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# Methods of grafting in horticultural crops

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**Abstract**
Grafting is an age old practice widely used with fruit trees and in recently in vegetables crops also. Joining two segments of two distinct plants together to create a single composite plant is the technique it involves. The term "rootstock," or just "stock," refers to the lower part, or root system. The term "scion" refers to the upper part, or shoot system. This method of propagating plants combines the favorable fruiting or ornamental traits of the scion and the rootstock, which may have special benefits including resistance to pests and diseases, the capacity to dwarf, or tolerance to difficult soil conditions. Rootstock material can be multiplied asexually (using cuttings or layers) or sexually (using seeds). Grafting, however, is actually a type of clonal or asexual proliferation. Consequently, a scion that is a genetic replica of the parent plant is formed by new plants that are created through grafting. Grafting, which is sometimes described as both a science and an art, calls for dexterity and good hand-eye coordination in addition to a fundamental knowledge of plant anatomy.

**Keywords:** Grafting, propagation, methods, inarching, splice, softwood, epicotyl, veneer

## Introduction
Grafting is a type of plant propagation in which two live portions from separate plants are grafted together so that they will eventually merge and grow into one independent plant. A broad range of classical grafting techniques can be found in Garner (2013) [11]. A graft typically consists of the rootstock and scion. The section of a graft combination known as the scion becomes the top of the plant, and the lower portion known as the stock (root stock) forms the new plant's root system. To encourage quick healing of the grafting area, this strategy should be used while the cambium cells are actively dividing.
It is an ancient method used for vegetative propagation and to improve plant performance. It is largely used in fruit trees, vegetables and in horticulture to induce beneficial phenotypical traits to the scion, such as its size, improved yield, fruit quality, and resistance to biotic and abiotic stresses (Gainza *et al*., 2015; Eliezer, 2014) [10, 8]. Large-scale commercial production of vegetable seedlings is expanding rapidly in many developed countries, and this will lead to an increased commercial supply and use of grafted vegetable seedlings throughout the world as reported by Lee, 1994 [19]. For example, it has been reported that brinjal grafted onto wild Solanum species and other resistant rootstocks is an efficient technique to control various pathogens (King *et al*., 2010) [17]. Grafting is one of the techniques to solve above mentioned problems exist in tomato (Pogonyi, *et al*., 2005) [26]. Cucurbits grafted on pumpkin provide drought tolerance in sandy soil (Anonyms, 2018) [2].

## Methods of grafting
### Attached methods of grafting
Only after a successful graft union development does the shoot system of the rootstock and the root system of the scion get removed. It is classified into approach grafting (splice approach grafting, tongue approach grafting and inlay approach grafting) and inarching methods. (Sadhu, 2014; Sharma and Manish, 2004; Kumar, 2010; Jitendra Singh, 2020; George Acquaah, 2016; Hartmann *et al*, 2009; Chadha, 2002) [28, 30, 18, 15, 12, 13, 5].

### 1. Approach method of grafting
The scion and stock are linked in an approach graft when both parts are on their own root system. Following the union, the scion plant base beneath the graft and the top of the stock above the graft are cut off. Instead of being looped off all at once, the stock and scion are looped off gradually. Plants are particularly well-suited to this method since they are difficult to multiply in other methods.

Usually, approach grafting is done on one or both target plants that are potted within a container. In a container or pot, the established plant—that is, the scion component of the grafted plant—may be positioned close to root stock plants. e.g. Avacado, Mango. Approach grafting with combination Otong and Sapuan was better than Otong-Petruk grafting in accelerating the growth of durian seedling as reported by Endang *et al* (2017) [9].

This kind of grafting ought to be carried out during the seasons of the year when the graft union will mend more quickly and actively. However, in order to keep the tissues from drying out when using alternative grafting techniques, the cut surfaces must be firmly secured to one another before being covered with grafting wax. Three distinct approaches exist for approach grafting. Splice approach, tongue approach, and inlay approach grafting are the three of them.

**a) Splice approach grafting**

**Procedure**

Both the stock and the scion in splice approach grafting need to have the same thickness. The root stock-containing pot is positioned close to the scion tree. This technique involves removing a 4-5 cm long bark and wood splice from the stock at a height of around 30 cm above the soil's surface. The scion shoot has a cut that is comparable. Smooth and even cuts that reveal the cambium layer are necessary to ensure that the pieces fit tightly together without any spaces between them when held together. The stock and scion's cut surfaces are securely fastened together using appropriate tying materials, such as twine, jute fiber, waxed tape, or adhesive tape, and appropriately waxed. The pot is regularly watered. After a correct union, the scion below and the stock above are cut.

**b) Tongue approach grafting**

e.g. Apple, Pear, Walnut. Also practices in cucurbitaceous crops as it ensures a high survival rate (Teja *et al*., 2020) [33].

**Procedure**

With the tongue placed on the cut surfaces of the stock and scion to give the graft union rigidity, it is nearly identical to splice approach grafting. The initial incision is created using the same technique as grafting using the splice approach. A narrow tongue is provided on each component by a second cut that is done upward on the scion and downward on the stock. Next, the scion is inserted into the stock until they lock together. The process of tying and waxing is identical to that of splice approach grafting.

**c) Inlay approach grafting**

**Procedure**

If the stock plant's bark is significantly thicker than the scion plant's, inlay approach grafting is employed. The stock plant's bark is thinned into a slot that is 7.5–10 cm long by making two parallel knife cuts and removing the bark strip in between. This is only feasible if the stock plant is developing vigorously and the bark has reached the slipping stage. The width of the slot must precisely match the scion that is to be inserted. The scion plant's stem should have a long, shallow incision made along one side at the site of union. The cut should be made deep enough to penetrate through the bark and somewhat into the wood, and it should match the length of the slot in the stock plant. The cut surface of the scion branch must be put into the stock plant's slot and fastened with two or more tiny, flat-headed wire nails. Next, liberal amounts of grafting wax must be applied to the whole union. After the union has healed, the scion can be cut below the graft and the stock above the graft.

**2. Inarching**

The top of the new root stock plant in inarching typically does not reach over the point of the graft union, unlike in approach grafting, even if both stock and scion plants are on their own roots during the grafting process. Inarching is an agronomic technique to repair trees that have been girdled as a result of damage caused by mice, rabbits and other rodents as well as mechanical injury (During the dormant season, young, suitable seedlings or rooted cuttings are put in a circle around the tree trunk to create a new root system. Early in the spring, when growth is most active, is when grafting should be done. e.g. Citrus trees damaged by foot rot or gummosis disease can be successfully inarched into resistant sour orange seedlings planted around the base of the tree. Tree vigor (circumference, height and diameter) and yield significantly increased in response to inarching in citrus as reported by Zhan *et al*., 2019 [35]. Moonkuntha *et al*. (2009) [21] recorded that inarching method had the highest success rate (100%) followed by side veneer and bark grafting with 20% success rate. The chip budding and cleft grafting method had 0% success rate. Approach grafting (inarching), a successful grafting method in sapota (Singh, 1980) [32] was used for producing grafted plants. However, the root stocks play role like C. lanceolatum proved one of the best rootstocks for Sapota as reported by Kalesh, 2005 [16].

**Procedure**

The seedling plants to prove the new root system are usually smaller than the tree to be repaired. The upper end of the seedlings should be 0.6-1.2 cm (¼-½ inch) thick. A lengthy, shallow cut, measuring around 10 to 15 centimeters, is made adjacent to the tree's trunk. The cut should be sufficiently deep to remove some wood, revealing two bands of cambium tissue. Towards the end of the seedling, a second, shorter cut, about 1.3 cm (½ inch) in length, is made on the side opposite the long cut. resulting in a wedge-shaped cut along the seedling's stem. By taking off a length of bark that is precisely the breadth of the seedling and just as long as the cut surface the seedling produced on its trunk, the older tree's trunk is made into a long slot. A small flap of bark remaining at the upper end of the slot is placed beneath the wedge end of the seedling. After this, four or five tiny, flat-headed wire nails are used to fix the seedling into the slot. Waxing the entire area completely is recommended after nailing. When the union is complete, the seedlings supply water and minerals to the top.

**Detached methods of grafting**

A kind of graft in which the side or apex of the rootstock is grafted after a portion of the shoot (scion) has been removed. Different methods of apical grafting are splice grafting, whip and tongue grafting, cleft grafting, bark grafting, soft wood grafting, epicotyl grafting, bridge grafting, double working, top working. Side-stub grafting, side-tongue grafting and side-veneer grafting are different methods under side grafting (Sadhu, 2014; Sharma and Manish, 2004; Kumar, 2010; Jitendra Singh, 2020; George Acquaah, 2016; Hartmann *et al*, 2009; Chadha, 2002) [28, 30, 18, 15, 12, 13, 5].

**a) Apical grafting methods**

**1. Splice grafting**

**e.g. Vegetables**

This method is most widely used and preferred by growers and commercial grated transplant producers. It can be performed in most vegetables by hand or machines. This method is popular in Cucurbits and Solanaceous vegetable crops (Deepak *et al*., 2019) [7]. It is a very straightforward, well-liked, and uncomplicated grafting technique that is especially helpful for small material. It is imperative that the diameters of the scion and the stock match. Splice grafting is usually done when the sap has started to rise before the bud break. Nirosha *et al*., 2023 [23] reported that this method is popular for cucurbits and other solanaceous crops.

**Procedure**

One year old root stock is selected and all side branches if any are removed. The stock is heading back, rising between 23 and 25 centimeters above the ground. Using a sharp knife, make a diagonal cut at the distal end of the root stock that is approximately 3–4 cm long. A similar slanting incision is performed on the proximal end of the scion. The cuts must be even and smooth to ensure a correct cambial contact and final union. The root stock and scion's cut surfaces are securely fastened together by binding them together with appropriate tying material. Upon the completion of the union, the wrapping is taken off.

**Whip and tongue grafting**

Whip and tongue grafting is similar to splice grafting except that a tongue is added to the cut surface to provide better fitting and rigidity. e.g. It is the predominant propagation method used on apples and is widely used on pear. Although most grapes are grown from cuttings in this country, whip grafting is the standard when they are propagated (Tim Hartmann).

**Procedure**

Similar to splice grafting, initial diagonal cuts are performed on both the stock and the scion. A second, shallow reverse cut is made, starting around one-third of the way from the cut's tip. This cut needs to be about half as long as the last one. When the tongue is ready, the graft is securely wrapped and fastened when the scion is put into the stock and they lock together. To ensure that the cambium layers make enough contact, the scion may be pushed to one side of the stock if the stock is thicker than the scion.

**Cleft grafting**

It is one of the earliest grafting techniques, specifically used to top working trees, either in the scaffold limbs of larger trees or in the trunk of smaller ones. Only stocks with a diameter of 2.5–10 cm and species with reasonably straight, evenly splitting wood are suitable for cleft grafting. It is usually done during later part of dormant season, or just before the active growth starts indicated by swelling of buds. Apart from fruit crops, this method is also practiced in vegetable crops like tomato and brinjal (Teja *et al*., 2020) [33]. e.g. Walnut, Hazelnut, Peanut, Grape. Panchal (2022) [24] proved in custard apple that the wedge grafting technique proved superior in during 15th March to 15th April.

**Procedure**

The stock plant is chosen, and once it is decapitated at the correct spot, the branch or trunk is cleft grafted. The branch or trunk must be cut so that the end of the stub that is left is smooth, straight, and free of knots and side branches in order to ensure a straight and uniform split and a proper union. Using a strong knife, chisel, or screw driver, create a vertical split that extends 5-8 cm down the center of the stub. A strong wooden wedge is put after the knife has taken out to maintain it open for the scion to be inserted later. Scion is selected from one year old wood, 15-20 cm long and 0.5-1.0 cm in diameter having 3-4 mature buds. Two slanting, smooth cuts on either side of its base, each 5 cm long, forming a wedge with an even slope are made. For stocks with a diameter of less than 2.5 cm, one scion is sufficient; however, for bigger stocks, two scions are inserted, one on each side of the cleft. Four scions are placed and two splits are formed at right angles to each other in still thicker shoots. To ensure that the scion stays securely fitted into the stock split, the tool that was previously inside the split is removed when the scion is installed. To stop the scion from wilting, the graft needs to be well waxed. Graft union takes place in about 2-3 months of grafting when the scion shows signs of growth.

**Bark grafting**

It is a simple and rapid method of propagation with high success rate and it does not require any special instruments. Some nurserymen prefer it over cleft grafting because it can be completed without splitting the stub, which keeps decay-causing organisms out. Bark grafting is only possible in the early spring, when the stock's bark begins to slip. Scion ought should be inactive. For deciduous species, the dormant season is used to gather the scion shoots, which are then refrigerated until grafting is completed.

e.g. Used for top working of flowering and fruiting trees, Grape (C. J. Alley, 1965) [4].

**Method I**

**Procedure**

Initially, the stock is severed at a smooth bark point. It is possible to insert multiple scions if the stock is thick. Bark is split downward for each scion, starting about 5 cm from the top end of the stub. From dormant wood, scions measuring 10–12 cm in length and ¼–½ inch in diameter with two to three buds are extracted. They are then prepared by making a slanting incision (5 cm) along one side of the root. Conversely, a tiny second incision is made. Next, the scion is placed in the middle of the divide between the stock's bark and wood. The scion's lengthier cut is pressed up against the wood. All exposed parts of the stub and scion should be coated with molten wax once the scion is securely fastened to the stock using adhesive tape, twine, or nails. After 6–8 weeks, if the grafting process is effective, the scion should begin to sprout.

**Method II**

This method of bark grafting is commonly employed for top working of mango trees.

**Procedure**

The branches selected for grafting are cut as in the same as the above method. Unlike the previous method, two vertical cuts ranging from 5.0 to 7.5 cm in length are made through

the stock's bark, reaching the wood. The scion's width and the space between these two cuts should match. The bark between these slits is raised carefully. A scion shoot of about 15-20 cm in length is collected form the past season's growth and is prepared for grafting by removing the leaf blade and giving a smooth slanting cut, 4-5 cm long, along one side at its basal end. Similar cut is given on the opposite side also. After that, the wedge-shaped scion is securely placed inside the bark flap so that there is no space between the scion and the stock. One or two nails are pushed in or jute fiber is tied to keep the scion firmly in place. After that, it is either fully waxed or wrapped with waxed tape. The scion's sprouting signifies a successful graft union. Every branch of the tree can have two or four scions grafted onto it, depending on the size of the limbs.

**Softwood grafting**

In western India, this grafting technique is utilized commercially for cashew nuts, tamarind, mango, and sapota. It is also used for in situ grafting, or grafting in pots, particularly in drylands and hot climates with little precipitation, where graft mortality from nurseries is quite severe.

In nursery mango seedling softwood grafting is great for graft success than other grafting methods (Arun Kumar and Varun Kumar, 2020) [3]. The success of softwood grafting using mango Alphonso as the scion was recorded by Patil *et al*.,2008 [25].

**Procedure**

One year old rootstock is selected. When the seedlings attain a height of 30 to 45 cm, the emerging soft, coppery red shoot is beheaded with a knife, retaining about 8 cm of the fresh stem. Then a longitudinal slit of 3 cm is made on the beheaded stock to insert the procured scion. A scion of 60-70 days old is selected and precured by defoliating the leaves on the mother plant 7-10 days before the detachment. The lower part of the scion is chopped on two sides to form a wedge shape that is approximately 3 cm long. The scion stick's wedge portion is put into the stock's slit and tightly fastened with polyethylene strips. Regularly water the grafted plant to encourage scion sprouting.

**Epicotyl grating**

Another name for it is stone grafting. Using this technique, immature scion is wedged or splice grafted onto germination-stage seeds that are less than two weeks old. High relative humidity and a moderate temperature are important for the effectiveness of epicotyl grafting. Priyanka e al., 2017 revealed that in jack fruit curing and grafting 10 days old cured scion registered significantly the maximum per cent of graft success (37.75%) and epicotyl grafting recorded the highest per cent of graft success (48.08%) as compared to softwood grafting (35.55%) and approach grafting (9.17%).

e.g. Mango, Walnut, Cashewnut, Chesnut, Pecan nut, Jackfruit (Islam *et al*., 2003) [14].

**Procedure**

**Splice grafting**

Less than two weeks old germinating seeds are chosen to serve as rootstock. On the stock, a 2-3 cm long slanting cut is done in the epicotyl area. Scion shoots are selected from the current year's growth. The proximal part of the scion undergoes a similar incision. Polyethylene tape is used to securely fasten both the stock and the scion.

**Wedge grafting**

Seedlings are redirected by keeping a 6-8 cm long stem attached to the stone. Using a sharp grafting knife, make a vertical cut on the beheaded rootstock that runs 4-6 cm across the center. The scion is selected from a dormant and 3 to 4 month old terminal shoot and should be defoliated on the mother plant 7-10 days prior to detachment. On the lower side of the scion stick, a wedge-shaped cut is made that slants from both sides. After that, the scion is carefully forced into the rootstock's incision such that the cambium tissues of the scion stick and rootstock overlap. Then, 150 gauge polyethylene strip is used to bind the connection.

**Bridge grafting**

Bridge grafting is a type of repair grafting used on plants that have been injured by insects, rodents, or frost. It is not a method of plant multiplication. It is only beneficial if the plant's trunk is hurt but not its root system. It is a method of 'repair grafting'. Bridge grafting is best done in the early spring when active growth of the tree starts and the bark is slipping easily. It is widely applied in trunk-wounded apple trees (Chenping, 2018) [6].

**Procedure**

Rootstock is selected when the bark is in slipping stage. In the initial stage of bridge grafting, all sick, dead, or irregular tissues are removed, and the girdled area's uneven margins are evenly trimmed. Next, a scion is put into the live, undamaged bark every 5-7.5 centimeters around the afflicted portion, attaching at both the upper and lower ends. Scions, which have a diameter of 6-12 cm and are suitable for the damaged plant, are harvested from dormant branches that are one year old. The ends of the scions are cut in the shape of wedges, but the length of the cut on one side is less than half that of the other. Then just above and below the damaged portion, a slit is made in the bark for each scion. The scion is inserted so that its longer cut surface is near to the wood, with the buds pointing upward. After that, the scions are fastened with nails. In young tree bridge grafting, it is especially crucial that the scions bow out slightly by being slightly longer than the area to be crossed. This bow allows for good contact at both ends and prevents the bark from tearing during winds. Grafting wax needs to be applied generously to all cut surfaces, including exposed wood, following the insertion of all scions. Under favourable conditions the healing takes place quickly. Buds sprouting on scions of successful grafts should be immediately removed, otherwise they will weaken the tree. When the union is complete, vascular connection between the upper and lower margin of the injured area is re-established and the sap starts flowing from top to the root system.

**Double working**

A double worked plant is composed of three genetically different parts, the rootstock, intermediate stock (or interstock) and scion. Thus, double worked plants have two graft unions, one between the rootstock and interstock and the other between interstock and scion.

Alberto San Bautista (2011) [20] observed that double graft achieved some higher beneficial nutrient uptakes and lower non-desirable nutrient absorptions, whereas no significant differences were observed in gas exchange parameters and

leaf water relation with simple graft. This superiority in nutrient and water uptake was found in plant growth, fruit yield, and in marketing quality.

The grafting, both double and single, increased yields and fruit weights compared to non-grafted plants in 'Piel de Sapo' melon cultivars (Miguel *et al*., 2011) [20].

e.g. Exploited commercially in apple and pear. Propagation of Bartlett pear on quince rootstock by using mutually compatible rootstocks like Old home or Buerre hardy pear is among the significant examples. Double-grafting is viable for pear seedling production using 'Japonês' rootstocks intergrafted with Cydonia quince trees (Seifert, 2009) [29].

Advantages Overcoming graft incompatibility between scion and the rootstock. Providing a cold or disease resistant trunk. Obtaining a dwarfing effect from the use of certain intermediate stocks. Obtaining the strong trunk or crotch systems, characteristic of certain cultivars.

**Procedure**

Desired rootstock is selected. Interstock may be less than 2.5 cm in length or large enough to have a distinct trunk. Selected interstock is grafted into the rootstock. After one year, the scion is grafted into the interstock.

**Top working**

Top working is used primarily to change the cultivar of an established plant (tree, shrub, or vine) either by grafting. It is an extremely severe pruning operation and one must decide before pruning, the number of scaffold branches to be retained, for maintaining a considerable balance between root and shoot system of plant. Selection of proper limbs is an important factor in top working. The branches to be grafted should be well distributed around the trunk, in the centre a vigorous healthy branch may be grafted to form the future leader. All the branches with weak crotches should preferably be discarded. Short-lived species, old or diseased trees are not good candidates for top working; in these situations, new planting is thought to be more cost-effective than top working. For top working, any of the grafting techniques (splice, cleft, splice, or bark) can be applied. But the most widely utilized technique is cleft grafting, particularly when thick branches are chosen. Whip and tongue grafting is the preferred technique when working with younger, thinner branches. Top working should be done in spring season, shortly before the beginning of new growth. However, the exact period depends on the method used.

e.g. Mango, Sapota, Aonla, Cashew, Guava, Tamarind, Jackfruit, etc.

**Procedure**

Three to five well placed scaffold branches not larger than 7.5 to 10 centimeters are selected and are conveniently close to the ground. The nurse branches are retained for broad-leaved evergreen trees and for deciduous trees where the winters are severe. The branches are cut off properly so that the bark is not torn down the trunk. Dormant scions for top-working are collected from healthy trees. Immediately after collection the scions are wrapped with polyethylene film and stored at 0°C. The scions will start growing within a few weeks. It is important to ensure that the scion is not dried out by exposure to the sun during the grafting process. Each grafted stub needs to be completely sealed with grafting wax as soon as it is grafted, covering all exposed cut surfaces. Fertilizer and recurrent irrigation are needed for the top-worked tree. Additionally, plant protection measures should be implemented to ward off caterpillars that consume bark and stop wood from decomposing.

**b) Side grafting**

There are numerous varieties of side grafting. The scion is put into the side of the rootstock, which is typically greater in diameter than the scion, as the name implies. used to propagate nursery trees on a huge scale. After the union, the scion typically takes over as the dominant shoot system, eliminating the rootstock shoot. The important types of side grafting are side stub, side tongue and side veneer grafting methods.

**Side stub grafting**

When grafting tree branches that are too big for whip grafting but too little for cleft or bark grafting, it can be helpful. It is helpful in revitalizing aging, barren orchards.

**Procedure**

The rootstocks having a diameter of 2.5 cm are selected. Using a heavy knife or chisel, make an oblique cut into the stock branch at a 20–30 degree angle. The incision should be roughly 2.5 cm deep, angled at such a depth that it will slightly open when the branch is pulled back, then shut again when the pull is released. The scion that is chosen should be 7.5 cm long, somewhat slender, and have two to three buds. A 2.5 cm long wedge cut is performed at the basal end of the scion. Using a single, sharp knife cut, both sides of the scion should have extremely smooth cuts. In order to maximize contact between the cambium layers, the scion must be inserted into the stock at an angle. The stock is then pulled back at the top to provide room for the scion to enter the cut. After then, the stock is made accessible. If necessary, two tiny, flat-headed wire nails can be inserted through the scion and into the stock to securely secure the scion. Normally, the scion should be securely gripped by the pressure of the stock, negating the need for tying. Using nursery tape to wrap the scion and rootstock at the place of union could also be beneficial.

Following the completion of the graft, the rootstock may be severed slightly above the union. This has to be done extremely cautiously to avoid dislodging the scion. Grafting wax needs to be applied generously throughout the whole graft union, closing all gaps. Additionally, the scion's tip needs to be sealed with white glue or coated in wax.

**Side tongue grafting**

For small plants, particularly those of the evergreen species with both narrow and broad leaves, side-tongue grafting is beneficial. A smooth part of the stem slightly above the plant crown should be present in the rootstock plant. The scion's diameter need to be somewhat less than the rootstock's.

**Procedure**

The same technique used for the whip-and-tongue graft is used to make the cuts at the base of the scion. A smooth section of the rootstock has a thin strip of bark and wood completely removed, the same length as the scion's cut surface. The rootstock cut is then reversed downward, beginning at a location one-third of the way from the top of the cut. This second cut in the rootstock and the length of the

reverse cut in the scion should match. Next, the two tongues are joined and the scion is inserted into the rootstock cut by matching the vascular cambium layers. The graft is securely wrapped, following the guidelines for the tongue and whip grafts. For a few weeks, the top of the rootstock is kept unaltered until the graft union begins to mend. Then, to drive the buds on the scion into active development, it is chopped back above the scion either all at once or gradually.

**Side Veneer grafting**

Fruit crops, deciduous trees and shrubs, and seedling conifers are among the many small pots liner plants that can be grafted using the side-veneer graft. This method is highly successful in establishing of *in situ* orchards. It is a simple method of grafting. The best time for veneer grafting in north India is March-April and July-August (Nayak and Sen, 2000) [22]. Scion can be easily stored for 8-10 days at ambient temperature (25-30 °C) in moist sphagnum moss grass covered with polyethylene. Another advantage of this method is that the scion of desired variety can be procured form distant places and grafted in a desired manner.

e.g. Mango is commercially propagated by side -veneer grafting (Singh and Srivastava, 1979) [31]. Camellias and Rhododendrons that are difficult to root, Conifers.

**Procedure**

Rootstocks of 1-1½ year old having a diameter of 1-5 cm are selected. A slanting cut, measuring 2.5–4.0 cm in length, is done in a smooth area approximately 15 cm above ground level, following the removal of leaves from below 15 cm of the rootstock. To remove a portion of wood and bark, a second short inward and downward cut is made at the base of the previous cut, intersecting it. The scion is prepared by making a very short incision on one side and a long cut down the other, matching the cuts on the stock. Next, the scion is positioned on the stock with the longer side's cambium layers matching. Both are tied together with polyethylene tape. When the scion growth begins, the shoot of rootstock must be taken off above the graft union in one or two strokes.

**Conclusion**

Grafting has been and will continue to be a valuable method for enhancing horticulture and agriculture. This method is appealing for increasing yields and growing fruits and vegetables in previously unfeasible situations since it is easy to graft on a large scale and allows for the selection of a rootstock with a wide range of resistance capabilities. Graft biology is expected to evolve further given the recent discovery of mobile RNA silencing and its ability to control growth or stress tolerance.

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