

Class Notes	
Class: XI	Topic: Package of practices of fruit crop-mango & banana
Subject: AGRICULTURE	

## MANGO

(*Mangifera indica*)

### Introduction:

Mango (*Mangifera indica*), the king of fruits, is grown in India for over 400 years. India shares about 56% of total mango production in the world. Its production has been increasing since independence, contributing 39.5% of the total fruit production of India.

### Climate and Soil:

It can be grown from alluvial to lateritic soils except in black cotton soil having poor drainage. It grows well in soils with slightly acidic pH. It does not perform well in soils having pH beyond 7.5. Soils having good drainage are ideal for mango.

Mango is a tropical fruit, but it can be grown up to 1,100m above mean sea level. There should not be high humidity, rain or frost during flowering. The temperature between 24 and 27°C is ideal for its cultivation. Higher temperature during fruit development and maturity gives better-quality fruits..

### Varieties

India is the home of about 1,000 varieties. Most of them are the result of open pollination arisen as chance seedlings. However, only a few varieties are commercially cultivated throughout India.

**Alphonso, Banganapalli, Bombay Green, Chausa, Dashehari, Fazli, Gulab Khas, Himsagar, Kesar, Langra, Neelum, Pairi, Totapuri**

### Propagation

Mango is a highly heterozygous and cross-pollinated crop. There are 2 types of mango varieties. Most of the varieties in south are polyembryonic and thus give true-to-type seedlings. In north, the varieties grown are monoembryonic and need to be propagated vegetatively. Mango is propagated on mango rootstock. For raising rootstock, the seeds of mango are sown within 4-5 weeks after extraction otherwise they lose their viability. They are:

**Inarching:** It is one of the most widely practiced methods of grafting. One can get a big-sized plant material for planting with over 95% success rate.

**Veneer and side grafting:** These can be utilized for preparing a grafted plant material or for insitu grafting, i.e. for the rootstocks which are already planted.

**Epicotyl /stone grafting:** This method is widely practiced in the Konkan region of Maharashtra. The germinated seedlings of 8-15 days old are used for grafting.

### Planting

Different systems of planting like square, rectangular and hexagonal are followed at different places. However, square and rectangular systems are also popular. The spacing depends on the vigor of the variety and the cropping system. The planting season varies from Jun to Sep. The main field is brought to fine tilth. Pits of **1m x 1m x 1m** size are dug. These are exposed to sun for about 30 days.

Before planting, pits are filled with well-rotten farmyard manure. The top and sub-soil are taken out separately while digging the pits. The grafts should be planted during rainy season.

**High-density planting** helps increase the yield/unit area. In north India, mango Amrapali is found amenable for high-density planting with a spacing of **2.5m x 2.5m**.

### **Manuring and fertilization**

The nutritional requirement of mango varies with the region, soil type and age. A dose of 73g N, 18g and 68g K<sub>2</sub>O<sub>5</sub> / year of age from first to tenth year and thereafter a dose of 730g N, 180g P<sub>2</sub>O<sub>5</sub> and 680g K<sub>2</sub>O should be applied in 2 split doses during June-July and September-October respectively. Spraying of zinc sulphate (0.3%) during February, March and May is recommended to correct the zinc deficiency. Spraying of Borax (0.5%) after fruit set twice at monthly intervals and 0.5% manganese sulphate after blooming corrects boron and manganese deficiencies respectively.

### **Irrigation**

The young plants up to 2-year-old should be watered regularly. The newly-planted grafts need about 30 liters of water every week. Irrigation during pre flowering phase increases flowering. Irrigating grown-up trees after fruit set at 10-day interval increases the yield.

### **Harvesting and Postharvest Management**

Mangoes should be harvested with pedicel. Injury to the fruits during harvesting brings down their quality and also makes them prone to fungal attack. An average mango tree yields 8 tonnes /ha. The number of fruits per tree doing its bearing age generally varies from 1000 to 2000 fruits. The productivity of mango is higher in Andhra Pradesh and Bihar.

### **DISORDERS**

**Alternate bearing:** Alternate bearing has been one of the major problems. Most of the south Indian varieties are regular-bearer, whereas north Indian ones alternate-bearer. Paclobutrazol is a promising chemical for flower induction in mango. Soil drenching with paclobutrazol (5g -10g/tree) results in minimum outbreak of vegetative flushes during September to October giving an early and profuse flowering and more annual yield without affecting fruit size and quality.

**Mango malformation:** Of the 2 types of mango malformation, vegetative malformation is more common in nursery seedlings and young plants. Floral malformation affects trees at the bearing stage. In vegetative malformation or bunchy top, compact leaves are formed in a bunch at the apex of shoot or in the leaf axil and growth of shootlet is arrested. Floral malformation directly affects the productivity. The incidence of disorder varies from variety to variety. Deblossoming alone or coupled with a spray of 200ppm NAA lowers the number of malformed panicles significantly.

**Black tip:** This disorder is caused by the smoke of brick-kilns located within a distance of 600m. Gases like carbon monoxide and carbondioxide, sulphur dioxide and acetylene cause these symptoms. It can be controlled by raising the height of the chimney of the brickkilns. Spraying borax (0.6%) at 10-14 days intervals starting from fruit set also controls it.

**Clustering (Jhumka):** This malady is characterized by a cluster of fruitlets at the tip of the panicle giving an appearance of bunch tip called jhumka. These fruitlets are dark green with a deeper curve in the sinus beak region compared with normally developing fruitlets. These fruitlets grow to marble size after which their growth ceases. One of the main reasons for clustering is the adverse climate during February-March, particularly the low temperature. Most of the fruits are aborted with shrivelled

embryos and do not develop further, signifying the role of normal embryo growth in the development of fruits.

**Spongy tissue:** It is specific in Alphonso mango. Fruits from outside look normal. but inside a patch of flesh becomes spongy, yellowish and sour. This disorder has brought down the export of this variety. Inactivation of ripening enzyme due to high temperature, convective heat and post harvest exposure to sunlight are the causes. Use of sod culture and mulching are useful in reducing its incidence. Mango hybrids Ratna and Arka Puneet which have Alphonso like characters do not suffer from this malady. Harvesting mangoes when they are three-fourths matured rather than fully matured ones also reduces this malady.

### **Pest and Diseases**

**Mango hopper (*Amaritodus atkinsoni*)**

**Nut weevil (*Cryptorhynchus mangiferae* and *C.gravis*)**

**Stem borer (*Batocera rufomaculata*) Fruit fly (*Dacus spp*)**

**Powdery mildew (*Oidium mangiferae*):**

**Anthracnose and stalk and end rot (*Collectotrichum gloesporioides*)**

## **BANANA**

B.N. : *Musa paradisiaca*

family: Musaceae

Banana is one of the oldest fruit known to mankind and also important food for man.

### **Origin:**

South East Asia ‘Apple of paradise’ Rich source of energy (137 K. Ca/100g) It is a good laxative.

### **Important status:**

Tamil Nadu, Kerala, Maharashtra, Andrapradesh and Bihar. Edible bananas are mostly hybrids of the two species. *M. acuminata*, *M. balbisiana*. They set fruits by parthenocarp.

### **Climate:**

Humid tropic plant. Temperature range of 10°C to 40°C with an average of 23°C. Altitude: Upto 1500 mts from MSL. Wind velocity more than 80 m/hr will damage the crop heavily. Rainfall : 100 mm/ month is good.

### **Soil:**

Deep well – drained soil with abundant organic matter.

Depth – one meter

Soil pH: 5.5 – 8.0 found to be optimum.

### **Propagation :**

**i. Sword sucker** – suckers with a well – developed base and pointed tip having narrow sword shaped leaf bladders in the early stage. ii. Water sucker or broad leaved sucker – small, undersized suckers of superficial origin bearing broad leaves.

Sword suckers – more vigorous, grows faster and comes to bearing early. Average weight of the sucker – 1.5 to 2 kg.

**ii. Micropropagation through tissue culture** – Rapid multiplication of banana suckers. Pretreatment of sucker : The roots and decayed portion of the corn are trimmed. Pseudostem is cut leaving 20 cm from the corn. To avoid wilt disease infected portion of the corn may be pared, dipped for 5 min in

carbendazion 0.1% (1 gm in 1 lit of water) for wilt susceptible varieties – Monthan, Neyvannan, Virupahshi etc.

### Field preparation

The land is ploughed deeply and leveled. The pits of size 45 cm<sup>3</sup> is dug. The pits are refilled with top soil, mixed with 10 kg of FYM, 250 g of neem cake and 50 g of lindane 1.3%.

Site of planting	Spacing	Plants / ha
Garden land	1.8x 1.8 m	3086
	1.5 x 1.5 m	4444
Wet land	2.1 x 2.1 m	2267
Hill	3.6 x 3.6 m	750

**High density planting** – 3 suckers / pit at a spacing of 1.8 x 3.6 m (4600 plants / ha).

### Irrigation

Irrigated immediately after planting, life irrigation – 4th day subsequent irrigation once in a week for garden land 10-15 days in wetland after manuring. Drip irrigation – 15 lit/ plant/ day from planting to 4th month. 20 lit/plant / day from 5th to shooting and 25 lit/plant/day from shooting till 15 days prior to harvest.

### Application of fertilizers

Varities	N	P	K
	(g/plant/year)		
Other than Nendran	110	35	330
Nendran	150	90	300

### Interculture

- De sucker – prune the side suckers at monthly interval
- Dry and dead, leaves are removed and burnt.
- Male flower – removed a week after opening of last hand (denavelling)
- Bunch emergence – propping. The trees are supported with bamboos or casurina poles to avoid damage by wind.

### Growth regulator

Grade of bunch -2,4-D at 25 ppm (25 mg/lit) may be sprayed after the last hand has opened. This also helps to remove the seediness in poovan variety. Spray CCC 1000 ppm of 4th and 6th month after planting. Spray plantozyme @ 2ml/lit at 6th and 8th month after planting to get higher yield.

**Micronutrient** : ZnSO<sub>4</sub> (0.5%) FeSO<sub>4</sub> (0.2%) CuSO<sub>4</sub> (0.2%) ad H<sub>3</sub>BO<sub>3</sub> (0.1%) at 3, 5 and 7 MAP to increase yield and quality of banana.

**Intercropping** :Leguminous vegetables, beet root, elephant foot yam and sunhemp. Avoid growing cucurbitaceous vegetables.

### Viral diseases of banana

#### 1.Bunchy top

#### 2. Banana bract mosaic virus –

#### 3. Banana Streak

### Fungal diseases of banana

#### 1. Panama wilt (*Fusarium oxysporum f.sp.cubense*)

#### 2. Sigatoka leaf spot disease

### Bacterial diseases

#### 1. Moko wilt (*Pseudomonas solanacearum*)

## **2. Tip over or heart rot ( *Erwinia carotovora* )**

### **Yield (t/ha/year)**

Poovan – 40-50

Monthan – 30-40

Robusta – 50-60

Dwarf Cavendish -50-60

**Note: This content has been prepared at home.**