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Popular Article

Training And Pruning of Fruit Crops

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INTRODUCTION

Training and Pruning are essential operations in successful orcharding. Training methods are adopted mainly in initial years whereas pruning is to be performed annually to regulate fruit bud formation. Training is a practice in which tree growth is directed into a desired shape and form. In modern orchards, shortening the initial unproductive period is emphasized: the sooner trees come into bearing, the sooner the economic burden on the orchard begins to be alleviated. Instrumental to this are high planting densities: even if each individual tree does not bear a large amount of fruit, the higher number of trees per hectare allows sizeable initial yields. Pruning is a dwarfing process and can be used to maintain any desired tree size. Pruning and training are almost always mentioned together, but there is a difference between them and each has a clear function. Pruning has been defined as the art and science of cutting away a portion of the plant for horticultural purposes. Pruning can be used to improve tree shape, to influence its growth, flowering and fruitfulness, to improve fruit quality, to repair injury, to contain the plant and to encourage light and spray penetration. Training, in contrast, refers to the direction of tree growth or form and the development of the structural framework of the tree. Pruning is only one of the techniques used in training.

TRAINING:

It means developing a desired shape of the tree with particular objectives by controlling habit of growth. When a plant is staked or tied or supported over a trellis in certain fashion or some of its parts are removed or trimmed with a view to giving the plant a particular shape the operation is called training. Training is start from nursery stage of plant. Some fruit crops like grape vines, ber, fig, guava etc require training.

Objects of Training:

- To admit lighter and air to the centre of the tree to expose maximum leaf surface to the sun
- To direct the growth of the tree so that various cultural operations such as spraying, ploughing, harvesting can be performed easily and at lower cost.
- To protect the tree from sun burn and wind damage.
- To secure a balanced distribution of fruit bearing parts of the tree.

Principles of Training:

- Formation of the mainframe work must be strong. The branches must be suitable spaced apart and the tree must be balanced on all the sides.
- Never allow several branches to grow at one place or very near each other.
- Careful training of main branches is very essential.
- Another important point about training is that if two branches are growing at the same point try to train them to grow at a wider angle. Narrow angle is always weak.

System of Training:

- **Central leader system:**

In this system the central leader branches are allowed to grow indefinitely so that it will grow more rapidly and vigorously than the side branches and tree became tall. Such a tree bears fruit more near the top. The lower branches are less vigorous and less fruitful. Shading of interior part of tree is the problem, which affects quality of produces. This system is also known as **closed centre system** and common in use in apple, pear, mango and sapota

Advantages:

- Such trees are structurally best suited to bear crop load and to resist the damage from strong winds.

Disadvantages:

- Trees under this system grow too tall and are less spreading.
- Tree management (spraying, pruning, thinning and harvesting) is difficult.
- Shading effect on interior canopy (the lower branches of such trees may be so much in shade that the fruit may not be able to develop proper colour).

- **Open centre or vase system:**

The main stem is allowed to grow only up to a certain height about 1.5 to 1.8 m and then it cut for development of lateral branches. It allows full sunshine to reach each branch. This is common in peaches, apricots and ber.

Advantages:

- The trees so trained allow maximum sunshine to reach their branches.
- Better coloration of fruits on the interior side of the tree.
- Trees are more fruitful and low spreading tree greatly facilitate operations like spraying, pruning, thinning and harvesting.

Disadvantages:

- Such trees are structurally weak, and their limbs are more likely to break with crop load and strong winds.
- This system does not only need severe pruning to start with but also constant effort to maintain its form through drastic pruning treatment.

- **Delayed open center or modified leader system:**

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It is intermediate between the above systems. It is developed by first training the tree to the leader type by allowing the central axil to grow unpruned for the first four or five years. Then central stem is headed back and lateral branches are allowed to grow as in the open centre system. Modified leader training is advisable for trees since fruits of good quality are produced due to enough sunlight penetration and cultural operations are facilitated in orchards of trees trained to this system. It is common in apple, pear, cherry, plum, and guava.

Advantages:

- The branches are well distributed, allowing plenty of sunshine to reach the interior of the tree.
- The trees are structurally strong and not prone to limb breakage.
- Owing to limited height of trees, spraying, pruning and harvesting may be done easily.

Systems of Training Dwarf Trees

1. **Spindle Bush:** modification of the dwarf pyramid or as intermediate between a vertical cordon and a bush form.

- Differs from the dwarf pyramid in that it has no specific arrangement of scaffold branches and from the vertical cordon in that the fruit is borne on short branches rather than directly on the main stem or trunk.
- Most important feature of this system is the tying down of lateral shoots in a horizontal position with little or no summer pruning.
- Trained with or without support posts with a central leader straight and with many small fruiting branches.
- These branches are bent out and down by spreaders to develop wide crotches and to induce early fruiting.
- Tree spread is controlled by cutting back the shoots to ½ to ¾ of their length or back to weak laterals.

2. **Dwarf Pyramids:** consists of a tree with a central stem about 2.5 m tall from which short branches radiate in successive tiers so that a pyramidal shape is build up.

- Fruiting spurs are developed on the short branches.
- Summer pruning forms an essential part of success with dwarf pyramids.

3. Cordons: are single stemmed trees.

- This form is seldom found in commercial fruit production and has been replaced by dwarf pyramids.
- Cordons are vertical, oblique or horizontal
- Vertical cordons: trees are trained erect and grown to a height of 10-12 feet with the first fruiting wood developed at about 30 cm. from the ground
- Oblique cordons: are trained at the 45^0angle.

4. Palmettes: refers to the shape of a palm leaf, an open fan or an open hand with spread fingers.

- Formed by developing lateral scaffold branches from the trunk beginning at 30 cm from the surface of the ground.
- These laterals are in pairs and are equally balanced in opposite directions. Other scaffolds are in turn vigorously developed but are kept about 30 cm apart.

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- Four groups: Horizontal, Oblique, Candelabra, Fan Palmette

5. Espaliers: similar to Kniffen system of training grapes.

- The trellis is 5 feet high with either 2 wires at 3 feet and 5 feet OR 4 wires at 2,3,4, and 5 feet.

6. Meadow or Bed Orchards:

- In this system, trees are planted at ultra-high densities of 30,000 to 100,000 tree per hectare.
- Trees spaced 30 x 45 cm apart with sprinkler head through which hormones, fertilizers, herbicides, pesticides and water may be applied.
- Cropping is taken every other year upto 20 t/acre but cropping every year may be possible by judicious pruning and management.
- It offers complete mechanization of both pruning and harvesting coupled with chemical control of weeds.

Limitations: -

- High cost of establishment
- Orchard becomes uneconomical before standard orchards.
- Annual production is sacrificed because of removal of fruiting buds in alternate years.

7. Tatura Trellis system in Peaches:

- One of the highest yielding systems.
- System appears to be V shaped.
- Trees are planted about 6 x 1 m apart (1668 trees/ha).
- Bearing starts in the second year.
- Main framework consists of Y shaped leaders which are tied with the wires.

PRUNING

Pruning may be defined as the art and science of cutting away of portion of plant to improve its shape, to influence its growth, flowering and fruitfulness and to improve the quality of the product. It also refers as the removal of any excess or undesirable branches, shoots, roots or any other parts of a plant so as to allow the remaining parts to grow normally. It is done to divert a part of plant energy from one part to another part of plant.

Purpose

1. Reduce (maintain) tree size and ease cultural practices.
2. Easier to hand thin and harvest.
3. Better spray coverage, better disease control, (less material).
4. Maintain tree vigor and cropping.
5. Renew old, unproductive wood
6. Stimulates production of fruiting wood
7. Improves fruit quality. May increase size (with proper thinning) Improves color development
8. Strengthen limbs.

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9. Photosynthate used for thickening branches when growing points removed, and less growth in height/length occurs.
10. Tree able to support heavy crop load.
11. Maintains fruiting wood in canopy interior.
12. High light allows for flower bud initiation/differentiation.

Objects of Pruning:

- Training of young trees
- To remove the nonproductive parts
- To removed diseased, dried and broken branches
- To control the size of the plant
- To regulate the fruit crops
- Maintenance of grown-up trees i.e. to maintain the health of bearing plant
- Bringing vigour in old trees

Effect of Pruning

- It increases new vegetative growth
- In young trees flowering will be delayed
- In old trees there will be new vigorous vegetative growth which bears fruit
- It reduces bearing surface are as a result tree remain dwarf which is compensated by accommodating a greater number of dwarf trees (because pruning is a dwarfing process)
- Improvement in size, colour and quality of fruits

Principles of Pruning:

- Young trees are pruned to train it to acquire a desired shape.
- In old trees light heading back is done to stimulate the flowering
- In bearing trees light pruning is done to stimulate fresh growth. it bearing flower buds on fresh growth
- In old trees heavy pruning is done to restore vigorous
- All the diseased, weak, dead or shading branches must be removed.

Systems of Pruning

- **Heading back**: Only terminal portion of twigs, shoots or branches are headed back or cut off (light pruning). When the terminal portion of branch/shoot is removed and it encourages lateral growth from the remaining shoot.
- **Thinning out**: A few twigs, shoots or branches are removed completely. When a shoot is entirely removed from the point of its origin and no re-growth is allowed to occur from the cut ends.
- **Thin wood pruning:** refers to the removal of slow growing, weak, under hanging branches or shoots which are either not fruiting or producing fruits of low quality.
- **Bench Cut** -removes vigorous, upright shoots back to side branches that are relatively flat and outward growing.

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- **Dehorning:** Cutting away the main limbs or thick major branches
- **Bulk pruning**: Heavy pruning all over the tree. For good fruit production only judicious heading back or thinning out should be done.

Types of pruning: Basically, there are three types of pruning with definite purposes.

(i) Frame pruning.

(ii) Maintenance pruning.

(iii) **Renewal pruning.**

1. **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.

2. **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.

3. **Renewal pruning**: This pruning is done in old trees like mangoes which shows decline. In this case severe pruning is required.

Rules of Pruning

- Never leave a stub as far as possible
- Minimum cut surface
- Start cutting from the lower end first, leave half way or even less and then cut from the top
- Keep the cut surface clean and smooth protect the wound with Bordeaux paste.

Season of Pruning

•Dormant Pruning

•Summer Pruning

- **Dormant pruning-** Most often done during the winter-commonly referred to as dormant pruning.
  - Dormant pruning is an invigorating process.
  - Heavy dormant pruning also promotes excessive vegetative vigor,
  - Timing of dormant pruning is critical. Pruning should begin as late in the winter as possible to avoid winter injury.
- **Summer Pruning**

- Done during summers-referred to as summer pruning.
- Its severity is much less, less common, more specific and selective.
- Eliminates an energy or food producing portion of the tree and results in reduced tree growth.
- For most purposes, summer pruning should be limited to removing the upright and vigorous current season's growth; only thinning cuts should be used.
- To minimize the potential for winter injury, summer pruning should not be done after the end of July.

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Advantages of Summer Pruning

- Better illumination of leaves and fruits
- Improved assimilation in centre of trees
- Better fruit colour, fruit quality and storage.
- Slower total growth of trees
- Less wood production
- Less total pruning effort and improved work efficiency
- Possibility of reducing crown volume of tree, better utilization of space, more tree per acre
- Less danger of winter injury

Time of pruning

- The best time for pruning of deciduous fruit is winter when the trees become completely dormant after shedding their leaves. Pruning of pear, peach, plum and phalsa should be carried out during January, whereas in case of grapes the pruning should be initiated in the second fortnight of January and completed by first week of February.

Some important terms used in training and pruning

- Trunk: Main stem of the plant.
- Head: Point on the trunk from which first branch arise
- Scaffold branches: Main branches arising from the head are known as scaffold branches.
- Low headed tree: Trees in which scaffold branches arise within 0.7-0.9 m height from ground level. Low headed trees come into bearing comparatively much earlier, are able to resist stormy winds more effectively and their spraying and harvesting expenses are less.
- High headed tree: Trees in which scaffold branches come out from the trunk above 1.2 m. In the tropical climate, high headed trees are unsuitable as their exposed trunks are subjected to sunscald in summer.
- Crotch: The angle made by scaffold limb to the trunk or the secondary branch to scaffold limb is called crotch. The crotch should be broad and not narrow.
- Leader: The main growing branch from ground level upto the tip dominating all other branches.
- Spur: Numerous shoot growth which are abundant over the fruit trees and upon which most of the fruit is borne.
- Water shoots: These are extraordinary vigorous vegetative shoots which grow from the high points on the main branches in upright direction at the expense of main branches.
- Suckers: Arise from adventitious buds on the roots or underground parts of the stem of the tree.

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