Canopy Management

Canopy management is the organisation of the shoots, leaves and fruit of the plant in order to maximise the quality of the microclimate surrounding them, thus improving quality and yield. Canopy management is one of the most important fruit plant management practice. This forms the basis of precociousness and longevity of the fruit trees in an orchard.

The above-ground part of a tree consists of the **trunk, scaffold branches**, and **lateral branches**. The **leader** is the vertical stem at the top of the trunk. Scaffold branches are primary limbs that form a tree's canopy. Secondary branches that emerge from scaffold branches are laterals. Growth comes from buds at the tips of branches (**terminal buds**), or along branch sides (**lateral buds**).

Water sprouts and **suckers** are two types of vigorous shoot growth generally considered undesirable. Water sprouts occur along branches, usually at pruning sites. Suckers grow from the trunk or roots.

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The strong scaffold system help the trees to produce heavy crop loads of quality fruits without any major limb breakage, example, peach cv patharnakh. Some trees bear regularly only if pruned every year, example, peach and grapes. Regular annual priming is essential for the induction of good amount of new growth, which will provide the tree maximum fruit bearing area uniformly over the whole tree. Unpruned trees grow beyond limits provided for each tree in an orchard.

The branches start intermingling with the branches of adjacent trees giving an impression of a jungle. The photosynthetic activity of the trees get adversely affected leading to the poor yields of low quality fruits. Orchards become economically unproductive. To keep the fruit trees within the area provided for their spread for whole of the life, canopy management is of prime importance.

1. Training of Fruit Trees:

After planting the fruit plants in the orchard, the training starts from day one. Initially few branches arising from rootstock portion and 10-15 cms above the union are removed at the time of planting. When vines are staked or tied over a trelly or pergola in a certain fashion or some of the parts are removed with a view to give it a desired shape, the operation is called training.

The training is done with the following objectives:

1. To admit light upto centre of the tree and provide sufficient movement of air across the plant.

2. To increase photosynthetic activity by exposing leaves to the sun.

3. To provide strong scaffold system this could bear the heavy load of fruits, without limb breakage.

4. To make hoeing, spraying, irrigation and other cultural practices at a nominal cost.

5. To get balanced distribution of fruit over the tree.

Training Systems:

The following training systems are normally followed for tree crops.

(i) Central Leader System:

The central leader is allowed to grow uninterrupted. The secondaries grow on the central axis on all directions. The fruit tree grows in a natural way. The tree trunks become very strong due to the spread of many scaffolds and secondaries. The trees become tall and spread mostly unmanageable at maturity. This system is most suited to litchi and mango.

(ii) Modified Leader System:

The central leader is allowed to grow to produce 3-4 side branches, then it is headed back at 75 cm height for low headed and at 90 cm for high headed plants. In the next year, the top bud sprouts to take the shape of the central leader, which is again headed back after getting 2-3 scaffolds at the last scaffold giving it an open centre. This can be done after 2-3 years of removal of the central leader that is why the system of training is called modified leader system of

training. In all, there can be 5-7 scaffolds on which secondaries are made to develop by removing apical dominance of each scaffold periodically.

Thus a tree takes the shape of an umbrella in spread and a cone in height. Modified leader system trees possess a strong durable framework like central leader system and openness of the open-centre system. Tress do not grow as tall as in central leader system, thus remain manageable for a long time. Orchard efficiency is never adversely affected due to overgrowth. There is no breakage of limbs due to the load of the fruits. This system is suited to pears, peaches, guava, mango, litchi and many more which can grow to form big trees.

(iii) Open-centre System:

The plants are planted in the orchard and simultaneously headed back to 75 cm height. The well placed 4-5 side branches are allowed to develop on the main axis. The top growing axis is again cut and is not allowed to resprout and give side branches. The selected scaffolds are made to produce secondaries and tertiaries just like in modified leader system.

Thus the tree gives the appearance of the umbrella. The limbs can cause breakage on the small main axis due to over weight of fruit on few scaffolds in comparison to modified leader system. This system is preferred for those fruit trees which have 10-15 years of life span example peaches and plums. This system is very suitable for exotic peaches in North Indian plains.

Pruning:

Normally pruning is an invigorating process. Many a times it is carried out to encourage new growth and fruiting. Pruning is defined as the removal of unwanted parts, viz. shoots, branches roots to allow the fast growth in the remaining parts.

Objectives:

(i) To remove the apical dominance for encouraging branching.

(ii) To remove unproductive over crowded branches.

(iii) To remove diseased and dead wood branches.

(iv) To encourage vegetative growth.

(v) To control the overall size of the fruit tree.

(vi) To regulate fruiting for regular cropping.

(vii) To give particular training.

Method of Pruning:

Annual pruning can be done in two ways:

(i) Heading Back:

This type of pruning can be done in both evergreen and deciduous fruit trees to remove apical dominance and encourage side branching. For peaches which bear on new growth, this type of pruning is an annual feature for getting regular fruiting. Normally 1/3 of the top shoot is removed every year during pruning. However, in some fruits like phalsa the whole bush is headed back to the ground level to develop sufficient number of branches for bearing regularly.

ii) Thinning Out:

When there is a bushy growth of side shoots on the secondaries or tertiaries, some of the branches are removed entirely from point of emergence without leaving any stub. It results in providing light and aeration in the tree. Thinning out encourages fast growth of the remaining terminals. To get best results from pruning a mix of heading back and thinning out will be best for long-term production of quality fruits from peaches.

(iii) Rejuvenation:

Old, tall overgrowing fruit trees of mango litchi, pear, etc. can be rejuvenated to get the fruit from the same trees for a number of years again. In literature it has been mentioned that the trees may be rejuvenated in parts, i.e. head back few scaffolds in one year and few is second and rest in the third. This way a tree shall continue to provide fruit for these years and rejuvenated simultaneously.

It has been found practically wrong. To rejuvenate the tree whole of the tree should be headed back at one time. Keep only 4-5 well placed scaffolds to a length of 15-20 cm. Many sprouts appear on these stubs. Make selection in the same season and keep 7-10 scaffolds on all the stubs not more than two on each stub in any case.

Such trees come into bearing again in 3-4 years after rejuvenation. The rejuvenation has been practiced in the field for pear, mango and guava orchards successfully. The time of rejuvenation for pear is December-January, for mango-January-February and for guava March-April and August-September.

Time of Pruning:

Time of pruning in different fruit plants differ from fruit to fruit. Normally deciduous fruits trees are pruned when complete dormant after shedding of leaves. Pruning of pear, peach and plum should be done in December-January, whereas phalsa and grapes needs to be pruned end January-February first week. Ber which is summer deciduous should be pruned in May-June.

2. Bending of Scaffolds:

To manage the canopy and get early fruiting from trees with long juvenile period, the bending of branches have been successfully practiced in pear. The bending of flexible scaffolds downward can be carried out by tieing the scaffolds to the trunk of the same tree or on to pegs in the basin of the tree. Bending of scaffolds provides the advantage of geotropism. The spur formation is enhanced by two years. Normally it becomes difficult in getting secondaries on the main scaffolds in pear training. Bending also helps in the sprouting of buds to produce good number of secondaries on a scaffold. Thus training on modified leader system is enhanced by one to two years. The bending of scaffolds can be carried out in Guava, Mango and litchi in addition to pear.

3. Provision of Supports:

The selection and breeding programme have developed precocious and heavy bearing cultivars in different fruits. Well managed orchards bear very heavily in their early years of bearing. The tender scaffold system is unable to bear this heavy weight and limbs tend to break from the centre. Some limbs break out rightly from the point of union on the trunk. This is particularly so in pathanakh pear. Peach cultivars and kinnow. The patharnakh orchards get devastated due to limb breakage these orchards never come to that position in the coming years.

Only the few cms long broken limbs continue to bear fruit. Peach tree break from the centre, the broken trees usually die. To save the hard developed canopy of tree, the bamboo

supports should be provided to the major heavily bearing limbs/shoots. This is required to 3-4 years of early bearing. Later on tree establish itself with required yield/fruit weight.