

of dried twigs and application of Bordeaux paste on cut ends and application of Bordeaux mixture can control dieback disease.

Against root and collar rot, removal of soil from the base of the trunk, scraping of the

dead bark and application of lime sulphur are to be done. As an alternative, smear Bordeaux paste over the treated roots and stem. Exposing the main roots to a depth of about 30 cm is also advised.

## MANGO (*Mangifera indica*)

Mango is adaptable to a wide range of climate and soil conditions and grows well from sea level up to about 1500 m above mean sea level. It withstands both fairly dry conditions and heavy rainfall.

### Varieties

Alphonso, Kalapady, Neelum, Mundappa, Pairi, Baneshan, Alampur Baneshan, Mulgoa, Suvarnarekha.

### Hybrids

Hybrid No.45 (Bennet Alphonso x Himayuddin), Hybrid No.87 (Kalapady x Alampur Baneshan), Hybrid No.151 (Kalapady x Neelum)

### Season

Plant one year old grafts with the onset of monsoon showers so that they get established before the rains. If rainfall is heavy, planting should be done during August-September.

### Vegetative propagation

Stone grafting is successful in mango. August is ideal for the operation. Select four month old scion materials. Defoliation of scion shoots 10 days prior to grafting is beneficial. Grafting of 8 cm long scion on rootstocks at a height of 6 to 8 cm is most successful. The dieback disease of grafts caused by *Colletotrichum* can be controlled by spraying 1 per cent Bordeaux mixture.

### Planting

Select good grafts for planting. Planting can be done in square system or hexagonal system. Prepare pits of size 1 m x 1 m x 1 m at a spacing of 9 m, one month before planting and allow to weather. Refill pits with mixture of topsoil and 10 kg of compost or FYM per pit to a level higher than the adjoining ground. Plant the grafts at the same depths as they were in the containers, preferably in the late evening. Deep planting results in poor growth of the plant. Ensure that the graft joint is above the soil level. Tie the plants to stakes to prevent snapping at the graft joints.

### Manuring

Apply FYM/compost and fertilizers at the rate indicated below:

Age of plant	FYM kg/plant/year	N:P <sub>2</sub> O <sub>5</sub> :K <sub>2</sub> O (g/plant/year)
1 <sup>st</sup> year	10	20:18:50
2 <sup>nd</sup> year	15	50:27:75
3-5 years	25	100:36:100
6-7 years	40	250:172:200
8-10 years	50	400:144:400
Over 10 years	75	500:360:750

Green leaves (25 kg/plant) and wood ash (10-15 kg/plant) may be applied additionally. Apply organic manures in May-June with the onset of monsoon. Apply the fertilizers in one dose during May-June until bearing stage

and thereafter in two equal split doses, the first during May-June and the second during August-September. Apply manures and fertilizers in trenches 30 cm deep taken at a distance of 2.5 to 3 m from the base of the tree.

#### **After cultivation**

Irrigate twice a week during summer months till the plants are 4-5 years old. Grow vegetables, horse gram, black gram, pineapple and banana as intercrops in young orchards. Carry out intercultural operations by ploughing or digging twice during the year in June and October. For reducing fruit drop and to improve productivity, NAA at 10-30 ppm concentration may be sprayed to the entire inflorescence at the peak stage in the second week after fruit set.

#### **Plant protection**

The important pests of mango are hoppers, stem borers, shoot midges, leaf feeding insects, fruit flies and psyllids. The common diseases are the powdery mildew,

anthracnose and dieback. To control mango hopper, spray carbaryl 0.1 per cent or malathion 0.1 per cent at the time of flowering. To control mango stem borer, apply paste made of crude carbolic acid (130 ml), soft soap (1 kg) and hot water (3.7 litres) to holes in the bark and plug the holes. To control fruit fly, spray malathion 0.1 per cent emulsion / suspension containing 2 per cent sugar. Collect and destroy attacked fruits that rot and drop down. Fruit flies can be effectively managed by keeping Ocimum trap @ 4/tree and a bait spray of 0.1 per cent malathion with 2 per cent sugar at monthly intervals from initial fruit set up to harvest. To control the leaf feeding insects, apply carbaryl 0.1 per cent. To control shoot midge, which causes the drying of tender shoots, apply carbaryl 0.1 per cent or dimethoate 0.05 per cent. Apply wettable sulphur for the control of powdery mildew and anthracnose. To control dieback of twigs and branches, cut the affected twigs below the infected region and apply Bordeaux paste to the cut ends.

### **PAPAYA (*Carica papaya*)**

Papaya thrives well in tropical climate. The occurrence of low temperature and frost limits its cultivation. The optimum temperature for the growth and development of papaya is 22-26°C. In Kerala, the limiting factors for commercial cultivation are high rainfall and severe drought in summer. However, this is best suited as a homestead fruit crop. The papaya prefers a rich, well-drained soil. It will not tolerate waterlogging around the trunk.

#### **Varieties**

Washington, Honey Dew, Coorg Honey

Dew, Solo, Pusa Dwarf, Surya, Co-7, Pusa Nanha, Pusa Giant, Co-2 and Co-5 are suitable for papain extraction.

#### **Propagation**

Papaya is propagated almost entirely by seeds. The best time for raising papaya seedlings is from February to March. The seeds are sown in raised seedbeds of 2 m x 1 m made 15 cm above the ground level or in polythene bags. A mixture of sand, leaf mould and dried FYM is spread over the seedbed. The seeds are sown 2-3 cm deep at a