cm and for brinjal 60x60cm.

Fertilizers

- Apply FYM at 20-25t ha⁻¹ and fertilizers 100N, 50 P₂O₅, 50 K₂O kg ha⁻¹ for bhendi, tomato and brinjal.

Pest Management

Shoot and fruit borers

- Spray carbaryl 50 W.P @ 2.5g l⁻¹ quinalphos @ 2.0ml l⁻¹ or endosulfan @ 2.0 ml l⁻¹ or monocrotophos @ 1.6ml l⁻¹ or carbaryl @ 3.0g l⁻¹. Repeat the spraying on need basis.

Jassids, aphids and Whiteflies

- Spray dimethoate @ 2.0ml or methyl-o-dementon @ 2.0ml monocrotophos @ 1.5ml or triazophos 1.5ml l⁻¹ of water.

Mites

- Spray dicofol @ 3ml or wettable sulphur @ 3.0g l⁻¹.

Gram caterpillar

- Grow marigold as trap crop. Keep bird perches @ 10 acre⁻¹. Spray HNPV @ 250 LE acre⁻¹, along with 0.1% jaggery and 0.1% sandovit solution. Application of acephate 75 SP @ 1g or quinalphos 25 EC @ 2.5ml l⁻¹ will minimise the incidence. Hand pick and destroy grown up larvae.

Disease Management

Powdery Mildew (Bhendi)

- Spray wettable sulphur @ 3g l⁻¹ or dinocap @ 1ml l⁻¹ at 10-15 days interval starting from first symptom appearance.

Yellow vein mosaic virus (Bhendi)

- Remove and destroy infected plants and spray triazophos @ 1.5ml l⁻¹ for the control of vector.

Damping off (Tomato)

- Raise the nursery in raised seed beds. Treat the seed with thiram or captan @ 3g kg⁻¹. Drench the bed with bordeaux mixture 5ml or coper oxchloride @ 3g l⁻¹.

Early blight (Tomato)

- Spray mancozeb @ 3g l⁻¹ twice at 15 days interval.
- Little leaf of brinjal (MLO disease)
- Remove and destroy the infected plants.

Chillies

- It is an important cash crop in the zone and grown as a vegetable (green chillie) and spice crop covering an area of 15,000 ha.
 - Season : Throughout the year under irrigated conditions.
 - Time of sowing / Planting Kharif / Rabi Summer
 - Nursery July/August January
 - Planting August / September February
 - Direct sowing : End of July to 1st week of August

Soils :

- For rainfed crop, black soils are best suited. For irrigated crop, light textured, alluvial, and garden lands are suited.

Varieties :

- Green chilli – G4, NP 46, Sindhur and LCA 235
- Dry chilli – G5, LCA 206, Jwala, LCA 304 and LCA 334

Seeds and sowing

- Seed rate is 1.5 kg ha⁻¹. Seedlings to be grown on raised beds. Seed treatment with thiram or mancozeb @ 3g kg⁻¹ and application of phorate granules to beds is important. Apply organic manures and sowing in lines and spraying with copper fungicide on 12th and 19th day is essential. Six-week-old seedlings are preferred and top the seedlings one week prior to transplanting.

Spacing

- Rainfed - 15cm x 56cm
- Irrigated - 60cm x 60cm
- Transplant 1-2 seedlings per hill on cloudy days on ridges and furrows.
- Direct sowing : 6.25kg/ha seeds are to be drilled. After 30-40 days of sowing thinning and gap filling are to be done.

Manures and fertilisers

- Basal dose of 25t ha⁻¹ FYM and neem cake at 3-4q ha⁻¹ at last ploughing.
- Rainfed crop : 60 N + 30P + 50K kg ha⁻¹ as basal dose.

- 20-30kg N ha⁻¹ as top dressing depending on rain.
- Irrigated crop. Basal dose - 60 N + 60 P₂O₅ + 30 K₂O kg ha⁻¹

Top dressing - 20 N + 10 K₂O at 45 DAP

20 N + 10K₂O at 60 DAP

20 N + 10K₂O at 75 DAP

Zinc sulphate @ 50kg ha⁻¹ can be applied in last ploughing.

Intercultivation :

- 4-5 times with chittiguntaka followed by hand weeding.

Irrigation :

- Chilli cannot withstand excess moisture. Irrigate depending upon soil moisture at weekly intervals. Avoid frequent and flood irrigation, which causes flower drop. Spray planofix 1ml in 4.5L of water 2-3 times at 15days interval to minimise flower drop.

Plant protection :

Thrips, mites and aphids

- Grow one or two rows of castor around the chilli crop and marigold and chillies in the ratio of 1:10 to reduce the incidence of thrips, mites and aphids. Spray phosalone @ 3ml or acephate @ 1g and dicofol @ 5ml of monocrotophos @ 2ml l⁻¹ litre of water

Pod Borers

- Carbaryl @ 3g or chlorpyriphos @ 2.5ml or quinalphos @ 2.5ml or monocrotophos @ 2ml l⁻¹ or acephate @ 1.5 g l⁻¹ of water.

Fruit rot and Dieback

- Removal of affected plants for avoiding further spreading. Spray capton @ 1.5g or Mancozeb @ 2.5gm l⁻¹ twice at the time of flowering.

Mosaic virus

- Remove affected plants and destroy. Control aphids and whitefly by insecticidal spray.

Yield : Green chilli : 250 q/ha

Dry chilli : 35-40q/ha

Post Harvest Technology

- Expose the dry produce to sun for 10-15 days by spreading in open yards to reduce moisture up to 8%. Move periodically for uniform drying. Remove borer affected and bleached pods for better price.



Package of Practices

Onion

Varieties

- Bellary Red, Pusa Red, Nasik Red, Agrifound Dark Red, Agrifound Light Red.

Seeding

- Sow nursery during June-July. 7-8kg seed sown on raised beds in 500 m² will be sufficient to transplant one hectare. The seedlings will be ready within 45 days. Plant on both the sides of ridges or beds with a spacing of 30x10cm. Dip the seedlings in 1% bordeaux mixture before transplanting.

Fertilisers

- Incorporate FYM at 25 t ha⁻¹ during preparatory cultivation and apply fertilisers @ 100:50:60 NPK kg ha⁻¹. Apply entire P, K and half of the N as basal and the remaining 50 N has to be top dressed in two equal doses at monthly intervals.

Weed Management

- Spray pendimethalin 3.5 l/ha one week after transplanting onion seedlings.

Pest Management

Thrips

- Spray dimethoate @ 2.0ml l⁻¹ or methyl dematon @ 2.0ml l⁻¹

or monocrotophos @ 1.5ml l⁻¹.

Disease Management

Blight

- Spray mancozeb @ 2.5g l⁻¹ or ziram @ 2g l⁻¹ or carbendazim @ 1g l⁻¹ four to five sprays at 7-10 days interval starting from first symptom appearance.

Post Harvest Technology

- Store the bulbs in aerated and ventilated structures, turn periodically and remove rotted bulbs.



Coriander

Varieties

- Lam CS 2 (Sindhu –105 days), Lam CS 4 (Sadhana – 115 days), Lam CS 6 (Swathi – 85 days) and Lam CS 7 (130 days) with yields ranging from 1000-1500kg ha⁻¹.

Seeds and sowing

- Optimum time of sowing is middle of october to middle of november coriander is drilled in solid rows 30cm apart using a seed rate of 15-20kg ha⁻¹.

Fertilisers

- Apply FYM at 10-15 t ha⁻¹ and fertilisers @ 30 N, 40 P₂O₅ and 50 K₂O kg ha⁻¹ as basal.

Intercultivation

- Crop should be kept weed free through intercultivation and hand weeding at 20 and 45 DAS.

Pest Management

- Tobacco caterpillar and gram caterpillar
- Adopt control measures as suggested in blackgram.

Aphids

- Spray monocrotophos @ 1.5ml l⁻¹ or acephate @ 1.0g l⁻¹.

Mite

- Spray dicofol @ 4ml l⁻¹ or wettable sulphur @ 3g l⁻¹.

Disease Management

Powdery Mildew

- Spray wettable sulphur @ 3g l⁻¹ or dinocap 1ml l⁻¹ twice at 10-15 days interval with first appearance of disease.

AJWAN (VAMU)

Varieties

a) Ommo-Lam selection I Medium (80cm) erect with 25 branches, early type (135 days): Reaction to pests and disease is same as other varieties. Average yield 8 q /ha which is on par with local but early by 20 days.

b) Ommo-Lam Selection II Medium tall (70cm), spreading with prolific branching (45 branches) with duration of 160 days. Reaction to pests and diseases is same as other varieties. Average yield 10q/ha, which is 15% over local.

Seeds and sowing

- Ajwan is a Rabi season crop and it is grown for its grain. For grain purpose, the best season is Rabi (October-February). Black cotton soils with high retentivity of moisture are best under rainfed conditions. Light garden soils are also suitable with irrigation source. This crop can be cultivated in comparatively poorer soils and can withstand moisture stress and drought when compared to other minor spices.
- Seed rate is 3-4 kg ha⁻¹. Optimum time of sowing is middle of August to October. The seed is sown very shallow with gorru and covered with a brush harrow with a spacing of 60x15cm.

Fertilisers

- Apply 20 N, 40 P and 20 K kg ha⁻¹ as a basal dose besides 5 tonnes of farmyard manure.

Intercultivation

- Weeding regularly up to 2 months and afterwards the crop will spread and smother the weeds.

Pest Management

- Spray monocrotophos @ 1.6ml l⁻¹ of water or chlorpyrifos @ 2.5ml l⁻¹ or quinalphos @ 2.5ml l⁻¹ of water just before flowering against Spodoptera and Helicoverpa. Spray 0.5% sulfex at the time of flower initiation and again after 15 days to control the powdery mildew disease.

Harvesting

- Harvesting may be done just at the time of grain turning to straw colour.

Threshing and cleaning

- After drying for 2-3 days, threshing is done by beating. The seed is perfectly dried under sun shade conditions, cleaned and bagged for marketing.



Acid Lime and Sweet Orange

- Well drained soils, free from salinity and alkalinity and uniform texture up to a depth of 2-3cm are ideal.

Varieties

- There are no named varieties in acidlime except Kagzi lime. In sweet oranges, Sathgudi, which is superior to Mosambi is recommended.

Planting

- Acidlime is usually raised from seed. Buddings on Gajanimma root stock are also recommended. In case of sweet oranges, buddings on Rangpur lime root stock are recommended. Buddings from registered nurseries should be used for planting.
- Pits of 1.0x1.0x1.0m have to be dug with 6.0m spacing, refilled with soil and manure mixture (1:1) for planting during July-December. Lower branches should be pruned up to 45cm from ground. Water sprouts and stock sprouts should also be removed periodically.

Manuring

- One year old plants may be given 25kg FYM and 3kg castor cake in equal splits during January, June and October. The dose should be increased by equal amounts every year. Four year old plants should receive 100kg FYM along with 12 kg castor cake during the period as in the case of one year old plants. About 1.5kg of urea, 2.5kg single super phosphate and 0.75 kg muriate of potash may be given to all bearing trees once in a year.

- A combines micronutrient spray – zinc sulphate 500g, magnesium sulphate 200g, ferrous sulphate 250g, copper sulphate 300g, borax 200g, lime 100g, urea 1000g and water 100 lit can prevent deficiency of minor elements, besides improving the quality.

Irrigation

- Frequency of irrigation depends on the nature of the soil. Light soils need frequent (weekly) irrigations than heavy soils (10-15days). Plants should not be subjected to stress during flowering. Double ring method of irrigation is ideal. Drip irrigation greatly economises the irrigation water.

Pest Management

Leaf Miner

- Spray malathion @ 3ml l⁻¹ or dimethoate @ 1ml l⁻¹ twice at weekly intervals beginning with the production of flush or sprinkle the neem cake solution on trees @ 250g of neem cake mixed in 4.5 litres of water at the early stages of infestation.

Leaf weevils

- Spray monocrotophos @ 1.6ml l⁻¹ or carbaryl @ 3g l⁻¹, two or three times at 10days interval.

Citrus butterfly

- Spray endosulfan @ 2.0ml l/ha or dichlorovas @ 1.0m l/ha of water or monocrotophos @ 1.6 ml l/ha.

Bark and Stem Borer

- Pour petrol in the holes and plug them with mud or inject solution of endosulfan @ 1.6ml l⁻¹ or dichlorovos @ 0.5ml l⁻¹ or malathion @ 1ml l⁻¹.

Mangu or pinkish mites

- Spray wettable sulphur @ 1.5g l⁻¹ or dicofol @ 3ml l⁻¹.

Fruit sucking moths

- Clean cultivation and removal of alternate hosts are of primary importance. The fruit damage can be minimised by bagging the individual fruits with palmyrah baskets.

Aphids

- Spray dimethoate @ 2ml/l.

Scales

- Rubbing the affected portion with a piece of gunny bag and spray malathion or methyl – o – demeton @ 2.0ml l⁻¹.

Disease Management

Twig blight and diplodia gummosis

- Pruning blighted twigs before onset of monsoon and spraying carbendazim @ 1.0g l⁻¹ four times at quarterly interval.

Canker

- Spray paushamycin @ 1g 10 l⁻¹ (copper oxychloride @ 10g 10l⁻¹) or mancozeb @ 2.0 g l⁻¹ + copper oxychloride 3g l⁻¹ thrice at monthly intervals during rainy season. For sweet orange first spray should be given when fruits are of marble size.

Pre harvest stem end rot

- Spray carbendazim @ 1.0g l⁻¹ thrice at monthly intervals during June, July and August.

Virus diseases

- Use certified bud material free from virus diseases. Greening and tristeza in sweet orange can be prevented by using Rangpur lime as rootstock.



Mango

- India contribute 64 percent of total world production of the 25 million metric tonnes and 83 percent of Asia's production of 11.8million metric tonnes. In India, Andhra Pradesh has second largest area under mango, being next to Uttar Pradesh covering about 3.70 lakh ha, but ranks first in production of about 29.6lakh tonnes per year. Krishna, Chittoor, Vijayanagaram, Khammam and West Godavari are five major growing districts in Andhra Pradesh.

Varieties

- Andhra Pradesh has the largest number of commercial varieties (table, juicy, pickle, off season, exotic and export varieties) and is endowed with the unique position of having the richest varietal wealth in the world.

Table purpose

Banganpalli (Baneshan, Safeda)

- This is the leading commercial variety of the state. Tree medium, fruit large sized (2 to 3 perkg), fruit colour golden yellow, quality very good, mid season (it is good in taste if tasted towards later half of May), moderate yielder and fairly regular, moderately tolerant to hoppers and winds, keeping quality good, suitable for canning.

Totapari (Bangalore, Collector, Chittoor mamidi)

- Better suited to dry regions, more regular and heavy yielder. Tree medium, mid season (bearing later than Banganpalli) fruits medium to large (2 to 3 per kg), skin thick, shape oblong (bottle necked towards the base) fruit quality poor to medium, trees vulnerable to cyclone damage, fruit keeping quality is excellent.

Suvarnakha (Sundari, Lal Sundary)

- Popular in Srikakulam and Visakhapatnam districts. Tree medium, bearing heavy and regular, early in coastal area (i.e about last week of April) and mid season in Telangana region. Fruit medium size (4 to 6per kg), skin medium thick, shape ovate-oblong, colour light cadmium with a blush of deep red, flesh firm, fibreless, fruit quality medium to good, with an acidic blend, susceptible to powdery mildew, keeping quality is good.

Neelum

- More popular in Rayalseema region. Tree medium, highly regular and heavy bearer, late season, fruits medium sized (4 to 6perkg), skin medium thick, shape oval-oblique (roundish), sinus some what prominent and beak distinct, colour orange yellow, flesh fibreless fruit quality better than Totapari, with an acidic blend, more susceptible to anthracnose keeping quality good.

Dashehari

- More suitable for Telangana Zone. Tree medium to vigorous biennial bearer moderate yielder, mid season, fruits small to medium in (4 to 8 per kg), skin medium thick shape elliptical – oblong, colour greenish yellow, flesh firm, fibreless, fruit quality excellent, with more sugar acid blend, keeping quality good.

Kasar

- Tree medium, mid-season, biennial in bearing, moderate fruits medium to large size (3 to 4 perkg), shape oblong, fruit colour light apricot yellow with red blush on shoulders. Taste is very good and sugar / acid blend is excellent.

Mahmooda vikarabad

- A dwarf variety suited for high density planting. Tree small, regular and heavy bearer, mid season to late, fruit medium, skin thin, yellowish green, flesh moderately firm, fibreless, fruit quality very good to best, susceptible to hoppers, tolerant winds, keeping quality of fruit good.

Hybrids

Malika (Neelum x Dashehari)

- Tree medium, mid to late season, fairly, fruits large sized (2 to 4 perkg), skin medium thick fruit shape oblong elliptic, colour cadmium yellow, flesh firm, fibreless fruit quality excellent with more sugar acid blend keeping quality good.

Neeleshan (Neelum x Banganpalli)

- A hybrid between Neelum and Banganpalli, released from Agricultural Research Station, Anantarajupet. This has become quite popular among the farmers of Rayalaseema region. It excels Banganpalli in productivity and regularity of bearing, fruit large sized and similar in appearance.

Manjeera (Rumani x Neelum)

- Hybrid of Rumani x Neelum released from Fruit Research Station, Sangareddy, fruit very attractive and large (300 to 350g) looks like Rumani. It is dwarf variety, suitable for high

density planting. About 500 plants can be accommodated per hectare adopting a spacing of 4.5m x 4.5m. It is a prolific and regular bearer.

Juicy Varieties

Peddarasam

- Popular in Godavari and Krishna districts. Tree medium in height, fruit large, greenish yellow when ripe, juice is abundant fibrous, sub-acidic, bearing early, fairly regular.

Chinnarasam

- Popular in Nuzvid area, tree medium, fruit medium sized, juice abundant, characteristic strong flavour fruit quality very good, bearing regular and heavy (mid season to late) keeping quality fair.

Navaneetham (Panchadara Kalasa)

- Tree medium to large, fruit medium, juice abundant fibre short and soft, fruit quality very good, bearing regular and heavy mid-season susceptible to powdery mildew and moderately tolerant to hopper.

Pickel varieties

Jalal

- Regular bearer fruit size medium to large it is a late variety.

Soils

- The most desirable soil for mango should be of medium texture, deep (2 to 2.5m), well drained, low water table (below 180cm in all the seasons) and having a pH range of 5.5 to 7.5 for good growths and production of mangoes provided they are not very alkaline. Higher calcareous soils are unsuitable for mango. Saline and alkaline conditions are not conducive for profitable mango cultivation.
- Localities which experience bright sunny days and relatively low humidity during flowering period are ideal for mango growing. It can do well in area having an average rainfall as low as 25cm if irrigation can be provided.

Planting material

- One or two year old vegetatively propagated plants in desirable rootstock should be collected from an authentic source. Under Fruit Research Station, Sangareddy conditions. Movadhan and Turpentine rootstocks are suitable for better growth of the tree. For better stand and longevity of the trees, it is advisable to go for in situ grafting.

Planting and spacing

- It is general / planted at the beginning of the monsoon (June-July). In areas with heavy rainfall it is done at the end of rainy season. Dig pits about 1m x 1m x 1m and fill with soil well-mixed with 25kg farm yard manure, 2 kg superphosphate and 150g aldrin dust. The planting distance will vary with the vigour of the variety and location ranging from 8 to 12meters. The dwarf hybrid varieties should be planted at closer spacing. Plant the graft with its earth ball intact and press the soil all around. The graft jointing should be above ground level. It always better to adjust it at the same height/depth at which it was in the pot or nursery bed. Stake the plant to prevent wind damage. Remove rootstock sprouts below the graft joint.

Manures and Fertilizers

- To improve the texture of light soils add adequate tank silt and FYM.

fertilizer schedule for mango is as follows

Age of the Tree	Nitrogen (g/tree)	Phosphorus (g/tree)	Potash (g/tree)
First year	100	100	100
Second year	200	200	200
Third year	300	300	300
Fourth year	400	400	400
Fifth year	500	500	500
Sixth year	600	600	600
Seventh year	700	700	700
Eighth year	800	800	800
Ninth year	900	900	900
Tenth year and onwards	1000	1000	1000

- Fertilizers should be applied through placement in circular trenches dug 4cm deep and 20cm away from the stem in the first year of application and increasing the depth and lateral distance in the multiples during later years. Manuring is generally done in the beginning of monsoon. Wherever irrigation is available, is advantageous to apply part of the manures after fruit set. In the absence of irrigation, foliar sprays of 2% urea and phosphorus through orthophosphoric acid may be sprayed in September – November and March. This zinc deficiency can be corrected by 0.5% ZnSO₄ at the beginning of the growing season thoroughly wetting the foliage.

Intercultivation and intercrops

- Intercrops like vegetables, low-growing field crops and fruits like phalsa or papaya can be profitably grown in all young orchards. Redgram is not advisable as it is a deep rooted plant and also an alternate host for mealy bug. In old orchards shade tolerating crops like ginger, turmeric etc., can be taken up.
- Pruning to remove the criss-cross dead & dried branches may be done so that the center of the tree is opened with less dense canopy and inner branches are exposed to sunlight. Spraying 1% urea & 0.5% Zinc sulphate has been recommended during October & November months for uniform flowering and fruiting every year.

Irrigation

- The young plants at pre-bearing stage should be irrigated frequently. In bearing trees, for obtaining good flowering, irrigation must be stopped at least 2 to 3 months before flowering period. Irrigation at regular intervals during fruit development period is necessary, beginning from fruit set stage to full development stage and stopped 30 days before harvesting the crop.

Fruit Crop

- Controlled by spraying 2, 4-D at 10ppm or Naphthalene acetic acid at 20 ppm twice at an interval of 15 days during the early stage of fruit development. Avoid any spray at peak time of flowering (full bloom stage).

Harvesting

- The characteristic taste and flavour of the variety develops only by harvesting full size matured fruits. The minimum total soluble solid content for harvesting without sacrificing the quality is 9.0 in case of Banganpalli and 8.5 for Dashehari. For knowing the maturity, fruit samples from various directions of the tree are taken and dropped in bucket of water, the dipped fruits being, indicative of correct maturity. In case of pickle mangoes, time of harvest is relatively more flexible and any time between stone hardening and attainment of physiological maturity appears to be suitable. Harvesting should be done, using mango harvester.
- All the fruits harvested with pedicel avoiding injury to the fruits.
- Avoid shaking and injuries to branches and thus no loss by way of fruit drop from trees during harvesting.

Post-Harvest Technology

- The harvested fruits should be covered or taken to the ripening room immediately to avoid damage. Remove the sap before keeping for ripening.
- Coating the fruit with 6% wax emulsion delays ripening by 2-4 days, minimizes the weight loss and disease incidence. The fruits can be kept for about 6 weeks in cold storage at a temperature of 5.5⁰C to 7.2⁰C and relative humidity of 85-90%. Storage life of mango can be extended by 20 days by hydro cooling (12⁰C) and 0.1% carbendazim treatment.

Recommendations for production of export quality mango

Integrated Nutrient Management

- Add organic manures profusely. Add 100kgs of well decomposed FYM or 10kgs vermicompost per tree.
- Add bio-fertilizers like phospho-bacteria, azospirillum @ 250g per tree.
- Raise green manure crops in the interspaces (sun hemp and daincha) in the month of June or July and incorporate in the field after 45 to 50 days.
- To avoid micro-nutrient deficiency apply 50 to 100g of Borax, 25g of Zinc Sulphate and 50g of Magnesium Sulphate per tree.
- Apply 100g each of NPK per one year old plant (217g Urea + 625g SSP + 167g MOP). Increase 100g each of NPK every year up to 10 years. For 10 years and above old plantation apply 2.17 kg Urea + 6.25 kg SSP + 1.67 kg MOP per tree.

- Foliar application of Zinc Sulphate @ 5g+2g Borax and 10g Urea per litre of water at new vegetative growth.
- Apply potassium Nitrate @ 10g per litre of water or 13-0-46 (multi K) @ 10g per litre based on leaf analysis in the month of October.
- Before flowering for good fruit set, spray Borax (Solubor) @ 2g per litre along with first spray schedule.

Pest disease Management

- Fruits should be free from pests and diseases. Plant protection measures should be taken at the time of flowering and fruiting against thrips, hoppers, mealybugs, powdery mildew, anthracnose and stem end rot.

Spray schedule for control of pests and diseases

- 1st spray – 15-20 days before panicle emergence / budburst spray, Monocrotophos (@1.5ml) + Wettable Sulphur (3g) /L on the entire tree.
- 2nd Spray – To control leaf hopper at budburst stage spray Carbaryl (3g) or imidochloprid (0.3ml) + carbendazim (1g) / L.
- 3rd spray – To control powdery mildew and hopper at flowering and fruit set stage spray endosulphan (2ml) + karathane (1ml) /L.
- Spray – At marble fruit stage spray Multi K (10g) /L + Mancozeb or Copper Oxy chloride (3g) /l.
- Add adjuvant @ 0.5m /L to spray solution.

Precautions at the time of harvest.

- Avoid injury to the fruit at the time of harvest. Use Dapoli harvester.
- Harvest the fruits at 70-80% maturity. The recommended weight of the fruit at harvest are as following :
 1. Banganpalli - 350g (10g more or less)
 2. Chousa, Dashehari - 300g (10g more or less)
 3. Alphonso - 250g (10g more or less)
 4. Kesar - 235-265g (10g more or less)
 5. Suvarnakha - 240-270g (10g more or less)
- Harvest the fruit with 5-7cm stalk and cut it to 1cm before shifting to pack house.
- Harvest fruits between 6-10 AM. Do not harvest the fruit

- when the temperatures are high.
- For export by sea select fruits which are green in colour without prominent lenticels and TSS of 7-9⁰B. Shelf life of these fruits is 20-25 days.
 - For export by air harvest the fruit at 100-105 days and when the fruits are green in colour with prominent lenticles. Shelf life of fruits is 17-20 days.
 - For export to other states harvest the fruits at 108-110 days, with 9-11⁰B TSS, shelf life is 10-12 days.
 - Arrange the fruits in plastic crates by padding the vehicle for transport to pack houses.

Pest and Diseases

Pests

Mango Hopper (*Idioscopus dypealis* ; *Amrotodus atkinsoni*)

- Spray carbaryl-3 g or fenvalerate 0.002% or monocrotophos 0.05% or phosphomidon 0.05%. First spray should be given at the early stage of panicle formation (bud burst stage). The second spray at full length of panicle but before full bloom and the third spray after fruits are set and have attained pea and marble stage.
- Hoppers suck the sap from flower panicles due to which flowers dry up and drop prematurely, leaves become curled.

Mealy Bug (*Drosiccha Mangifereae*)

- The early instar nymph can be controlled by spraying monocrotophos 0.05% or carbaryl 0.2% or methyl parathion 0.5%. Use polyethylene band on the trunk region to prevent climbing.
- Mealy bug drain out the plant sap and reduce the vitality and vigour of the plant. Processive and continuous draining of plant sap causes wilting and finally drying of infested tissue.

Shoot borer (*Chlumstla transverse*)

- The attacked shoots may be clipped off and destroyed. Spraying of Fenvalerate (0.02%) or Quinalphos (0.05%) at fortnightly intervals from the commencement of new flush. Total 2-3 sprays may be given depending on infestation.
- Caterpillars enter the young shoot from the terminal end and borer down to a depth of 8-10cm. The affected shoots wilt and dry up.

Stem borer (*Batocera rufomaculata*)

- They can be destroyed by inserting a hard wire into the tunnel. Seal the tunnel with wet clay after applying 50 EC metacid 0.05% or petrol or few crystals of paradichloro benzene (PDC).
- The grubs bore into the bark and stem. This can be identified from the chewed material coming from the bores and by the hollow sound when the branch is tapped, in severe cases the plant dies.

Stone or Nut weevil (*Cryptomhynchus mangiferae* Sym. *Stermochetus mangiferae*)

- Destroy the adults in bark should be washed with wiped kerosene amulsion, Spray Fenthion 0.01%.
- The grubs of the insect damage the pulp and cotyledons of the stone. Alphonso, Neeleshan and Totapari varieties are susceptible to this pest.

Diseases

Powdery mildew (*Oidium mangiferae*)

- It can be controlled by spraying wettable sulphur 0.2% or Dinocap 0.1% along with second spray of insecticide given for hoppers. If the powdery persists, repeat after 3 weeks.
- White powdery out growth appears on young leaves and inflorescences. In severe cases young shoots wither & drop. Affected leaves become distroyed.

Anthracnose (*Collectotrichum gloeosporioides*)

- Dead twigs should be pruned to reduce inoculum potential, spraying copper oxychloride or Dithiocarbamate (0.2%) or carbendazim (0.1%) in the nursery. Instantaneous dip of fruits in Benomyl solution (1000 ppm) before storage reduces the incidence of the disease.
- Brown fungal spots appear on the leaves and inflorescences, resulting in shedding of flowers. Black spots appear on fruits.



Top

Gauva

- In India, Guava is cultivated in more than sixteen thousand hectares. But in Andhra Pradesh the area under guava is estimated as only 4,770 hectares.

Varieties

Allahabad Safeda

- Tree vigorous, medium tall, 5.8 to 6.2m, branching with dense foliage, tendency to produce long shoot, crown broad and compact, leaves 9.5 to 9.8cm long and 4.8cm wide elliptical to oblong in shape. Fruits medium in quality, roundish in shape and weight 180g and keeping quality good.

Lucknow-49 or Sardar Guava

- Semi dwarf tree, vigorous, heavy branching, crown flat. Leaves large, elliptical, ovate to oblong in shape. Fruits roundish ovate in shape. Skin colour primrose yellow with occasional red dots on the skin. Early bearing in season. Taste sweet and keeping quality excellent. Profuse bearer.

Safed Jam

- Tree medium sized drooping branches, fruits round, average weight 150g, thin skin, tasty. It is a hybrid of Allahabad Safeda and Kohir and evolved at Fruit Research Station, Sangareddy. Seeds soft, located at the core. Flesh soft and dull white in colour.

Kohir Safeda

- It is a hybrid between Kohir Safeda selection and Allahabad Safeda and evolved at Fruit Research Station, Sangareddy. Tree is large, dome-shaped, bears profusely. Fruits are large, oblong, average weight 200g and some what hard seeded.

Soils

- Almost all soils are suitable for guava cultivation. However, deep loams with good drainage are highly suitable. It is sensitive to water logging. Although it survives upto 8.2pH, planting should not be done on saline or alkaline soils.
- In areas, having a distinct winter season, the yield tends to increase and quality improves. It requires dry atmosphere at the time of flowering and fruiting. High temperature at the time of fruit development causes fruit drop.

Propagation

- Planting is done in June-July or October-November depending on rainfall and its distribution and the type of soil. Pits of 60cm x 60cm x 60cm are dug in summer

season at a spacing of 6 to 7 meters on either side. The pits are filled with Farm yard manure and soil in equal proportions at the commencement of monsoon. About 100g of BHC 10% dust is also mixed to ward off termites. Layers taken from food pedigree trees should be obtained for planting.

Manures and fertilizers

Age of the tree	Nitrogen (g/tree)	Phosphorus (g/tree)	Potash (g/tree)
1-3 years	50	20	75
4-5 years	100	40	150
7-10 years	200	80	300
11-years above	300	160	450

- In case of zinc deficiency identified by interveinal chlorosis, sparse foliage, reduced leaf size and meager fruit production, pre-flowering spray of 0.3% zinc sulphate along with 0.15% lime should be given.

Intercultivation

- The root suckers should be removed frequently. The tree should be pruned and trained to good shape and with strong branches.
- Intercrops like vegetables and fruits like phasla can be profitably grown in all soils in young orchards upto 4th year. Good crops can be obtained if the trees given Bahar treatment, i.e, withholding water for about a week expose the surface roots and then irrigate the trees after application of manures and covering the roots before flowering.

Irrigation

- For young plants, irrigation at 2-3 days interval and for grown up trees at 10 days interval. Basins should be widened as the tree grows in size.

Plant protection

Stem borer

- Attacks the tree between February and April Months. The grubs should be removed and petrol is injected into the holes and plugged to kill and young ones remaining inside.

Wilt

- Yellowing and browning of leaves at the tips of twigs is the characteristic symptom. Splitting of bark and drying of leaves on terminal branches is followed by complete wilting of plants in 10-15 days.

- Control : Soil may be treated with lime or gypsum @ 1 to 2 kg/tree, to prevent the disease Dry branches may be removed and wilted plants uprooted.



Package of Practices

Sapota

- India is considered to be the largest producer of sapota in the world, though it is considered to be a minor crop in India. At present, total area and production under sapota is estimated at 25,824 hectares and 3.38 lakh tones. In Andhra pradesh sapota is cultivated in an area of 3,490 ha with a production of 8.50 tonnes/ha. But the productivity of 8.5 tonnes/ha. In Andhra Pradesh is far less than the All-India productivity level of 14.19 tonnes/ha.

Varieties

Cricket Ball (Calcutta Large)

- This bears the largest sized fruits, which are round in shape. Pulp is gritty and granular and moderately sweet. This variety is free from leaf spot disease.

Kalipatti

- Fruits are oval shaped less seeded with a sweet mellow flesh of excellent quality. Fragrance is mild. Each fruit has 1-4 seeds. Fruits appear singly. The main harvest is in winter. This variety has higher T.S.S, ascorbic acid and total sugar.

Pala (Gutti)

- The fruits are small to medium sized and oval or egg shaped, with apex broadly pointed and are very sweet. The bearing is heavy and fruits are borne in clusters. The fruit has thick skin and good flavour.

Kirthabharthi

- On the rind 4-6 ridges are seen. Fruit skin is rough, medium thick and buff coloured, and pulp is sweet. Fruit apex is rounded. The fruits can be transported to distance markers.

Dwarapudi

- The fruits resemble those of cricket ball but small in size, fruits have a sweet pulp.

Oval

- The fruits are small to medium sized and oval or egg shaped. Pulp is coarse grained and less sweet.

Soils

- Sapota prefers a warm and moist weather and grows both in dry and humid areas. Coastal climate is best suited. Areas with an annual rainfall of 125-250cm are highly suitable. The optimum temperature is between 11 and 34⁰C. A high temperature of 41⁰C during summer causes flower drop and fruit scorching.
- The soils must be well drained and should not have high lime content which induces chlorosis.

Spacing

- Light soils - 10m x 10m
- Heavy soils - 13m x 13m

Planting

- Prepare land by ploughing and harrowing. Dig pits of about 1m x 1m x 1m. Fill the pits with top soil and compost. Plant the grafts in the middle of pit keeping the graft joint above the groundlevel. Provide support by staking. Planting should be done during rainy or late winter season.

Manures and Fertilizers

F.Y.M

- Before planting : 50 kg/plant
- Every year : 50 kg /plant

Age of the tree	Nitrogen (g/tree)	Phosphorus (g/tree)	Potash (g/tree)
1-3 years	50	20	75
4-5 years	100	40	150
7-10 years	200	80	300

11 years onwards	400	160	450
------------------	-----	-----	-----

- Manure plants in the beginning of rainy season. The fertilizers should be applied in trenches 20-30cm deep and 30cm wide along the drip line of the tree.

Interculture

- The tree basin should be kept free of weeds. Bromacil @ 3kg a.i/ha proved to be the best herbicide for controlling both broad-leaved weeds and grasses and was effective for a period of 6 months.
- Vegetative and other field crops can be grown as intercrops in the first 6 to 7 years.
- Application of SHADU at 100ppm before flowering and again at peak flowering stage results in higher fruit set and NAA at 300 ppm after fruit set results in better retention.

Irrigation

- When plants are young irrigation may be given throughout the year depending upon soil condition. In later stages, during summer, irrigation should be given at 20-25 days interval and in winter at 30 to 35 days interval. Over irrigation results in flower and fruit shedding and also large number of fruits and flat limb malady (fasciation of shoots).

Plant protection

- Sapota does not suffer from serious pests and diseases. But some times, chiku moth, chiku bud bore leaf miner, mid rib folder, leaf spot disease, sooty mold and flattening of branches (*Botryodiplodis theobromes*) are seen. Hence for sapota there is no regular spiny schedule and needful control measures have to be adopted. In case of severe infestation of bud borer, whose larva damages the flower bud, spraying of malathion (0.05%) or monocrotophos (0.01%) is recommended. The leaf disease can be effectively controlled by monthly spray of mancozeb (0.2%).



Seethaphal

- Among the annonaceous fruits, only Seethaphal and Atemoya, a hybrid between Seethaphal and Cherimoya (*Annona Cherimola*) are of commercial importance.

Varieties

Balanagar

- It is a local seedling variety collected from Balanagar area of Mahaboobnagar district (A.P). The fruit quality is good. Fruit size big with large tubercies and blenty of very sweet pulp.

Red seethaphal

- The fruits are purple coloured and the leaves of the plant are purplish at the midrib. Sweet in taste but seeds are many. This variety has got the disadvantage of developing stone fruits. Its seedlings come true to type and are very prolific.

Washington P.1107005

- This is an introduced variety. The fruit is large, pulpy, few seeded and greenish white in colour. Bearing is sparse.

British guinea

- Fruit large greenish white in colour, pulpy, few seeded, quality good bearing sparse. Fruit kept for about a week after ripening without spoilage.

Island gem

- This is an Australian variety, the fruit is very large in size, smooth, surface, very large segments very pulpy, very sweet, excellent flavour, bearing is sparse, fruits irregular in shape, keeps for about a week.

Atemoya

- This is a hybrid between Seethaphal and Cherimoya, Atemoya grows to a height of about 5.6m and has luxuriant growth. Hence, planting distance must be 7m x 7m. Ripe fruits are whitish green in colour, juicy, delicious pulpy with an excellent acidic flavour, very few seeded. Keeping quality good, can be kept even upto 10 days, bearing is erratic. For every 8-10 plants of Atemoya, one plant of custard apple should be planted in the middle to act as polliniser plant. Otherwise the bearing of Atemoya will be poor and erratic. Atemoyas fruits will come to harvest from October to December.

Pink's mammoth

- This is a variety of Atemoya, introduced from Australia. The fruit is very large, avoid, pulpy, delicious, very few seeded and round segments, excellent in quality, bearing is poor. Fruits are irregular in shape. Fruits kept for about a week after ripening without damage.

Propagation

- By venier grafting on its own root stock.

Soils / Climate

- Seethaphal grows on variety of soils. The sandy, marginal and waste lands may be utilized for growing these fruits. Since water/logging causes tree decline, heavy soils with poor drainage, sub-soils with hard pan or high water table are to be avoided. Seethaphal is capable of growing in soils having upto 50 percent lime and 300ppm of chlorine in irrigation water.
- Areas with high humidity, occasional rains and warm temperature are ideal for seethaphal in terms of fruit set and development.

Planting

- Pits (50x50cm) are dug and filled with a mixture of 20kg farmyard manure and 300g fertilizer mixture of urea, superphosphate and muriate of potash in equal proportion at least a fortnight before planting. Planting is done in rainy season at a distance of 5mx5m.

Manures and fertilizers

- The bearing trees of seethaphal should be given 250g N, 125 g P₂O₅,125g K₂O per plant before the commencement of rainy season. The Atemoya should be fertilized with 450g N, 450 g P₂O₅, 450g K₂O per plant of about 5 years age.

Interculture

- In the initial years of planting, intercrops like groundnut, minor millets and linseed can be grown during rainy season and pea, oilseeds and gram during winter season.
- Seethaphal bears flower on the current season growth and very rarely on older wood. The early completion of leaf fall is essential for the initiation of new growth. Therefore manual defoliation during the mid-summer is recommended.

Irrigation

- Seethaphal does not require irrigation as it prefers semi-arid conditions. For Atemoya, after manuring an irrigation may be given. Afterwards when the fruits are developing 1 or 2 irrigations will improve fruit size and yield.

Harvesting

- Harvesting should be done at proper stage of maturity. Fruits are harvested when the colour is light green, segments become flat, the interspaces between segments become yellowish white and initiated cracking of the carpels. Fully mature fruits open in 2-3 days after harvest. The temperature between 15 and 30⁰C and low relative humidity accelerates the process of ripening.

Post harvest technology

- The seethaphal fruits can be stored at 15-20⁰C temperature, 85-90% relative humidity, low oxygen and ethylene tension and 10% CO₂. Wax emulsion @ 8 per cent also extends the storage life.

Plant protection

- Seethaphal is generally free from the attack of any serious pests or diseases.

Disorders

Stone fruits

- Some fruits instead of attaining full size, remain very small and become brown and dry up. These are known as stone fruits, which are retained on tree for a long period. Competition among the developing fruits and high temperature are supposed to cause stone fruit formation.

Fruit cracking

- This usually happens from a heavy rainfall or irrigation after a prolonged dry spell. Evenly distributed irrigation schedule and constant and uniform moisture level in the soil will reduce this problem.



BER

- It can be grown on a wide variety of soils. It can withstand alkalinity and salinity it can be grown even in the soils with pH 8.5.

Varieties

- Gola, Kaithilli, Umran, Seb and Mundia are suitable to arid zones of A.P.

Planting

- Buddings should be planted in pits of 0.60x0.60m with spacing of 6x6m. Pits should be filled with 1kg single super phosphate at the base and with mixture of 1:1 good top soil + FYM and 100g of endosulfan 4% dust.

Pruning

- Pruning in the month of May immediately on receipt of monsoon rains for rainfed crops is good. For high yield and quality fruits, pruning up to 4-6 secondaries should be done.

Manures and Fertilizers

- Entire FYM, half the dose of nitrogen and entire dose of P₂O₅ and potash should be given after pruning in June, taking advantage of rains. The remaining nitrogen should be applied in September.

Age of the Tree	FYM (kg)	N(g)	P(g)	K(g)
1 st year	10	100	50	50
2 nd year	30	200	100	100
3 rd year	50	300	150	150
4 th year	70	400	200	200
5 th year onwards	90	500	250	250

- Intercrops like groundnut, greengram and horsegram can be grown up to 3 years after planting. Spray GA-10ppm after fruit set for increasing size of the fruit.

Pest Management

Fruit fly

- To minimize the pest infestation, orchard soil should be ploughed during March-April, May-June and August to expose the hibernating pupae to the bright sun and birds. The dropped fruits infested with fruitfly should be collected and buried deep in to the soil to destroy the pest. During fruiting season spray dimethoate @ 2ml l⁻¹ or malathion @ 1.5ml l⁻¹ or dichlorovos @ 1.25 ml l⁻¹.

Fruit borer

- Fruit borer can be effectively controlled by foliar spraying at pea size of the fruit and again after 20 days with profenphos 40% + cypermethrin 4% @ 1ml l⁻¹ or monocrotophos @ 1.6ml l⁻¹ or profenphos 1ml l⁻¹.

Disease Management

Powdery Mildew

- The disease can be effectively controlled by foliar spraying after appearance of the disease and again after 10 days with dinocap @ 0.1 g l⁻¹.

Pomegranate

- Light to medium soils with good drainage are suitable. It performs well on light soils with good colour. It can tolerate salts to certain extent.

Varieties

- Ganesh (GPG 1) and Mridula are suitable to AP.

Planting

- Air layers or cuttings can be planted with a spacing of 4x4m. For light soils 4x3.5m can be adopted.

Manures and Fertilizers

The following fertilizer doses should be given

Age (year)	FYM (kg)	N(g)	P(g)	K(g)
1	10	250	125	125
2	20	250	125	125
3	40	500	250	250
4	80	625	300	300

- Full doses of FYM, P, K and half of the N should be given at Bahar treatment prior to first irrigation. The remaining quantity can be given in single dose, 40-45 days after first dose. Application of Doron at 0.2% controls cracking of fruits and improves fruit colour.

Irrigation

- Irregular irrigations induce fruit cracking. Irrigation should be given at definite intervals depending upon soil and seasonal conditions.

Pest Management

Fruit borer

- Spray endosulfan @ 2ml l⁻¹ or carbaryl @ 4g l⁻¹ or monocrotophos @ 1.6ml l⁻¹ from flower bud stage onwards at 2-3 weeks interval. A maximum of four sprays may be necessary.

Disease Management

Fruit spot

- Spray copper oxychloride @ 3g l^{-1} or carbendazim @ 1g l^{-1} twice at 20 days interval after the appearance of the disease.