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24 AG201

CROP PRODUCTION TECHNOLOGY

PREPARED BY
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UNIT 5

Production Practices of Horticulture crops

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mixed with soil.

Inter cultivation

Periodical hoeing and in the first year intercrop like pulses can be grown. Ten to twelve

months after planting the first harvest starts.

Harvest and yield

At the end of first year 250-400 kg of leaves /ha can be harvested.

In II year :Once in 4 months everytime 1800kg /ha which would workout to 5400 kg/ha/year

III year :Yield 5400kg/ha

IV year :2500kg/ha once in 3 months which would work out to10,000 kg/ha/year

V year onwards: 5000 kg/ha once in 3months which work out to20,000kg/ha/year

FRUIT CROPS MANAGEMENT

Mango, Banana, Sapota, Papaya, Guava, Acidlime, Sweet orange, Orange, Grape, Pine apple, Pomegranate, Jack, Amla and Jamun

1. Mango

Mangifera indica

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 Puneethand Sindhu are popular varieties in mango.

Varieties suitable for Tamil Nadu

Banganapalli, Bangalora, Neelum, Rumani, Mulgoa, Alphonso, Senthura, Kalepad, Imam Pasand

Soil

Ideal soil for mango is red loamy. Good drainage is preferable for better establishment. Ideal pH range is from 6.5 to 8.0.

Climate

- Mango trees perform well both under tropical and subtropical climatic conditions.
- The trees can survive at 10 °C to 65 °C but the optimum of temperature is 21° C to 27 °C
- Mango trees grow over a wide range of frost free climates.

Season of planting

- Planting spreads from July to December.

Planting material

- Approach grafts is used for planting.

Field preparation

- Dig pits of 1 m x 1 m x 1 m. Fill in with topsoil mixed with 10 kg of FYM and 100 g per pit.

Spacing

Adopt anyone of the following spacing depending on requirements.

1. Under conventional system of planting:7-10 m either way
2. High Density Planting : 5m x5m (400 plants/ha)
3. Double hedge row system : Adopt a spacing of 5m x 5m within double rows and 10m between successive double rows (266 plants/ha)

Planting

- Grafts are planted in the centre of pit with ball of earth intact followed by watering and staking. The graft union must be 15 cm above the ground level

Irrigation

- Regular watering is recommended till establishment. Under conventional irrigation systems, weekly irrigation is essential.

Intercropping

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

Manures and fertilizers (Kg per tree)

Manures	**and1stYear**	**Annual**	**6thyearonwards**
Fertilizers		**increase**	
FYM	10.0	10.0	50.0

N	0.20	0.20	1.0
P_2O_5	0.20	0.20	1.0
K_2O	0.30	0.30	1.5

Harvest Season

- Harvest spreads from March to June.

Harvest and yield

Yield varies with varieties and spacing adopted.

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

2. BANANA

Musa sp

Varieties

- Desert
  - Robusta, Dwarf Cavendish, Grand Naine**,** Rasthali, Vayalvazhai, Poovan, Nendran, Red Banana, Karpooravalli, Co.1, Matti, Sannachenkadali, Udayam and Neypoovan are popular varieties in banana. Cavendish groups are generally prefered inexport market.
- Culinary
  - Monthan, Vayalvazhai, Ash Monthan and Chakkia are cultivated for culinary purpose. Nendran is a dual purpose variety used for dessert and culinary
- Hillareas
  - The popular varieties of bananas suitable for hilly areas are Virupakshi, Sirumalai and Namarai. Red Banana, Manoranjitham (Santhanavazhai) and Ladan are also cultivated in hills

Soil

- Well drained loamy soils are suitable for banana cultivation. Alkaline and saline soils should be avoided.

Season of planting

- Wetlands

- Poovan, Rasthali, Monthan, Karpooravalli and Neypoovan can be cultivated during February – April.
- Nendran and Robusta can be cultivated during April–March

- Irrigated drylands
  - Banana can be cultivated in garden lands during January– February and November – December
- Hill banana
  - April – May (lower Palani hills), June – August (Sirumalai) are the suitable seasons for cultivating hill banana
- Padugai lands(In between two river beds)
  - In Padugai lands, the crop can be cultivated during January – February and August – September

Selection and treatment to suckers

- Select sword suckers of 1.5 to 2.0 kg weight which are free from diseases and nematodes.
- Trim the roots and decayed portion of the corm.
- Dip the corm with 0.75% Monocrotophos, shade dry for atleast 24 hours and plant.

Field Preparation

- For wet lands no preparatory cultivation
- For irrigated dry lands : 2-3 ploughings to obtain medium tilth
- For Padugai lands : one deep spade digging
- For Hilly areas: construct contour and clear the bush and dig pits and plant

Spacing and number of plants as per the varieties

Sl No	System/variety	Spacing(m)	Succors/ha (No)
1.	Dwarf Cavendish	1.5x 1.5	4440
2.	Robusta and Nendran	1.8x 1.8	3080
3.	Rasthali,Poovan,Karpooravalli, Monthan	2.1x 2.1	2260
4.	Pairedrow	1.2x1.2x2.0	5200
5.	2-Suckers/hill	1.8x 3.6	3200
6.	3-Suckers/hill	1.8x 3.6	4800

High density planting can be adopted for higher productivity. Plant 3 suckers / pit at a spacing of1.8 x 3.6m (4600plants/ha) for Caven dish varieties and 2 mx 3 m for Nendran (5000 plants/ha)

Irrigation

- Irrigate immediately after planting; give life irrigation after 4 days; subsequent irrigations are to be given once in a week for garden land bananas and once in 10 – 15

days for wetlands.

- Use drip irrigation @ 5-10 litres/plant/day from planting to 4th month,10-15 litres/ plant /day from 5th to shooting and 15litres /plant/day from shooting to till 15 days prior to harvest

Drip irrigation schedule

Slo	Crop growth stage	Duration(week)	Lit/tree/day N
1.	After Planting	1-4	4
2.	Juvenile Phase	5-9	8-10
3.	Critical Growth Stage	10-19	12
4.	Flower bud differentiation Stage	20-32	16-20
5.	Shooting Stage	33-37	20 and above
6.	Bunch Development Stage	38x50	20 and above

Intercropping

- Leguminous vegetables, beetroot can be grown as intercrops.

Nutrition management(kg/ha)

Variety/soil	N	P2O5	K2O
Wetlands			
Nendran	210	35	450
Rastali	210	50	390
Poovan,Robusta	160	50	390
Irrigated dryland			
Nendran	150	90	300
Except Nendran	110	35	330

Aftercultivation

- Digging at monthly intervals and earthing up of soil will facilitate better establishment of plants. Desuckering should be done at monthly intervals. The dry and diseased leaves are removed and burnt to control the spread of leaf spot diseases.
- The plants at flowering stage may be propped. Cover the peduncle with flag leaf to prevent main stalk end rot.

Micronutrients

- Spray micronutrients viz., ZnSO4 (0.5%), FeSO4 (0.2%), CuSO4 (0.2%) and H3BO3(0.1%)and3,5and7MAPtoincreaseyieldandqualityof banana.

Intercropping:

- Leguminous vegetables, Beetroot, Elephant foot yam and Sunhemp.A void growing Cucurbitaceous vegetables.

Crop duration

- The bunches will be ready for harvest after 12 to15 months of planting

Harvest

- Bunches attain maturity from 100 to150 days after flowering depending on variety, soil, weather condition and elevation

Yield (t/ha/year

Poovan **:**40–50

Monthan **:**30–40

Rasthali **:**40–50

Robusta **:**50–60

Dwarf Cavendish **:**50– 60

4. **SAPOTA**

Manilkhara achras

Sapotaceae
Varieties :

CO1,CO2,CO.3,PKM1,PKM2,PKM3,PKM-4,PKM(sa)-5,Kallipatti,CricketBall, Pala, Guthi, Kirtibarathi and Oval.

Soil and climate It is a tropical crop and can be grown upto an altitude of 1000 metres. It can be grown in all types of soils.

Planting materials
Sapota can be propagated by approach grafting.

Season of planting
The ideal season of planting is June to December.

Spacing
8 x 8 m (156 plants / ha) for conventional planting. Adopt high density planting at 8x 4 m (312 plants / ha) for high productivity

Manures and fertilizers (Kg / tree)

Manures and Fertilizers	1year old	Annual increase	6thyear onwards
FYM	10.000	10.000	50.000
N	0.200	0.200	1.000
P	0.200	0.200	1.000
K	0.300	0.300	1.500

After cultivation
For higher productivity remove the root stock sprouts, water shoots, criss-cross and lower branches.

Intercropping
Legumes and short duration vegetable crops may be raised as inter crop during pre- bearing stage. Raising of intercrop serve as additional income and enriches the soil fertility by fixing the atmospheric nitrogen..

Harvest
A mature fruit is dull brown in colour and the colour immediately below the skin when scratched is of lighter shade, while in the immature fruits it is green. The mature fruits are harvested by hand picking.

Ripening
Ripen the fruits by keeping a beaker containing 5000 ppm Ethrel + 10 g NaOH pellets in an air tight chamber. (5 ml Ethrel in one lit of water is 5000 ppm).

Yield
Depending upon the variety the fruit yield ranges from 20-25 t /ha /year.

5. GUAVA

***Psidium guajava* l.**
Myrtaceae

Varieties Allahabad ,Lucknow46 ,49 ,Arka Amulya, Arka Mridula**,** Banaras, Baptla, Arka Kiran, Lalit and TRY (G)-1 are the suitable varieties for cultivation.

Soil and climate Guava grows well both in wet and dry regions but it does better under irrigation in the dry tracts.

Well drained soils are the best suited for guava cultivation.It can tolerate salinity and alkalinity.

Planting material



Layers are used as planting material.

AIR LAYERING

Season of planting
The planting is distributed from June-December.

Spacing
A spacing 5-6 m in either way is generally followed.

Planting
Plant the layers with the ball of earth in the centre of pit of 45cmx45cmx45 cm size filled with FYM 10 Kg neem cake 1 Kg and top soil

Irrigation Irrigate copiously immediately after planting, again on third day and afterwards once in 10 days or as and when necessary.

Manures and fertilizers
FYM 50Kg and one Kg in each of N, P and K per tree in two split doses during March and October should be applied.

Intercropping
Legumes and short duration vegetable crops may be raised during pre-bearing stage.

Harvest
Layers come to bearing in 2- 3years. The first crop can be harvested during February – July and the second one during September – January.

Yield
The crop yields about 25 t / ha.

PAPAYA

Varieties

- CO 1, CO 2, CO 3, CO 4, CO 5, CO 6, CO 7, CO 8, Coorg Honey dew and Surya.
- CO 3, CO 7 and Surya are gynodioecious (bisexual + female) types highly suitable for table purpose and CO 2, CO 5 and CO 6 are dual-purpose varieties for table and papain production.

Soil and climate

- It is a tropical fruit and grows well in regions where summer temperature ranges from

35°C - 38°C. Tolerates frost and comes up to an elevation of 1200 m above mean sea level.

- Well drained soils of uniform texture are highly preferable to avoid the collar rot disease.

Sowing

- 500 g of seeds is required for planting one ha.June-September is the best season for planting. Avoid planting in rainy season

Nursery

- Treat the seeds with Captan @2 g/kg of seeds.
- Dibble four seeds in polythene bags in depth not exceeding one cm. Keep the polythene bags in partial shade.
- Watering can be done with the help of rose can. Seedlings will be ready in about 60 days

Planting

- Plant the seedlings at 1.8 m either ways in pits of 45cm x 45 cm x 45 cm size

Irrigation

- Irrigate copiously after planting. Irrigate the field once in a week

Application of fertilizers

- Apply FYM 10 Kg/plant as basal and 50 g in each of N, P and K per plant at bi-monthly intervals from the third month of planting .

Micronutrients

- Spray ZnSO4 0.5% + H2BO3 0.1% during 4th and 8th month to increase growth and yield characters.

Crop duration:24–30months.

Harvest

- Fruits should be picked at colour break stage

Yield

- The average yield is 200-250 t/ha

6. **GRAPES (*Vitis vinifera)***

Varieties:

- Muscat (Panneer), Pachadraksha, Anab-e-Shahi, Thompson Seedless, ArkaShyam, ArkaKanchan, Arka Hans, ManikChaman, Sonaka, Sharadh Seedless and Flame Seedless are normally cultivated.
- Muscat is grown in Tamil Nadu where the rain fall is low to moderate

Soil and climate

- The crop performs best in 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 at least 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.

Spacing

- The adopted spacing is 3 x 2 m for Muscat and 4x 3mfor other varieties.

Irrigation

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

Manures and fertilizers (Kg per vine)

VARIETY	FYM			GREEN LEAVES			N			P			K		
	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III
Muscat	50	50	100	50	50	100	0.10	0.20	0.20	0.08	0.16	0.16	0.30	0.40	0.60
Pachadraksha Thompson Seedless	50	50	100	50	50	100	0.20	0.30	0.40	0.08	0.16	0.24	0.40	0.80	1.20
Sonaka, Manikchaman Sharadseedless, Anab-e-Shahi	50	50	100	50	50	100	0.20	0.40	0.60	0.08	0.16	0.24	0.40	0.80	1.20

Training

- The vines are trained with single stem upto pandal with a stalk on tipping at 2 m height.
- On further tipping, secondary and tertiary arms are developed for spreading all over pandal.

Pruning

- 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.

Yield

- Seedless 15t/ha/year
- Muscat 30t/ha/year
- Pacha draksha 40t/ha/year
- Anab-e-Shahi and Arka hybrids 20t/ha/year

7. AMLA

Phyllanthus emblica

Varieties

The most popular cultivable varieties of amla are Banarasi, NA7 ,Krishna ,Kanchan , Chakaiya, BSR

Soil and climate

Amla is a subtropical plant and prefers dry climate. It is a hardy plant and can be grown in variable soil conditions. The crop can tolerate salinity and alkalinity.

Planting material

Seedlings, Grafts and Buddings are used for planting.

Planting

Planting is done during July-August with a spacing of 6x6 m in pits of 1x1m or 1.25x 1.25m.

Irrigation Irrigate the plants initially for establishment. No irrigation is required during rainy and winter season. Drip irrigation is appropriate which can save water upto 40-45%.

Manures and fertilizers(per plant/year)

Manures and Fertilizers	Bearing tree
FYM	10kg
N	200g
P	500g
K	200g

Manuring should be done immediately after pruning.

Training and pruning
The main branches should be allowed to appear at a height of 0.75-1 m above the ground level.

Plants should be trained to modified central leader system.
During March–April, prune and thin the crowded branches to provide maximum fruit bearing area in the tree.

Yield
The crop yields about 100 kg/tree annually.

FLOWER PRODUCTION

Floriculture is the art and knowledge of growing flowers to perfection. It deals with the cultivation of flowers and ornamental crops from the time of planting to the time of harvesting. It also includes production of planting materials through seeds, cuttings, budding, grafting and marketing of flowers and flower produces It includes cultivation of flowering and ornamental plants for sales or for use as raw materials in cosmetics, Perfume industry and also Pharmaceutical sector.

Important flower production statistics in Tamil Nadu

Sl No	Flower	Area(ha)	Production (Tonnes)	Productivity (t/ha)
1	Rose	1949	14130	7.25
2	Jasmine	10623	92951	8.75
3	Mullai	2769	23537	8.50
4	Jadhimalli	841	7569	9.00
5	Crossandra	1317	2634	2.00
6	Chrysanthimum	2240	20160	9.00
7	Marigold	1502	22530	15.00
8	Arali	1195	9261	7.75
9	Tuberose	1529	15290	10.00
10	Others	3174	34343	10.82
	TOTAL	**25610**	**227115**	**8.87**

Flowers are commercially classified as

Cut flowers and **loose flowers**.

Cut flowers in Tamil Nadu are:

- Cut rose, cut chrysanthymum, carnation, anthurium, dentrobium orchid, lilium, gladious, gerbera, china aster. Golden rod,

Loose flowers

- Rose, malligai, mullai, jathimalli, crossandra, chrysanthemum, marigold, tube rose, neruim