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College of Agricultural, Consumer and
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Budding

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Horticulture Facts

“Budding” is any form of grafting in which a vegetative bud, with its surrounding tissues, is transferred from one plant to another closely related plant, in order to propagate a cultivar or horticultural variety.

The term “budding” is often used synonymously with the term “bud grafting.” Budding is widely used for the propagation of stone fruits such as peach, shade trees, roses, and other types of nursery stock.

The Rootstock

A rootstock plant is used in propagating nursery stock by means of budding. The plant should have the following desired characteristics: vigor, good growth habit, disease resistance, and ease of propagation.

The most favorable results occur when the rootstock has grown in the nursery row for one year prior to budding. The stem of the understock plant should be at least 1/4 inch in diameter at the location where the bud is to be inserted. Both the rootstock and the budwood should be free of pathogens so that healthy, pest-free nursery stock is produced.

Please note that nursery stock in Illinois must be inspected for freedom from pathogens before it can be certified for sale.

Methods Of Budding

“T” budding is one of the simplest and oldest grafting methods known, and it is by far the most commonly used method of budding. With only a little practice, the amateur can use it successfully for the summer propagation of various woody plants, including most broad-leaved ornamental or shade tree cultivars (horticultural varieties). It is the standard nursery method for propagation of peaches and other stone fruits, roses, and shade trees.

In our region, chip budding can be used both earlier and later in the season and seems preferable to “T” budding for nut trees, apples, certain minor tree fruits such as persimmon, and particularly for grapes when grown on pest-resistant understock.

“T” budding is usually done in the field during the normal growing season. The best time is generally from August to early September, although some budding is done as early as June, or even earlier, particularly when budwood has been stored from the previous winter.

The understock should be of the same species, or a closely related one, and compatible with the bud to be inserted. For example, peach grows on peach, plum on plum (or peach), apple on apple or crabapple, pear on pear (or quince, for dwarfing), ash on ash, holly on holly, and so on.

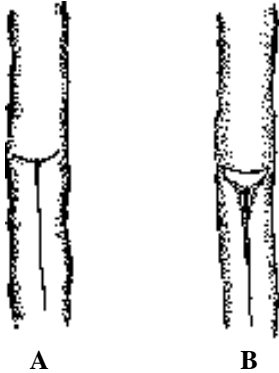
Local seedlings of suitable size can be used as understocks, or you can get both one-year seedlings and clonal understocks of fruits and roses from specialist nurserymen. An orchardist or homeowner may bud several branches to top-work a larger seedling tree or a tree of an unprofitable cultivar. It may also be done to give a quick test to some new cultivar, to supply pollinizer branches

for a self-unfruitful tree, or to develop a novelty plant on which more than one variety is present.

“T” Budding

This procedure is done as follows:

1. Choose a suitable time when the understock bark will peel or slip. Remove the leaves from a smooth area on the bark. This will usually be done on this year’s or last year’s wood. Cut a vertical slit about 1-1/2 inches long. Then, at the upper end of this cut, rotate the knife blade part of the way around the stock, again cutting through the bark and “crossing the T” (see A in the illustration below). Lift the bark flaps at and below this intersection (see B).

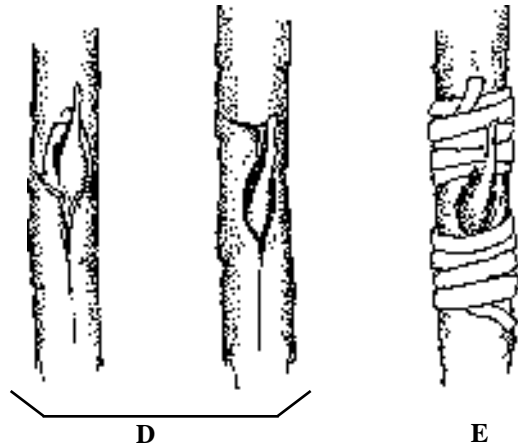


2. From the cultivar to be propagated, select a firm, healthy stick of recent growth that has vegetative (*not* flower) buds. Cut off the leaves, but allow about 1/2 inch of the petioles (leaf stalks) to remain. The stick should be smaller in diameter than the under stock tree or branch where the bud is to be inserted. Starting about 3/4 inch below a bud, draw a sharp knife at a small angle through the bark and wood of the budstick to 3/4 inch above the bud. Then with a cross cut, detach the bud and surrounding tissue from the stick (see C). (If the bark is loose enough on a stone fruit, walnut, or pecan, the bud piece may be carefully “dewooded.” For other fruits, a small sliver of wood usually remains under the bud.) Wrap the bud sticks in moist newspaper from the time they are cut to keep them fresh.



3. Insert the lower end of the bud piece beneath the stock bark at the intersection of the “T”, and push it down with the thumb and forefinger until it is in place against the cambium (white layer between the bark and the wood) of the stock (see D).

4. Wrap the stock to hold the bud piece firmly in place until it unites with the stock. Use rubber or plastic strips, waxed cloth strips, or raffia for wrapping (see E). Rubber budding strips are generally used by nurserymen in the Midwest.



A number of variations in the method are sometimes used. In the “inverted T” method, the cuts and direction of bud insertion are reversed, but the bud is still set to point upward. This is generally used in Florida citrus budding but can also be used with deciduous material. For the greenwood budding of nuts and other difficult materials in June and July, a leaf or part of a leaf blade is left on the bud piece. As a final step in this method, the bud and leaf are firmly overwrapped with a sheet or bag of clear or white polyethylene plastic. The plastic helps retain moisture. The leaf nourishes the bud piece and tends to promote a more rapid union.

Chip or Plate Budding

This method was originated before 1900 by a Missouri nurseryman, J.F. Jones, and has been recommended in Illinois since the early 1950s. It is now the preferred method with many nurserymen and amateurs around the world.

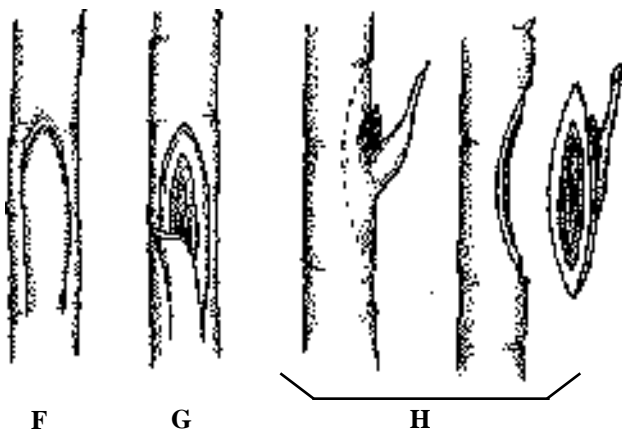
The shallow-chip method (also called plate-budding, the Jones Method, or dry budding) has distinct advantages over “T” budding in this climate. It can be done both earlier and later in the season and even during periods when the bark does not peel well enough for “T” budding. You can also plate bud onto the trunk or branches of stock trees much larger than the budwood sticks. Where the bark is relatively thick, as on 2- to 4-year-old wood, the plate bud gives a better connection and is more easily tied in place without damage to the bud. Such species as walnut,

mulberry, and several flowering trees can be propagated by plate budding in our climate, whereas attempts to “T” bud them have usually failed. Plate budding and other chip methods are a little slower, but often give sufficiently better results to suggest their general substitution for the traditional “T” budding method.

Chip budding is accomplished as follows:

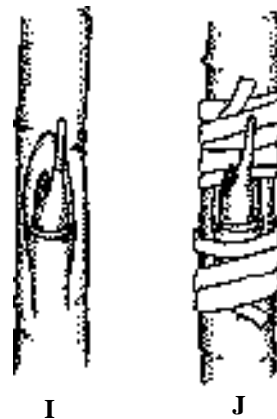
1. Select a smooth section on the stem of a healthy stock tree of a compatible species. With a sharp knife, make a down-slanting cut about 1-1/2 inches long at a small angle to the axis of the branch. Slice completely through the inner bark, exposing a small patch of the cambium, the layer between the inner bark and wood (see F in illustration). If the first cut doesn't go through the bark, slice slightly deeper until some cambium is exposed. Then cut off half or more of the bark that has been loosened, leaving a little flap at the bottom of the slice (see G).

2. Bud wood is usually this year's growth, but it can come from dormant growth kept under refrigeration. Take a vigorous stick of the scion variety to be worked. We usually cut off the leaves and most of the petioles if the scion stick comes from the current season's growth (see step 5). Select a bud to be transferred from the scion stick. Slice downward below it at a 30-degree angle, cutting slightly into the wood beneath the bud. Next, separate the bud piece with a second cut at a small angle, starting 3/4 inch above the bud and connecting with the previous cut. Leave the sliver of wood in the bud piece. (The bud piece is shown in H).



3. Transfer the bud piece quickly to the cut in the stock tree. Put its lower end beneath the bark flap and the other end against the cut bark and exposed cambium of the stock (see I).

4. Wrap and tie the bud piece in place with a rubber or plastic budding strip. Leave the “eye” of the bud itself exposed when tying with rubber, but nearly cover the rest of the bud piece and the cut surface of the stock, as shown in J. Do not cover the buds with grafting wax.



5. Walnut propagators have found that it is better to bud walnuts with part of a leaf left on the bud piece. It has been ascertained that this also helps in some other species, such as redbud and magnolia trees. With these species, add a fifth step to the process: wrap a plastic sandwich bag or plastic strip around the area of the budding operation, making it nearly airtight by tying above and below the enclosed leaf. The leaf may die in a few weeks, but it hastens the bud's union with the stock while it is actively growing.

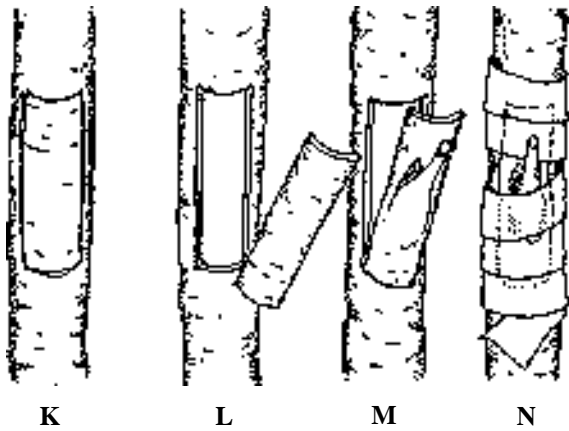
The chip bud used for grapes is shaped much like the plate bud, but it is cut deeper, the cut going into the wood of both stock and scion. Grapes are budded in late summer or early fall, and the bud is then covered with several inches of well pulverized, moist soil.

Patch Budding

In this method, a rectangular piece of bark is removed from the stock and replaced with a patch of bark of equal size that contains a bud of the cultivar to be propagated. Patch budding is slower than “T” budding and chip budding, but it is widely used for thick-barked species such as the walnut. Results are best when done in late fall or early spring.

1. Make two transverse parallel cuts about one inch apart on the understock (see K next page). (Double-bladed knives have been developed for ensuring that the distance between the cuts are identical on both the understock and the bud stick.) Connect the two transverse cuts by two vertical cuts, using a single-blade knife (see L next page). Remove the patch of bark.

2. Select a bud stick that is approximately the same size as the understock; however, a stem diameter of 1/2 to 1 inch is ideal. Repeat the procedure used in removing the bark patch on the understock. The two transverse cuts should be made an equal distance above and below the bud that is to be removed from the bud stick. The patch containing the bud should be identical in size to the patch removed from the understock (see M next page).



3. Place the bud patch onto the understock immediately. The patch should be wrapped tightly with plastic tape to hold it in place and to prevent it from drying out (see N). Plastic tape that is used for tagging nursery stock can be used for this purpose.

4. The patch will be healed into the understock after several weeks, at which time the tape can be removed.

Follow-Up Procedures

Most tree buds that are grafted after July 1 in Illinois will not make any new growth the same year. The main thing to do is to watch them and loosen the ties, if necessary, as the understock tree grows during the rest of the season. The plastic overwrapping is removed about three weeks after budding.

Remove unwanted sprouts the next spring. Cut off the trunk or branch carrying the propagated bud an inch or more above the bud. After the bud has grown into a strong shoot, cut the temporary stub off with a slightly slanting cut just beyond the shoot. Continue to remove any new growth that may start on the stock below the propagated bud.

Buds propagated in the spring may begin growth in the same year. Starting about two weeks after budding, gradually remove the original tops above most inserted buds. Buds of nut trees may take about two weeks longer to unite with the stock, so don't try to hurry them.

Growing buds need plenty of light, so cut out competing and shading growth. Also, provide stakes for tying up the new shoots. They may grow fast enough to be in danger of bending out of shape or being broken in windy weather.

Helpful Treatments

Fungicidal treatments and plastic film coverings have helped make budding a more reliable procedure. The film prevents the bud piece from drying out, promotes quick callus tissue growth, and acts as a barrier against the insects that might otherwise destroy the buds. The use of

both a plastic film and a fungicidal treatment can be done independently. However, to get good results, particularly with difficult woody plant materials, (1) treat both the budwood and the stock with a dithiocarbamate fungicide, and (2) enclose the bud graft area immediately after budding with a polyethylene or similar film.

Fungicides

Of the two dithiocarbamate fungicides used in budding trials, ferbam appeared to be slightly superior to zineb in protecting buds. Each was applied as a 20 percent mixture (by weight) of the commercial wettable powder formulation in water. A mixture combining approximately 10 percent of each material in water gave results just as satisfactory as the 20 percent ferbam mix. Thiram (a good seed-protectant fungicide) gave less promising results than the dithiocarbamates.

Ferbam and other fungicides are mixed by adding 200 grams of the wettable powder preparations (as commonly used in spray mixtures) to a liter (1,000 grams) of water. In the case of ferbam, a mixture of approximately 20 percent can be made by practically filling a bottle with the fluffy black powder (not packed down), and then adding enough water to bring the mixture up to stopper level. For zineb, use 11 tablespoonsful (or 3/4 cup) per cup of water. Keep the mixture in a stoppered bottle, and shake it well before application.

The stick of budwood is wiped before budding with a cloth moistened in the fungicidal preparation. The applied material is then allowed to dry. This leaves a film of fungicide on the bark. The budding area on the stock tree is also wiped with the fungicide-moistened cloth before the bark is lifted from the stock. Beyond that, the normal procedure is followed for "T," chip, or patch budding, whichever method is best adapted to use with the material being propagated. Budwood that is to be stored or shipped should also receive the fungicide treatment.

Plastic Wrapping

Polyethylene film seals in water vapor, but at the same time it allows other gases to pass through. Thus, the film is useful for maintaining high humidity around living plants or plant parts. The nearly transparent form of polyethylene film, often used for plastic bags, has been most commonly used and is satisfactory for enclosing buds, both before and after propagating.

Polyethylene film can be cut into small rectangular patches which are then used to wrap around the stock. After securing the bud to the stock, a plastic patch is placed around the graft. Tie both above and below, to completely enclose the inserted bud or shoot scion. Use either cotton twine or a rubber propagating strip for tying.

An alternative method is the application of a plastic ribbon as a spiral wrap, starting below the bud and then securing it above the bud.

Commercial sources now offer a plastic bud tie with an attached wire staple for quick fastening. This procedure does not require the handwork involved later on when removing polyethylene, polyvinyl, or rubber ties.

Budding Tools And Supplies

For a small amount of budding, the cuts can be made with any sharp knife or injector-type razor blade. The tying can be done with strong ordinary rubber bands. However, it is best to use a good knife, one designed especially for budding work, and special rubber or plastic budding strips, available from dealers who handle nursery supplies.

If you cannot find grafting knives and bud-tying supplies locally, some of the leading mail order dealers in the Midwest are listed in the next column. Useful reference books are also listed.

A.M. LEONARD & SONS, INC., Post Office Box 816,
Piqua, OH 45356.

A.H. HUMMERT SEED COMPANY, 2746 Chouteau
Avenue, St. Louis, MO 63103.

FLORIST PRODUCTS, INC., 2242 North Palmer Drive,
Schaumburg, IL 60195.

MELLINGER'S, 2310 West South Range Road, North
Lima, OH 44452.

NASCO, 901 Janesville Avenue, Fort Atkinson, WI
53538.

Reference Books On Grafting

Grafter's Handbook. R.J. Garver. New York: Oxford
University Press, 1967.

Plant Propagation Principles and Practices. H.T.
Hartmann and D.E. Kester. Englewood Cliffs, NJ:
Prentice-Hall, 1983.

*Proceedings of the International Plant Propagator's
Society* (annual publication). 2295 Hillside Way, Box
3131, Boulder, CO. 80302

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