West Virginia Department of Agriculture
Kent A. Leonhardt, Commissioner
1900 Kanawha Blvd., East
Charleston, WV 25305
agriculture.wv.gov

Grafting

an introduction to the art

***

***

GRAFTING

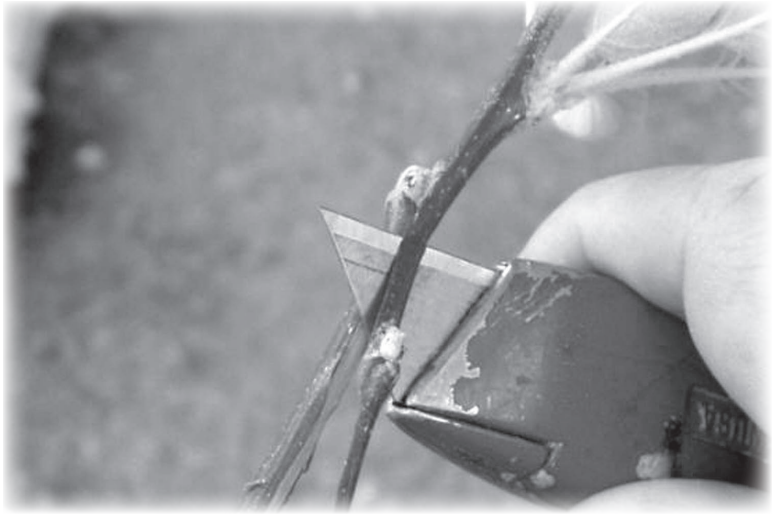

Table of Contents

Introduction 1

Storage of Scions 2

Whip Graft 2, 3

Bark Graft 3, 4

Side Graft 4, 5

Cleft Graft 5, 6

Budding 7

Success in Grafting 8

GRAFTING

100% Success In Grafting Is Rare

Some reasons for failure are:

1. Scion and stock are incompatible. Apple will not unite with plum, but apple on apple is ok.
2. Grafted at wrong season.
3. Understock in weak condition.
4. Scions are not vigorous
5. Scions dry or winter injured.
6. Scions not dormant.
7. Cambrium of sacion and stock not meeting properly.
8. Scions upside down.
9. Improperly waxed or wax too hot.
10. Scions displayed by wind, birds, etc.
11. Too shaded after growth starts.
12. Damaged by aphids or other insects.
13. Killed by fire blight.
14. Union girdled by failure to release binding in time.

GRAFTING

Albert C. Cole, (WVDA) Former Director
Plant Pest Control Division

Propagating or growing plants by inserting a piece taken from one plant on another is known as GRAFTAGE. There are two principle reasons for grafting: to perpetuate a particularly appealing variation of a plant that will not come true from seed and which is not readily propagated by cutting*; and to propagate a species that does not produce seed in a given area and cannot be grown acceptably from cuttings. Grafting differs from the making of cuttings in that the cut part, or scion, grows on another plant, or root stock, rather than in the soil, where it would produce its own roots.

There are two general kinds of grafting. Grafting proper is the method of inserting a piece of branch from one plant into another. Budding involves the insertion of a bud with little or no wood attached into another plant. The success of either operation depends on the cambium of the scion and of the stock uniting and growing together. The cambium is the new and growing tissue which lies under the bark. Therefore, the line of demarcation between the wood and the bark should coincide where the scion and stock are joined.

Both grafting and budding are usually carried out in winter or early spring when the scion or bud is dormant.

When the parts are joined, the wounded or exposed surfaces are securely covered with grafting wax and/or bandage to prevent evaporation as well as to hold the surfaces firmly in place. Grafting wax can be purchased from most garden shops or nursery supply firms or it can be prepared by melting together four pounds of resin, two pounds of beeswax and one pound of tallow, after which it is poured into a pail of cold water. When it is hard enough to handle the mixture is worked by hand until it becomes the color of manila paper and has the “feel”. The hands should be well greased before the wax is worked or applied by hand. Another wax formula calls for ¾ pint raw linseed oil in place of the tallow.

These waxes work best if they are melted and applied with a brush.

CAUTION - if it is too hot, the wax may injure the scion.

Melted paraffin, which tends to crack in cold weather and certain tree wound compounds can also be used in grafting.

* A portion of a stem that will send out roots if kept moist.

Storage of Scions

Scion wood for grafting can be taken any time after November 1, and before growth begins in the spring, although the earlier it is collected, the better chance one has of getting undamaged material. There is some danger of the buds starting to grow or of winter injury if scions are left on the tree until spring. The wood should be tied securely and carefully labeled immediately after being collected. If placed in moist (not wet) sawdust or moss and kept in a cold place, the scions should be in good condition in the spring. They can also be stored in a quart fruit jar and kept in the refrigerator. It is important that scion wood be kept dormant until the time to graft. Temperatures slightly below freezing are best. Scions will keep in good condition frozen, but they are not available for use on short notice. With moss or sawdust packing they need about a week to thaw out.

Whip Graft

The whip or tongue graft is used where the understock is nearly the same diameter as the scion.

CUTS - Cut off a branch of the understock leaving a stub at least 1 foot long. Make a straight, slanting cut about 1½ inches long on both scion and stock (figure 1A and C). Try to have a bud on the scion close to the point of union. Make the cut straight and even-one stroke with a sharp knife will do it. The bevel need not go all the way across.

For the tongue make a straight draw cut (not split), beginning one-third of the distance from the pointed end of the bevel or nearer where the end is blunt (figure 1B and D). Cut the tongue to almost opposite the heel of the bevel; make it thin.

UNION - Match the two parts together (figure 1E and F). Unless the scion and stock are the same size, offset the scion and stock so the inner bark is in contact on one side (figure 1E).

TYING AND WAXING - Bind tightly (figure 1F). Wax the union and upper parts of scions; two coats are preferable (figure 1G).

In dry seasons, cover with a paper bag to help retard rapid drying. This should be removed gradually when moist conditions return - merely tear the bag at first.

AFTER-CARE - Grafts should be thoroughly covered with wax or other material. It may be necessary to rewax in five to ten days.

If the graft has been tied, the binding should be cut shortly after

Budding

Budding is always undertaken in young branches, preferably not over one year old, and can be done in the summer or in the spring. The buds should be mature, as indicated by a slightly brownish color.

On the branch of the stock, 15 inches or more from the trunk, make a “T” cut just through the bark. Lift the corners carefully and loosen the bark. Cut a bud from the bud stock with a thin piece of wood attached. Slip the bud under the flap, tie and wax. Several buds may be inserted on one branch.

AFTER-CARE - Cut the tie in two or three weeks before it binds too tightly. Next season when the bud starts growing, cut off the stock above or beyond the bud.

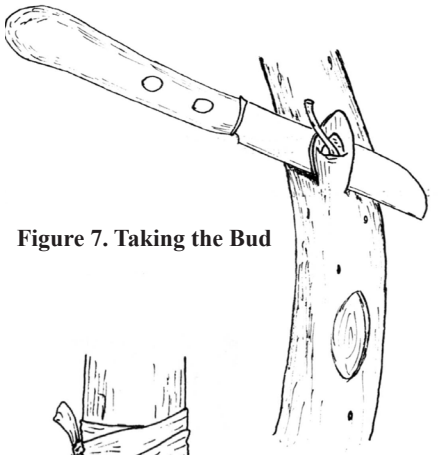

Figure 7. Taking the Bud

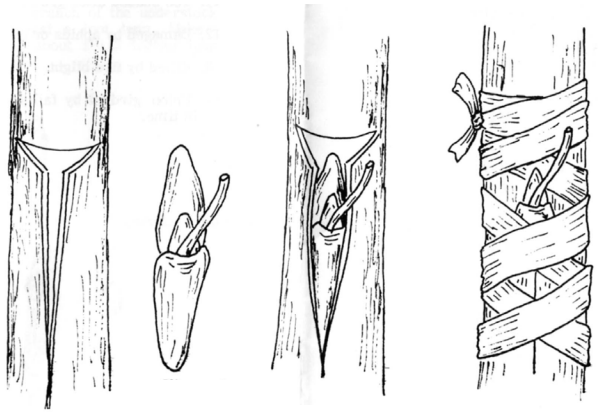

Figure 6. BUDDING

BUDDING - From left (figure 6): T-shaped cut in stock with bark spreader to receive bud; the bud; bud inserted; tied. Waxing is, in general, not needed. It may, however, tend to prevent dessication. Do not wax bud.

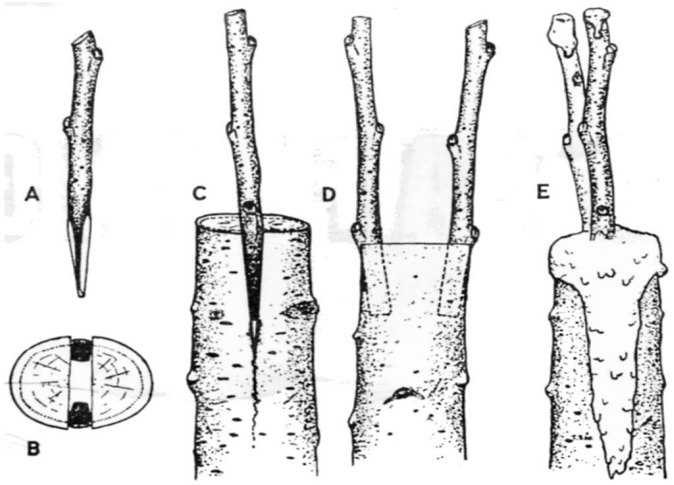

Figure 4. Cleft Graft

pinch back the tips before growth becomes "leggy." A twine encircling all the shoots from one stub will give some support (figure 5F).

The first season let all the scions grow undisturbed. The second spring, select the most suitable as the permenent branch and consider the others as "spares". The spare scions should be left to assist in healing over the stub, but they should be cut back to a few buds on each (figure 5G). The third spring, cut the spare scions back severely again. The fourth season or when crowding is noted, cut off some or all of the spare scions as seems necessary.

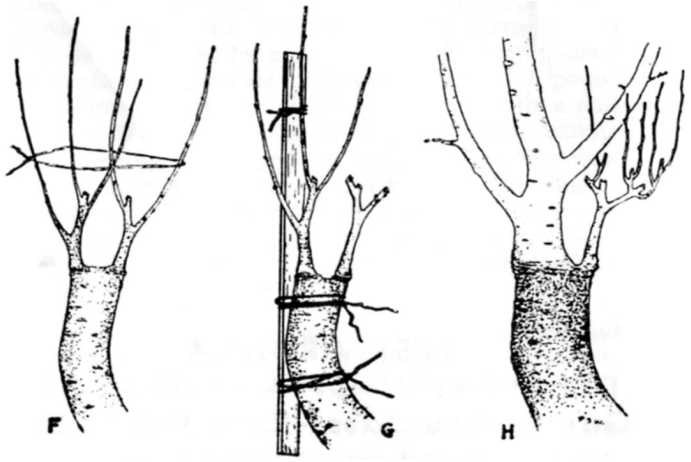

Figure 5. After-Care of Cleft Graft

growth starts, to prevent girdling. Some sucker growth from below the graft may be allowed to grow the first season, but it should not be permitted to shade the scion growth. After the first season, all growth but that from the graft should be cut off.

Grafts should be inspected during the growing season to guard against faulty waxing or binding. If aphids appear, spray with nicotine sulfate. If fire blight attacks the shoots, remove them by cutting three or four inches below the symptoms.

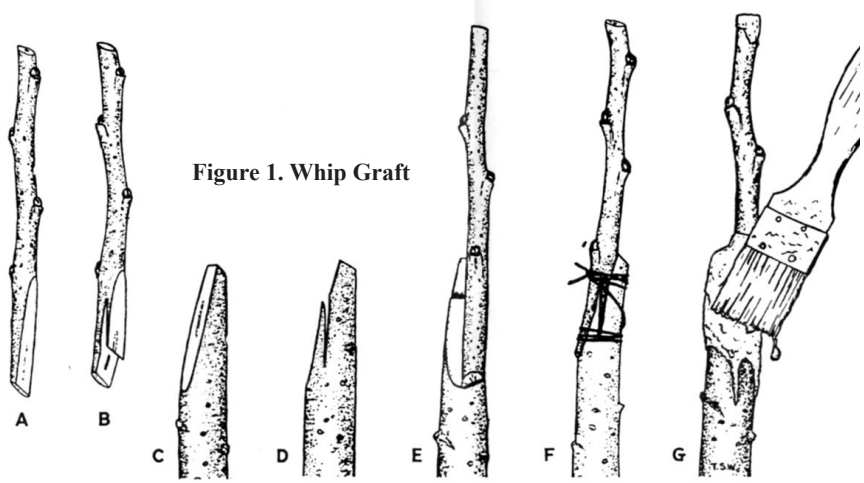

Figure 1. Whip Graft

Bark Graft

The bark graft is not commonly used, but it is a very good way to work branches too large to cleft. The bark of the stock must slip or separate easily from the wood. The chief objection to this graft is that the scions may break out later unless supported.

CAPS - Figure 2B and C show two kinds of cuts. Slit the bark of the sawed stub about 1½ inches (figure 2B). Start an opening with the bark separator. A knife blade may injure the cambium.

Cut the scion to a wedge, making the surfaces straight and even, about 1½ inches (figure 2A). Try to have a bud on the scion near the point of union. For inlays, shape the scion first (figure 2C). Use the thickest scions as they hold nails better. Measure and mark the place on the bark of the stock, then carefully cut out a piece of bark the same size as the scion.

UNION - As in figure 2B, carefully push the scion down until most of the cut surface is covered. Fit the "inlay" (figure 2C) into the prepared place. The more scions that are used, the better the chance there is for the stub to heal over. Place the about two inches apart.

TYING AND WAXING - The graft shown in figure 2B can be tied or nailed. If the bark edges are loose, nail them down. Nail the inlays as shown in figure 2C. Two nails may be needed.

Use cigar box nails or No. 20 gauge ¾ inch wire nails, driving then with a light hammer to avoid crushing the bark.

AFTER-CARE - See under Cleft Graft.

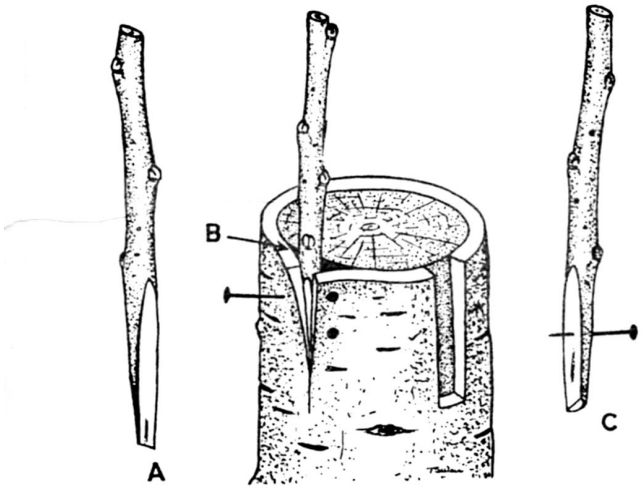

Figure 2. Bark Graft

Side Graft

The side graft is very useful and easily made. It is adapted to a fairly wide range of sizes of understock up to ¾ inch. It can be made before the bark will slip.

CUTS - Select a smooth place on the understock branch no nearer than a foot from the trunk. Make a slanting cut at a narrow angle almost to the pith (figure 3B). Cut the scion to a short, sharp wedge (about 1 inch) with one side thicker than the other (figure 3A).

UNION - Bend the branch slightly to open the cut. Press the scion in so the cambium; of the stock and scion meet at one side with the thick side of the scion toward the edges in contact (figure 3C). Cut off the stock above the union (figure 3D). Use sharp shears to avoid disturbing the union.

TYING AND WAXING - Tying is unnecessary if the stock binds well, but it may be needed on small material if the scion is not held firmly. Wax all cut surfaces carefully (figure 3E).

AFTER-CARE - See under Whip Graft

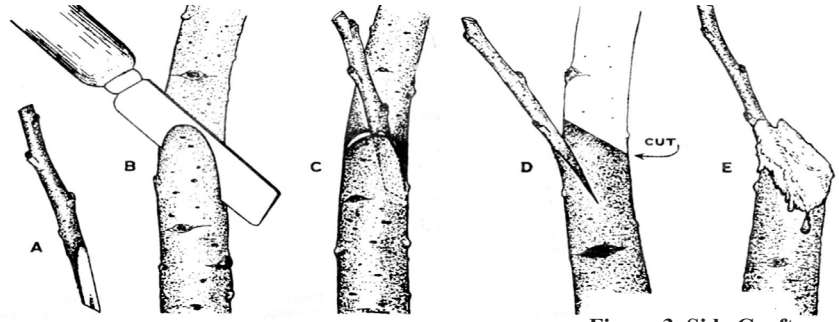

Figure 3. Side Graft

Cleft Graft

The cleft graft is used with large understocks - up to about two inches.

CUTS - Select a place free from knots and cut off the stock with a saw. Cut the cleft (avoid splitting if possible) with a grafting chisel, large knife or hatchet. After a trail or two, the proper depth of the cleft will be learned. In horizontal branches the cleft should be side wise, i.e. not perpendicular, to reduce breakage from birds and heavy foliage.

Cut scions to a blunt wedge about 1½ inches to 2 inches long, with one side shortly thicker than the other (figure 4A and B). If the scion wedge is cut to a sharp point, there is danger of the bark peeling. Also a sharp scion wedge will not fit the cleft as well (figure 4C).

UNION - Open the cleft slightly with a grafting tool or screw driver. Insert a scion on each side, with the inner bark of the stock and scion in contact. Have the thick side of the scion outward (figure 4B).

Keep in mind that the bark of larger stock is thicker than the scion bark and that the scion should not be flush with the stock.

Every slight tilt will assure a contact, at least where the cambial layers cross (figure 4D).

TYING AND WAXING - There is no need to tie unless the stock is small and does not bind well. Wax the unions. Be sure the cleft is covered in full length (figure 4E).

AFTER-CARE - Vigorous growth from scions will need attention to prevent breakage by birds, ice, storms, etc. Either tie the scion to a supporting brace (figure 5G) or