
COOPERATIVE EXTENSION
University of California – Sacramento County
Environmental Horticultural Notes

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Bud Grafting

#85

Inserting a portion of one tree onto another tree is known as grafting. There are several methods of grafting; in some methods, a one-year-old stem (scion) with two buds is placed onto an existing tree (stock), and with other methods, a single bud is placed into the stock. The choice of grafting method depends on the age of the stock, the time of year, and the comfort with and success of the method. Bud grafting is simpler, often more successful, and can be done over a longer period than other grafting methods. T-budding is used for fruit trees and chip budding is used for grapevines. Consult the UC publications listed below for further information.

Grafting can be used when the existing tree has died or is injured but healthy rootstock suckers are available. Also, you can graft multiple varieties, or in some cases multiple species, on a single tree. For example, if space exists for only one cherry tree, one or more other varieties (pollinizers) can be grafted onto the tree. Also, grafting several varieties of peaches and nectarines on one tree can greatly extend the harvest period for that tree. In any case, it is best to graft young trees or trees that have been cut back so that the branches resulting from grafts can be allowed to grow sufficiently.

Be sure to use a knife that is specially designed for grafting or budding and keep the blade well sharpened on one edge only. Because the blade is so sharp, use extreme caution and carry bandages in case you are cut. After grafting, mark the variety with a loosely wrapped label. Later, paint or mark the graft so you will not prune it off later when the graft is less visible. Monitor the progress of the new growth periodically and summer prune it as needed.

Timing. Bud grafting, or budding, can be done anytime between late April and September. Budding involves cutting and peeling back the bark of the stock, which can only be done when the bark is “slipping” (when it can be peeled away from the wood); this is during the period of active growth. Buds grafted early in the season can be forced to grow that same season, whereas buds grafted July should be allowed to remain dormant, and then forced to grow early the next spring. Buds are “forced” to grow by pruning off or notching the shoot above the graft.

Bud Stick Preparation. From the bud source tree, cut off a vigorous current-season shoot that is pencil thickness or greater; this shoot is called the bud stick. Immediately cut off the leaf blades by cutting the petioles (leaf stems) in half; this reduces water loss by removing the leaves and provides a short handle to hold the bud when it is removed. If not grafted immediately, place in wet paper towels or newspaper and in a plastic bag. Keep them refrigerated until they are used; they will remain viable for two to three weeks when cut and stored in this manner.

Stock Preparation. The most commonly used method is T-budding (Fig. 1). Choose a current-season shoot on the stock tree that is the same size or slightly thicker than the scion shoot. Make a horizontal cut through the bark only, about halfway around the shoot. Then create the capital “T” by making a longitudinal cut (perpendicular to the first) downward about 1 to 1½ inches. Use the “bark lifter” on the budding knife, or a butter knife, to separate the bark from the wood on both sides of the second cut, beginning at the top and working downward. Avoid using the blade because it tends to cut the bark rather than lift it.

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Bud Removal. Next, the bud is removed from the scion in the following manner. Make an upward slicing cut into the stem, beginning about ½ inch below the bud to be removed (be sure the bud hasn't already started to grow). Make the slice about ¾ to ½ the thickness of the scion stem and continue upward to just over ½ inch above the bud. Then make a horizontal cut about ½ inch above the bud, through the bark only. The bud is removed by squeezing the sides of the cut bark just above the bud; this squeezing should separate the bark from the wood, taking the bud with the bark. Only a sliver of wood remains still attached to the bud stick.

For late summer budding, some people advocate including the wood sliver with the bud for better success. If the wood sliver is included, the stock should be about twice the thickness of the stick from which the bud piece originates in order to ensure good contact between the edge of the bud piece (cambial area) and the wood of the stock.

Bud Insertion. Insert the point (bottom) of the bud piece under the flaps of the T cut on the stock and gently push the bud piece downward until the top cut of the bud piece is just under, and touching the top of the T cut on the stock. The bud piece should be centered between the bark flaps.

Rubber Strip Wrap. To secure the bud, firmly wrap a rubber strip around the bud, beginning at the top and working downward. Begin and end by tucking the end of the rubber strip under the wrap. Work all the way from the top cut to the bottom of the T, but do not cover the actual bud with the strip. It is not essential to completely cover the cut area; that is, there can be some space between the wrapped spiral of rubber strip, as long as the bark flaps firmly cover and seal the bud piece.

Budding Grapevines. Chip budding (Fig. 2) is used for grapevines because it is more successful. It is usually done late August through September, for growth the following spring. At this timing, select budwood from mature canes in which the bark has turned brown, and only bud onto vines that are actively growing. Chip budding can also be done in the spring, which will produce a shoot later the same growing season.

Make a cut deep into the scion at an angle of 45 degrees just below the bud to be removed. Then make a second cut, starting about ½ inch above the bud, to connect with the base of the first cut. Make identical cuts into the stock, which should be similar in size to the scion cane. Securely place the bud into the stock cut and tie with plastic grafting tape to prevent the bud from drying out. Be sure to cover all cut areas with the tape, but do not cover the bud.

Forcing Bud Growth. Buds that were grafted between April and July should be forced to grow by heading the shoot about ½ inch above the top of the T cut. This is done 2 to 3 weeks after grafting, after you are confident the graft was successful. Buds grafted in August or September should not be forced to grow until the following spring to prevent fall frost from killing the tender young shoot. You will know if the graft was successful if the bud remains plump and the bark piece remains green. To be certain, you can nick the bark of the bud patch with a knife; if it is green underneath, the bud has "taken," and if it is brown it is dead. As the bud grows, remove nearby competing shoots. If you don't want to cut the branch off above the bud, the bud can be forced to grow by notching or girdling above the bud (see below).

Girdling and Notching. Girdling of small branches can be used to force a bud to grow where a new branch is desired, such as a bud recently grafted into a branch that you did not want to head. A strip of bark about 3/16 in. wide is removed about ½ inch above the bud halfway around the branch. Girdling can be done anytime from early spring, after the bark begins to "slip," through early summer. The practice is most successful on current-season or one-year-old wood, but it usually works on older wood as well. A quicker method is "notching," in which a ¾ -inch round (rattail) file is pulled in a single stroke across the branch above the bud, through the bark only. In addition to being quicker, notching can be done in the dormant season, so that a bud can be forced to grow in early spring.

Both girdling and notching interrupt the downward movement of the plant hormone, auxin, through the phloem (inner bark). Auxin is produced in the shoot tips and moves down the phloem, preventing the growth of lateral buds. This phenomenon is especially characteristic of apically dominant species such as cherry, pear, and to a lesser extent, plum. The bud or buds immediately below the removed bark strip are therefore released from the influence of the auxin and will usually begin to grow.

Fig. 1 T-Budding Fruit Trees

- A) T cut made through the bark of stock
- B) Bark of stock peeled back
- C) Bud piece removed.
- D) Bud piece slipped into open T cut (top of bud piece should touch the top of the T cut but not overlap it).
- E) Rubber strip attached. Bark flaps must overlap bud piece. Do not cover bud with wrap.

Fig. 2 Chip Budding Grapes

- A) The bud removed from the bud stick.
- B) A notch made in the stock to receive the bud.
- C) the bud inserted in place.
- D) The bud tied in place and ready to be covered with soil.

University of California Publications

Budding and Grafting Fruit Trees in the Home Orchard. Leaflet 2990.

Budding and Grafting Citrus and Avocados in the Home Garden. Publication 8001.

Propagation of Temperate-Zone Fruit Plants. Leaflet 21103. (Out-of-Print 06/00)

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