Banana

Introduction

Banana is the fruit of a plant of the genus *Musa* (family Musaceae), which is cultivated primarily for food and secondarily for the production of fibre used in the textile industry are also cultivated for ornamental purposes. Almost all the modern edible parthenocarpic bananas come from the two wild species – *Musa acuminataMusa balbisiana*. The scientific names of bananas are *Musa acuminata, Musa balbisiana* or hybrids of *Musa acuminata and balbisiana,* depending on their genomic constitution.Bananas are vigorously growing, monocotyledonous herbaceous plants.The banana is not a tree but a high herb that can attain up to 15 meters of height. The cultivars vary greatly in plant an d fruit size, plant morphology, fruit quality and disease and insect resistance. Most bananas have a sweet flavor when ripe; exceptions to this are cooking bananas and plantains. Plantains are hybrid bananas in which the male flowering axis is either degenerated, lacking, or possess relicts of male flowers. Plantains are always cooked before consumption and are higher in starch than bananas. The two groups of plantains, French and Horn, produce fewer fruit per plant than sweet bananas. The groups differ in whether the male parts of the inflorescence are present or absent.

Varieties

Dessert

Robusta, Dwarf Cavendish, Grand Naine**,** Rasthali, Vayal vazhai, Poovan, Nendran, Red Banana, Karpooravalli, Co.1, Matti, Sannachenkadali, Udayam and Neypoovan are popular varieties in banana. Cavendish groups are generally prefered in export market.

Culinary

Monthan, Vayal vazhai, Ash Monthan and Chakkia are cultivated for culinary purpose. Nendran is a dual purpose variety used for dessert and culinary.

Hill areas

The popular varieties of bananas suitable for hilly areas are Virupakshi, Sirumalai and Namarai. Red Banana, Manoranjitham (Santhana vazhai) and Ladan are also cultivated in hills.

oil and Climate

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

Season of planting			
Wet lands	**Garden lands**	**Hill Banana**	**Padugai lands**
Poovan, Rasthali, Monthan, Karpooravalli and Neypoovan can be cultivated during	Banana can be cultivated in garden lands during January – February and November –	April – May (lower Palani hills), June – August (Sirumalai) are the suitable seasons for cultivating hill banana.	In Padugai lands, the crop can be cultivated during January – February and August – September.

February – April. Nendran and Robusta can be cultivated during April – May.	December.		

Selection and pre-treatment of 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, cut the pseudostem leaving 20 cm from the corm and grade the suckers to size. To avoid wilt disease in Rasthali, Monthan, Virupakshi and other wilt susceptible varieties, infected portions of the corm may be pared and dipped for 5 minutes in 0.1% Emisan solution (1 g in 1 lit of water). Pralinage is done with 40 g of Carbofuran 3 G granules per sucker. (Dip the corm in slurry solution containing 4 parts clay plus 5 parts water and sprinkle Carbofuran to control nematodes). Alternatively, dip the corm with 0.75% Monocrotophos, shade dry for atleast 24 hours and plant. Sow Sunhemp on 45th day; incorporate it after about a month.This operation reduces nematode build up. Use tissue cultured banana plants with 5-6 leaves. At the time of planting, apply 25 g Pseudomonas fluorescence / plant.

Field preparation

Wet lands

No preparatory cultivation is necessary.

Garden land

2 – 4 ploughings are required before planting.

Padugai

One deep spade digging is essential.

Hill Banana

Clean the jungle and construct contour stone walls before planting.

Digging Pits

Wet lands

Place the suckers at ground level and earth up at stages.

.No.	System of Planting	Planting Distance	Plant population /ha
1.	**Dwarf Cavendish**	**1.5 x 1.5**	**4440**
2.	**Robusta and Nendran**	**1.8 x 1.8**	**3080**
3.	**Rasthali, Poovan, Karpooravalli, Monthan**	**2.1 x 2.1**	**2260**
4.	**Paired row**	**1.2 x 1.2 x 2.0**	**5200**

5.	**2-Suckers /hill**	**1.8 x 3.6**	**3200**
6.	**3-Suckers/hill**	**1.8 x 3.6**	**4800**

rrigation

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. Irrigate the fields copiously after every manure application. Use drip irrigation @ 5-10 litres/plant/day from planting to 4th month, 10-15 litres/plant/day from 5th to shooting and 15 litres /plant/day from shooting to till 15 days prior to harvest.

Drip Irrigation Schedule

S.No	Crop Growth Stage	Duration (Weeks)	Quantity of Water (1/Plant)
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	**38 x 50**	**20 and above**

Fertigation Scheduling

Stage	Units / day			Kg/ha/day		
	N	P_2O_5	K_2O	N	P_2O_5	K_2O
Days after Planting						
1- 150 days	**3**	**2**	**1**	**3.24**	**0.82**	**1.03**
151 - 240 days	**1**	**3**	**2**	**1.08**	**1.23**	**2.06**

241 - 270 days	**1**	**1**	**2**	**1.08**	**0.41**	**2.06**
271 - **360 days**	**0**	**0**	**3**	**0.00**	**0.00**	**3.08**

Fertigation for tissue culture banana

After cultivation

Garden Land

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. Male flowers may be removed a week after opening of last hand. In Robusta banana, floral ruminants may be removed a week after opening of the last hand to avoid 'fingertip disease'. The plants at flowering stage may be propped. Cover the peduncle with flag leaf to prevent main stalk end rot. Cover the bunch with banana leaves to avoid sunscald. Polythene bunch cover will improve the external appearance of banana fruits.

Wetland

Form trenches in between alternate rows and cross trenches at every 5th row. The trenches are periodically deepened and the soil is spread over the bed. Surface diggings may be given at bi-monthly intervals and desuckering at monthly intervals. Remove the male flower a week after opening of last hand.

Prop plants at or prior to flowering. Cover the peduncle with flag leaf and the bunch with leaves to avoid sunscald. For ratoon crops in respect of Poovan, Monthan and Rasthali allow the follower at flowering stage of the mother plant and remove the other suckers during harvest.

Perennial banana
Surface digging should be done once in two months. One deep digging may be given during January – February. Other operations should be done as similar in garden land.

Hill banana
Give four forkings in January, April, July and October. Remove outer sheaths to keep the corm inside the soil and ward off borer. Maintain two bearing plants and two followers per clump along the contour.

Growth regulators
To improve the grade of bunches 2, 4-D at 25 ppm (25 mg/lit) may be sprayed on Poovan and Co 1 banana after the last hand has emerged. This will also help to remove seediness in Poovan variety. Spray CCC 1000 ppm at 4th and 6th month after planting.

Micronutrients
Spray micronutrients viz., ZnSO4 (0.5%), FeSO4 (0.2%), CuSO4 (0.2%) and H3BO3 (0.1%) and 3, 5 and 7 MAP to increase yield and quality of banana.

iseases

Sigatoka leaf spot

Remove affected leaves and burn. Spray any one of the following fungicides commencing from November at monthly interval. Carbendazim 1 g/lit., Benomyl 1 g/lit., Mancozeb 2 g/lit., Copper oxychloride 2.5 g/lit., Ziram 2 ml/lit,

Chlorothalonil 2 g/lit. Alternation of fungicides for every spray prevents fungicidal resistance. Always add 5 ml of wetting agent like Sandovit, Triton AE, Teepol etc. per 10 lit of spray fluid.

Panama Disease
Uproot and destroy severely affected plants. Apply lime at 1 – 2 kg in the pits after removal of the affected plants. In the field, Panama wilt disease can be prevented by corm injection methods. A small portion of soil is removed to expose the upper portion of the corm. An oblique hole at 45° angle is made to a depth of 10 cm. Immediately, a gelatin capsule containing 60 mg of Carbendazim or 3 ml of 2 % Carbendazim solution or capsule application for 50 mg of *Pseudomonas fluorescens* is injected into the hole with the help of ‘corm injector’ on 2nd, 4th and 6th month after planting.

Fusarium wilt
Management

- Varieties Poovan, Robusta, Moongil show resistance.
- Rasthali, Monthan, Karpooravalli susceptible to the disease.
- Flood fallowing the infected fields. Raise paddy for one season to suppress the pathogen.

- Nematodes predispose the pathogen, paring and paralinage with carbofuran 40g / rhizome and 10 g of *P.fluoroscens* .
- Removal of infected trees and application of lime @1-2 Kg/pit.
- Capsule application of carbendazim or *P.fluoroscens* @ 60 mg/capsule/tree on 2nd, 4th and 6th month after planting. The capsule is applied in the corm by making a hole of 10 cm depth at 45°.
- Corm injection with 3 ml of 2% carbendazim.
- Spot drench with carbendazim 0.1%.
- **ottaivazhai in Poovan**
  Spray 2,4 – D at the rate of 25 ppm within 20 days after opening of last hand (1 g/40 lit/200 bunches) or 1.2 g of Sodium salt of 2,4 – D dissolved in 40 lit of water for 200 bunches.

- **Crop duration**
  The bunches will be ready for harvest after 12 to 15 months of planting.
- **Harvest**
  Bunches attain maturity from 100 to 150 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

- **Market information**

Growing Districts	Coimbatore, Erode, Thoothukudi, Tirunelveli, Trichy, Vellore,Kanyakumari and Karur districts
Major Markets in Tamil Nadu	Trichy, Coimbatore, Theni
Preferred Varieties and Hybrids	Grand Naine, Dwarf Cavendish, Robusta, Rasthali, Poovan, Nendran, Red Banana, Ney Poovan, Pachanadan, Monthan, Karpuravalli
Grade Specification	The hands are graded based on the number and size of fingers in each hand. Overripe and injured fruits are discarded. Banana is sent to the local market as bunches.