



FACULTY OF AGRICULTURAL SCIENCES & ALLIED INDUSTRIES

- Horticultural plants are grown for their produce like fruits, vegetable, flowers, medicinal components, spices (oleoresins), aromatic (essential oils) etc.
- Therefore, these plants should be managed in such a way that human desires for the purpose of growing them are fully satisfied in terms of quality and quantity of produce.
- This demands direct manipulation of plant growth itself or plant environment through various inputs.
- In manipulation of plant development, training and **pruning** are important for which our knowledge about plant development and its phenology has to be complete. These practices are important in fruit crops.

Training

Physical techniques that control the shape, size and direction of plant growth are known as training or in other words training in effect is orientation of plant in space through techniques like tying, fastening, staking, supporting over a trellis or pergola in a certain fashion or **pruning** of some parts.

Objectives

1. To improve appearance and usefulness of plant/tree through providing different shapes and securing balanced distribution.
2. To ease cultural practices including intercultivation, plant protection and harvesting.
3. To improve performance like planting at an angle of 45° and horizontal orientation of branches make them fruiting better.

Methods of **Training**

- Method of **training** of a plant is determined by the nature of plant, climate, purpose of growing, planting method, mechanization, etc. and therefore, intelligent choice is necessary.

Training in herbaceous annuals and biennials

- These plants are usually grown without any attempt to alter their growth patterns because even if useful not practical being in large number in field.
 - However, for some of ornamental value and creeping nature following types of **training** is affected.
1. Staking or supporting of vine like plants.
 2. **Training** on pergola or trellis of vine type fruit plants or even indeterminate type tomatoes.
 3. Nipping of apices for encouraging lateral growth to give bushy appearance or fulsome appearance in pot plants like Aster, Marigold and Chrysanthemum.
 4. De-shooting or removal of lateral buds for making single stem for large flowers as in Chrysanthemum and Dahlia.
 5. Staking with bamboo sticks and tying together various shoots in potted Chrysanthemum.

Training of woody perennials

- The woody perennials, which are widely spaced and remain on a place for a long duration, are trained for develop strong framework for sustainable production of quality produce and for ornamental beauty in different shapes (topiary).
- In these plants following types of [training](#) are followed.

Open Centre System (Vase Shaped System)

In this system the main stem is allowed to grow to a certain height and the leader is cut to encourage lateral scaffold from near the ground giving a vase shaped plant. This is common in peaches, apricots and ber.

Central Leader System

In this system the central axis of plant is allowed to grow unhindered permitting branches all around. This system is also known as closed centre system and common in use in apple, pear, [mango](#) and sapota.

Modified Leader System

- This system is in between open centre and [central leader system](#) wherein central axis is allowed to grow unhindered upto 4—5 years and then the central stem is headed back and laterals are permitted.
- It is common in apple, pear, cherry, plum, guava.

Cordon System

- This is a system wherein espalier is allowed with the help of [training](#) on wires.
- This system is followed in vines incapable of standing on their stem.
- This can be trained in single cordon or double cordon and commonly followed in crops like grape and passion fruit

Other [Training](#) Methods

[Training](#) on pergola

- To support perennial vine crops pergola is developed by a network of criss-cross wires supported by RCC/angle iron poles on which vines are trained.
- This is common for crops like grape, passion fruit, small gourd, pointed gourd and even peaches.

[Training](#) in different shapes

- Generally ornamental bushes are trained in different shapes for the purpose of enhancing beauty of places.
- These shapes could be vase, cone, cylindrical and rectangular, box, flat and trapezoid.
- Presently for the convenience of mechanization these shapes are being utilized in fruit trees.
- Such shapes are given to adjust the geometry of plantation like hedge row system, box, unclipped natural in fruits like guava, [mango](#), sapota and citrus.

Details of [Training](#)

1. *Height of the Head:* This is the height from ground to first branching or scaffolding. Depending on the height the trees could be divided in three groups.

2. *Low Head*: 0.7—0.9 m. This is common in windy areas. Such plants are easy to maintain.
3. *Medium Head*: 0.9—1.2 m. This is the most common height which combines both effects, ability to stand against wind and easy management.
4. *High Head*: More than 1.2 m. Common in tropics in wind free areas. Operations under the canopy are easy to perform.
5. *Number of Scaffold Branches*: It refers to allowing of number of scaffolds on the primary axis of the tree which vary from 2 to 15 but extremes are undesirable. In fruit trees 5 to 8 scaffolds are preferred to make the tree mechanically strong and open enough to facilitate cultural operations.
6. *Distribution of Scaffolds*: Scaffolds should be distributed in all the directions spaced at 45-60 cm allowing strong crotches through wide angles of emergence.
7. A well trained tree is an asset to the farmer and therefore, efforts should be made for [training](#) trees appropriately in formative years for sustainable production. In fact the process should have begun from nursery itself.

Pruning

- It refers to removal of plant part like bud, shoot, root etc.. to strike a balance between vegetative growth and production.
- This may also be done to adjust fruit load on the tree.

Objectives

1. To control plant size and form.
2. For plant performance like
3. Establishment of transplant where leaves/shoots are pruned to strike a balance between root and shoot so that plants lose less water against restricted root system lost during lifting of plants.
4. Improvement in productivity and quality by regulating the load of the crop and extent of flowering.
5. For flower and fruit quality.
6. Elimination of non-productive vegetative growth like water sprouts, suckers, dead and diseased wood.
7. In case of forest trees production of knot free timber.

Types of [Pruning](#)

- Basically there are three types of [pruning](#) with definite purposes.
 1. Frame [Pruning](#).
 2. Maintenance [Pruning](#).
 3. Renewal [Pruning](#).

Frame [Pruning](#)

- This [pruning](#) is done to provide shape and form to a plant in its formative years so that tree develops strong framework and a shape for ease of operations.
- This process begins from nursery itself and continues up to fruiting stage.

- This is done continuously irrespective of the season.

Maintenance Pruning

- To maintain status- in production level and for uniform performance this pruning is done.
- In some plants like grapes, apple, pear, peach etc. (deciduous trees) it is an annual feature and in others (evergreen like mango, sapota) it is rare confining to removal of water sprouts and unproductive growth and opening of the tree.

Renewal Pruning

- This pruning is done in old trees like mangoes which shows decline .
- In this case severe pruning is required.

Factors to be Considered During Pruning

- In some of the tree species pruning as a regular feature in bearing trees is done to strike a balance between vegetative growth and production so that farmers get sustained production uniformly with optimum quality of produce.

To achieve this one should consider the following factors

4. Time at which buds are differentiated in relation to blooming.
5. The age of the wood that produces the most abundant and highest quality of fruit buds.
6. In consideration of these factors our knowledge about bearing habit of the tree/plant should be complete.
7. Bearing habit means relative position of a fruit with reference to its potential bud giving rise to flower or inflorescence in the shoot.
8. This habit varies from plant to plant.