



## Plant Propagation in Horticultural Crops

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Propagation of plants means the development of new individuals, which are used in the growth of new plantings. It is defined as the reproduction of a plant from a source that is often referred to as a mother plant. For each plant, there is a different method of plant propagation. We use various techniques of propagation to achieve various aims like uniformity in crops, increased production, resistance against pests and diseases, early bearing, and the acquisition of certain characteristics in the next generation.

There are two methods of plant propagation: the sexual method and the asexual method. The sexual method means propagation by seeds, while in asexual propagation we use the vegetative parts of plants for raising new ones. Vegetative parts include shoots, leaves, roots, stems, buds, and underground parts that are used in different ways for reproducing new plants. The most general methods of asexual propagation are cutting, layering, grafting, and budding, which are done differently in different plants. We can propagate perennial plants in vegetative or generative ways. Many fruits and nuts Trees are usually propagated by vegetative means by using grafting methods. For this method of propagation, there are two types of grafting methods. The first one is grafting, and the second is budding. Both of them are used for the same purpose. They are used to create a new plant through the union of a suitable rootstock and an aerial part of another plant of the desired variety, called a scion. Other fruits are propagated by their own cuttings, such as stem, root, and runner.

Sexual reproduction of fruit trees is a less-used method in horticulture. It is mainly applied in research stations to conserve the richness of the gene pool as well as develop new varieties. On the other hand, this method is unable to fulfil the requirements for production quality and quantity. After sexual reproduction, the new specimen carries uncertain characteristics of its own, which include the tendency to change back to a more wild-like state. However, some of the known fruits retain their specific characteristics independently of the method of propagation used.

### Types of plant propagation

1. Asexual propagation
2. Sexual propagation

1. **Asexual Propagation:** Asexual propagation is also called vegetative propagation. In vegetative propagation, the vegetative parts of a plant, like leaves, stems, and roots, or their modified forms, are used for propagation. This method is widely used for the propagation of most horticultural crops.

**Plant propagation by Cutting:** Cutting means removing the vegetative part of a plant, which, after separation and planting, is able to develop itself into a new plant. The best time to plate cuttings is in the spring and fall. It is a quick and cheap method of plant propagation. We can produce a large number of uniform plants quickly.

**Stem cutting:** In stem cutting, a non-flowering part of the plant is taken and put in a rooting medium. After developing roots, it is treated as a new plant. There are four types of cutting.

- Hard wood stem cuttings
- Semi hard wood stems cuttings
- Soft wood stem cuttings
- Herbaceous stem cuttings

**Hard wood stem cuttings:** The cutting that is taken from woody and mature plants is called "hard wood stem cutting." Example: a rose, pomegranate, grapes, etc. Hard wood cuttings may be of three types: straight or simple cutting, heel cutting, and mallet cutting.

**Semi hard wood stems cuttings:** The cutting taken from 4- to 9-month-old shoots of current-season woody plants is called semi-hardwood cutting. Example: Croton, Acalyphas, Aralias, etc.

**Soft wood cuttings:** Cutting taken from a 2- to 3-month-old Herbaceous or succulent plants are called soft wood trees. Example: Alternanthera, Coleus, Duranta, etc.

**Herbaceous cutting:** Cuttings taken from 1- to 2-month-old herbaceous plants are called herbaceous cuttings. Example: Dahlia, petunia, carnation, etc.

**Leaf cutting:** The plants that have thick and fleshy leaves have the capacity to produce plantlets on their leaves. In the process of leaf cutting, the leaf blade with or without the petiole and axillary bud is used for starting new plants. After that, adventitious roots and shoots form at the base of the leaf and form a new plant. However, the original leaf does not become part of the new plant.

There are four types of leaf cutting:

- Leaf blade cutting
- Leaf vein cutting / Leaf slashing
- Leaf margin cutting
- Leaf bud cutting

**Plant propagation by Layering:** Layering is defined as the development of roots on a stem while it is still attached to the parent plant. After that, the rooted stem is detached or becomes a new plant with its own roots. Such a root is known as a layer. There are several forms of ground and aerial layering. In aerial rooting, rooting is encouraged on the aerial part of a plant after wounding. In ground layering, branches running parallel to the ground are utilized.

#### **Advantages of layering**

- The mother plant supplies nutrients as it remains attached while rooting.
- It is an easy process and doesn't require much care.
- We can get large plants by using large branches of the plant.

#### **Disadvantages of layering**

- It is a costly and slow method.
- A limited number of plants can be propagated by this method.
- The plants grown by this method are shallow-rooted.

## Classification of layering

### A. Ground layering

- Tip layering
- Simple layering
- Trench layering
- Mound layering or stool layering
- Compound or serpentine layering

**Tip layering:** Tip layering is the propagation of plants by bending a stem to the ground and covering the tip with soil so that roots and new shoots develop. It is quite similar to simple layering.

**Simple layering:** In simple layering, a branch of a plant is bent to the ground, and some portion of it is covered with soil leaving the terminal end of the branch exposed. The branch that is layered produces roots, and after the formation of roots, it is ready to transplant.

**Trench layering:** In trench layering, a plant or a branch of a plant is grown in a horizontal position in the base of a trench, and then the soil is filled in around the new shoots as they develop. Roots develop from the base of these new shoots. This layering is also called etiolation layering. Trench layering is used for woody species like apples, litchi, etc.

**Mound layering or stool layering:** In mound layering, a plant is cut back to the ground level during the dormant season, and then soil is heaped around the base of the newly developing shoots. After root formation, the rooted layers are separated from the mother plant. This method is used on a plant whose branches are firm and difficult to bend.

**Compound or serpentine layering:** Compound layering is similar to simple layering; the only difference is that in compound layering, the branch is alternately covered and exposed along its length. In this method, longer branches are required so that they can be layered at different places. For example, jasmine, clematis, muscadine grape, etc.

### B. Air layering

In air layering, roots form on an aerial shoot. The rooting medium is tied to the shoot for getting roots and formation of roots. The best rooting medium for air layering is Sphagnum moss. Sphagnum moss holds large quantities of water until root initiation and through root initiation and root development. Examples: Crotons, Ficus, Fig, Guava, Phalsa,

**Plant propagation by grafting:** In grafting two parts of independent plants are joined in such a manner that they unite and grow together into single independent plant. The part of graft combination which is to become the upper portion or the shoot system or top of the new plant is termed the scion and the part which is to become the lower portion or the root system is the rootstock or under stock or some time stock. The single plant obtained as a result of union between the stock and scion is termed as Stion.

There are mainly two types of grafting

- Attached scion methods of grafting
- Detached scion methods of grafting

**Attached scion method of grafting:** In attached scion methods of grafting, the scion is still attached to the mother plant (scion plant) until the graft union takes place. After the successful union of the scion and rootstock, the scion is gradually cut from the parent plant.

**Detached scion methods of grafting:** In detached scion methods of grafting, the scion is separated from the scion plant or mother plant just before grafting. In this method, the rate of success of plant propagation is higher.

Types of detachable scion grafting

- Veneer grafting
- Side grafting
- Wedge or cleft grafting
- Stone or epicotyl grafting
- Whip or splice grafting
- Bark grafting

**Plant propagation by Budding:** In budding, a single mature scion bud is inserted into the stem (rootstock) in a way that results in into a union and continues to grow as a new plant. It is also a type of grafting. The plant that grows after the union of the stock and bud is known as a budding.

There are many types of budding. Some of the popular methods of budding are given below:

- T – budding
  - Patch budding
  - Ring budding
  - Flute budding
  - Forkert budding
  - Chip budding
2. **Sexual Propagation:** "Sexual propagation" means propagation or multiplication by using seeds. Successful fertilisation and the combination of parental gametes result in the formation of seeds. It is an easy method and is widely used for the propagation of crops like ornamental annuals, medicinal plants, vegetables, and fruit plants, such as papaya.

## Conclusion

Much of vegetative plant propagation was developed in the last century. Plant pathologists have helped propagators by developing and testing methods to rid soil, growing media, tools, containers, etc. of pathogens. This has greatly increased the profitability of vegetative plant propagation. Although still an important concern, losses from diseases during propagation are much less today than a century ago. Not only have plant pathologists helped propagators, but the reverse is true as well. By using the vegetative plant propagation techniques of rooting shoot tip cuttings, grafting, and micro propagation Using apical meristematic tissues to escape pathogens, researchers have revolutionised an important part of plant pathology. Methods of vegetative propagation will continue to evolve and become more efficient. Expect to see many new innovations as we learn more about plants and their biology.

## References

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