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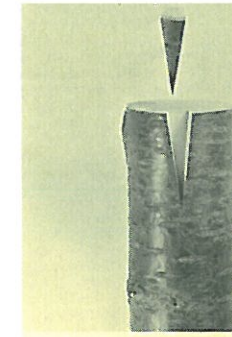
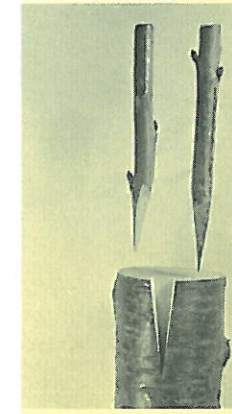




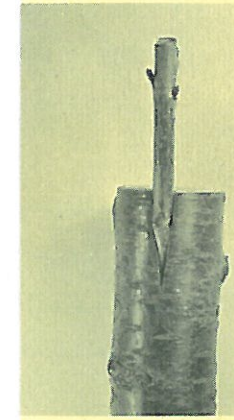
PROPAGATION

by

Budding

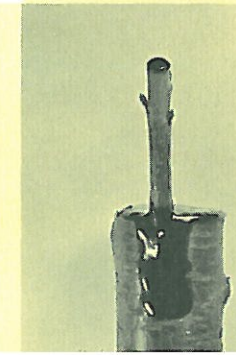
and

Grafting



by Walter D. Krause

ILLUSTRATED



FORWARD

The art of joining parts of plants and watching the miracle of new growth has given man a sense of accomplishment and well-being for centuries.

This book describes and illustrates seven techniques of budding and grafting of small trees as well as top-working of very large trees.

PART I desribes and illustrates four methods of Grafting.

PART II describes and illustrates three methods of Budding.

PART III illustrates Propagation Equipment and Supplies.

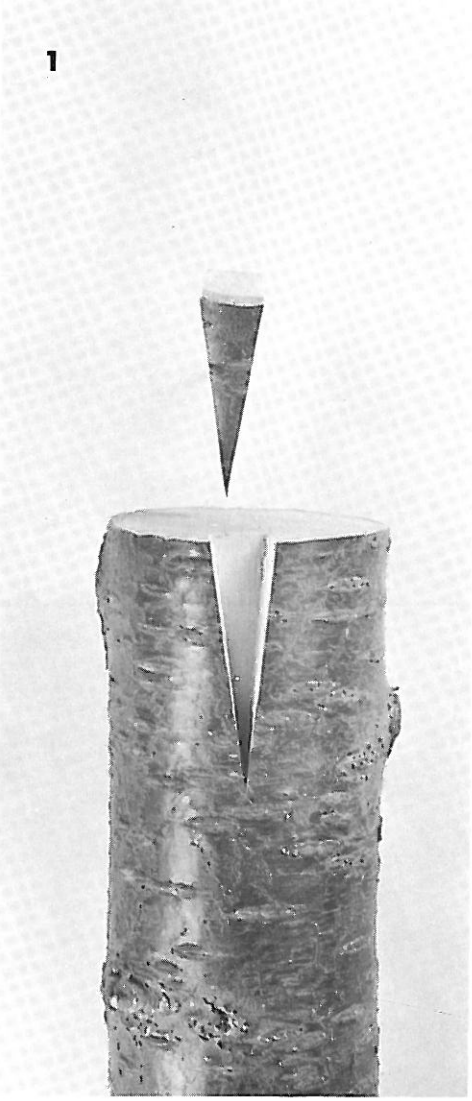
INDEX

THE WEDGE GRAFT

The Wedge Graft technique is effectively used in grafting stock of large diameter. One and one-half inch diameter and larger. This technique may be employed during the dormant season and terminated when sap flow begins.

Equipment: Wedge Knife, Scion Knife, Plastic-tip Hammer

1



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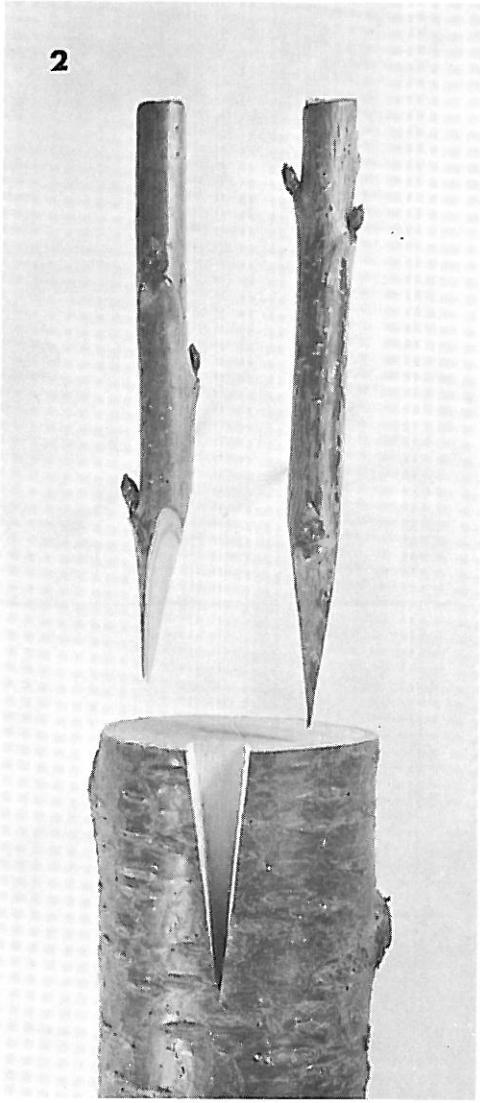
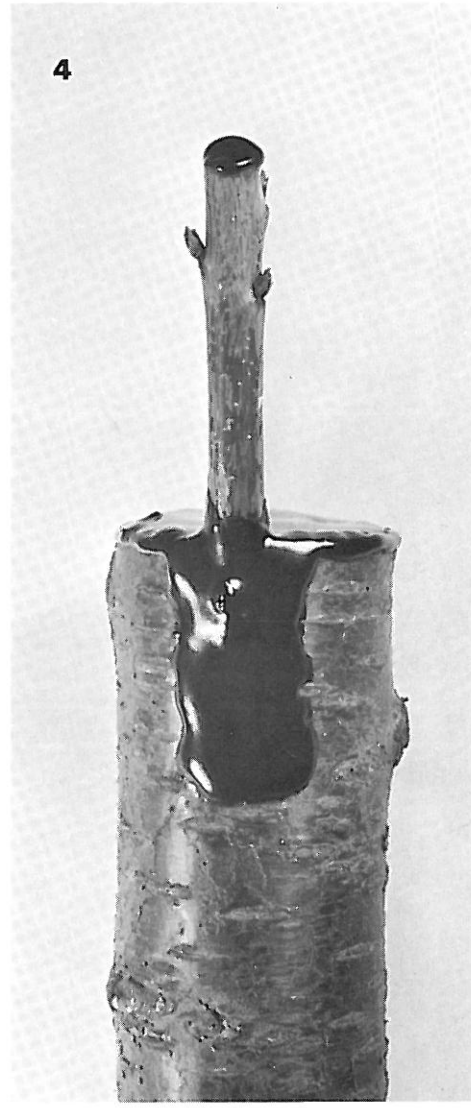




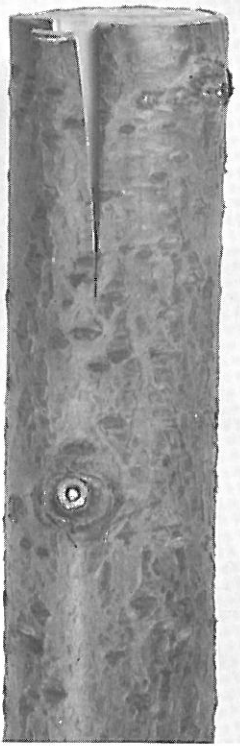
1. The wedge knife is carefully driven through the bark into the hardwood, with the plastic-tipped hammer to the depth equal the caliper of the selected scion. In removing the wedge from the stock it is important the removed wedge is nearly a perfect wedge.
2. Preparing the scion for placement, all cuts and shaping must be straight, clean cuts. The scion must make uniform contact along the walls of the opening.
3. The tapered point of the scion must be placed slightly into the hardwood. The slight outward angle of the scion will assure satisfactory crossing of cambium cells. The placed scion is firmly tapped into place, eliminating nailing or tying.
4. All cuts and openings must be promptly covered with grafting compound.

THE BARK GRAFT

The Bark Graft system in grafting is generally used in topworking large walnut and pecan trees. Bark Grafting may be done only after the sap flow has freed the bark from the hardwood. Scions must be selected during the dormant season and carefully stored until the bark slips.

Equipment: Scion Knife, Stapler or Small Nails

1



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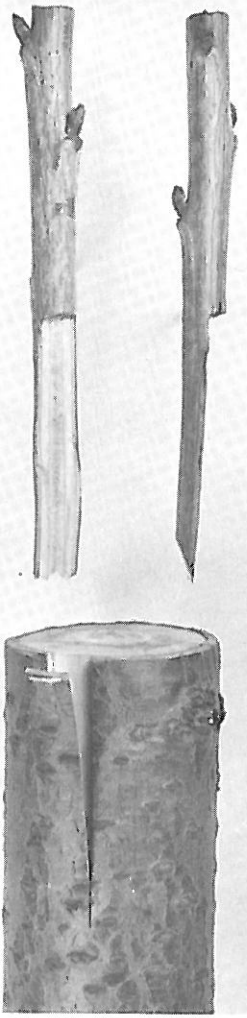
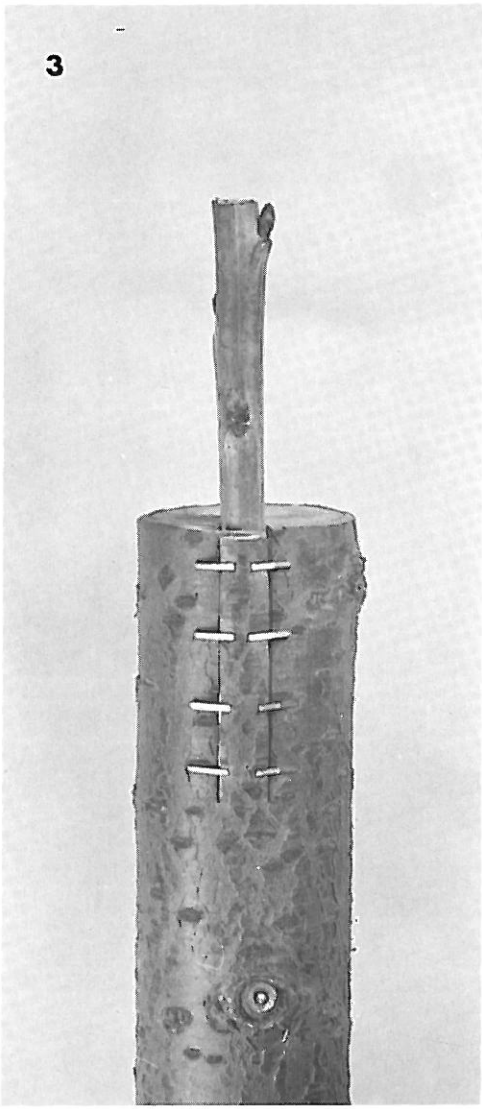
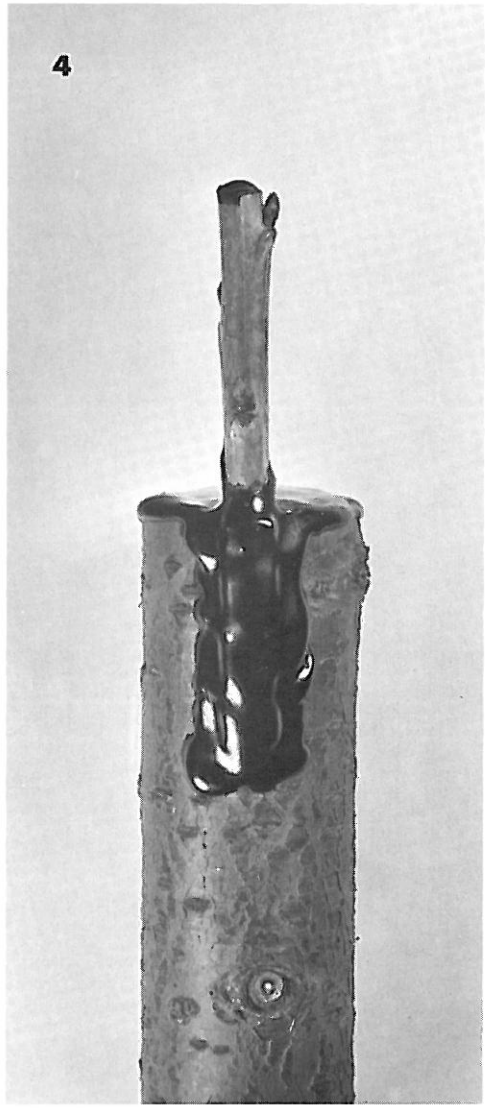






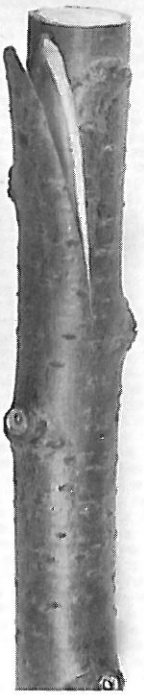
1. Two parallel cuts through the bark provide the opening for the scion. The bark must freely slip from the hardwood. The length of bark flap should be four times the caliper of the scion.
2. The scion must be carefully cut to form a straight flat surface to obtain maximum cambium contact of stock and scion.
3. Replace the flap and carefully staple in place. Use 9/16 inch staples or 3/4 inch flat-head nails.
4. Cover all cuts and openings with grafting compound.

THE SIDE GRAFT

The Side Graft has a very wide range of use in grafting small as well as stock up to one and one-half inch in diameter. Side Grafting may be employed during the dormant season and should be terminated when sap flow begins.

Equipment: Side Grafting Knife, Scion Knife

1



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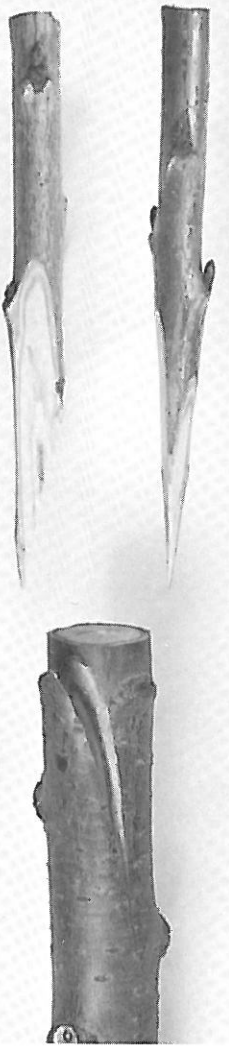


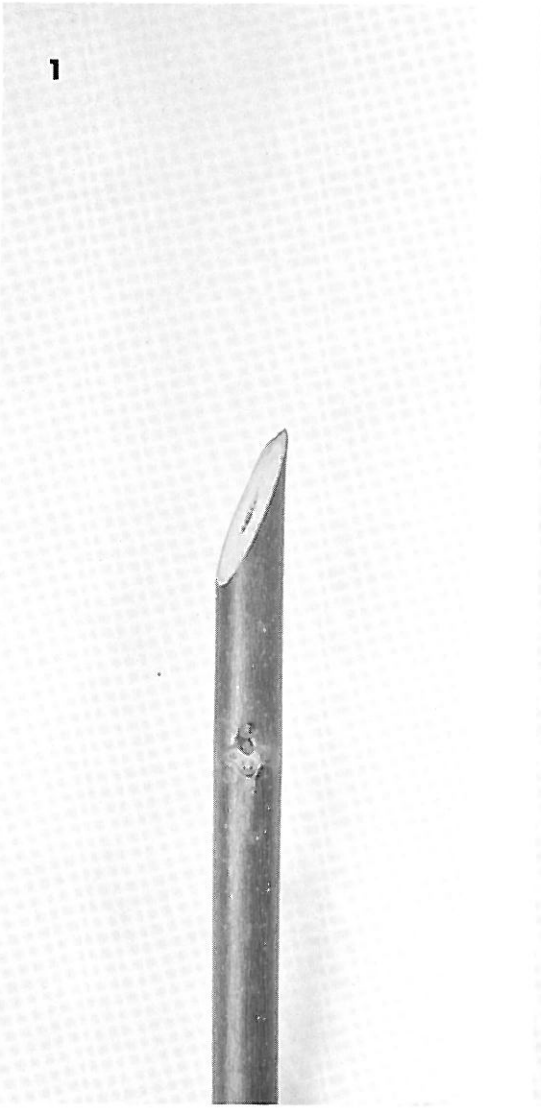
1. The initial long angle cut through the bark into the hardwood must be accomplished in a single straight cut.
2. The scion is shaped with two long tapered cuts to firmly fit into the stock. All cuts in shaping must be clean, single cuts to assure uniform effective cambium contact.
3. The scion is placed on a slight angle assuring cambium crossing of scion and stock. The scion is tied in place with plastic tape or rubber tie strips.
4. All cuts and openings must be carefully covered with grafting compound.

THE WHIP GRAFT

The Whip Graft is a very versatile method of grafting plants. This technique may be employed on very small plants in the greenhouse and on much larger plants in the field. Exact equal caliper of scion and stock material will assure consistant successful Whip Grafts.

Equipment: Scion Knife, Plastic Tape or Rubber Tie Strips

1



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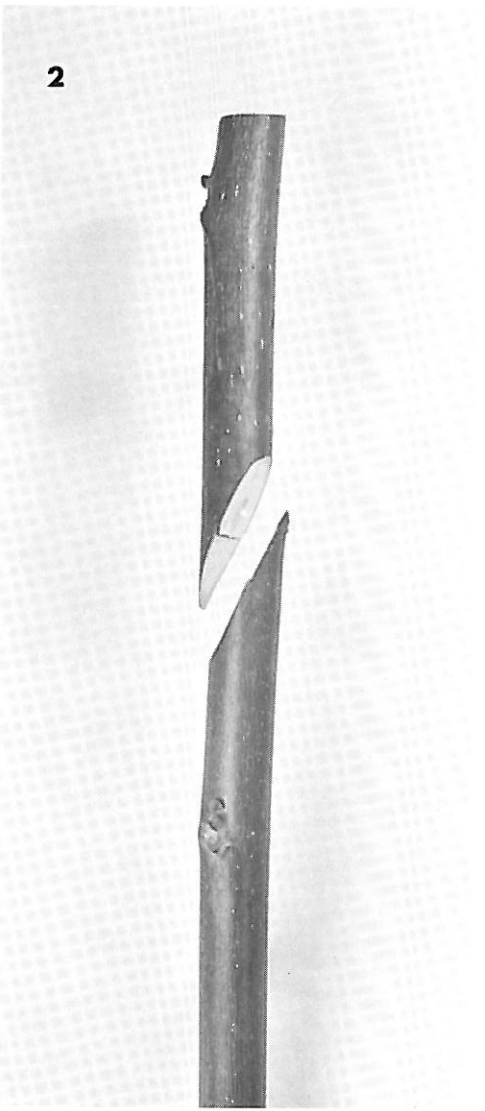
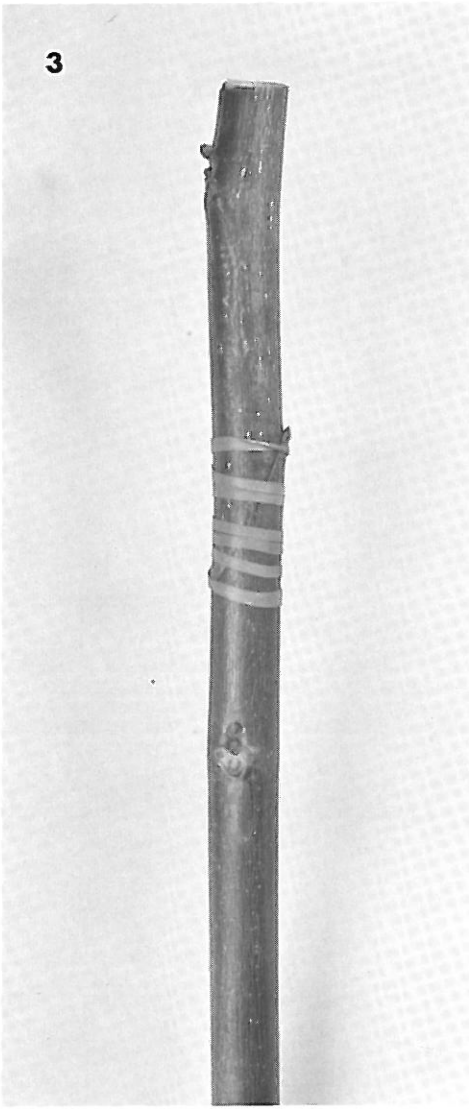


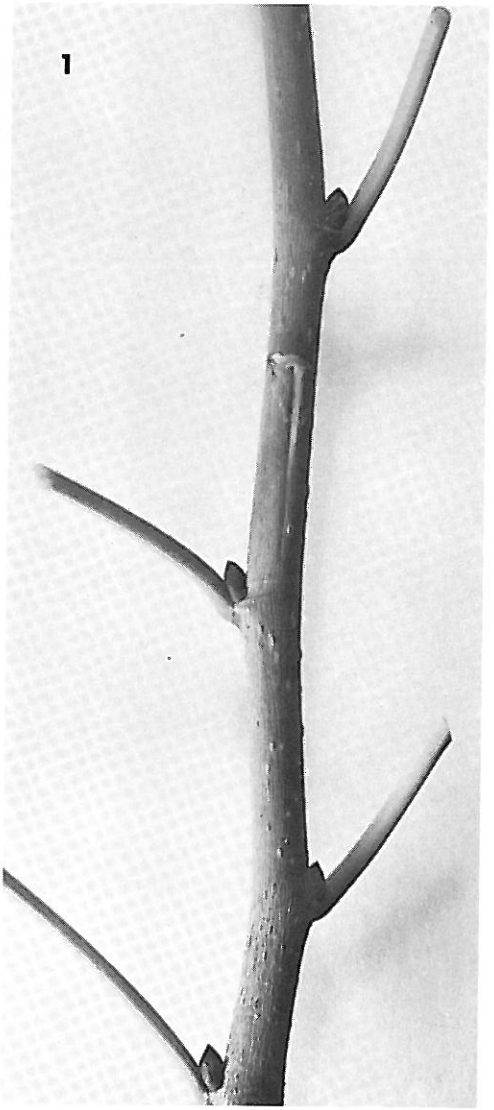


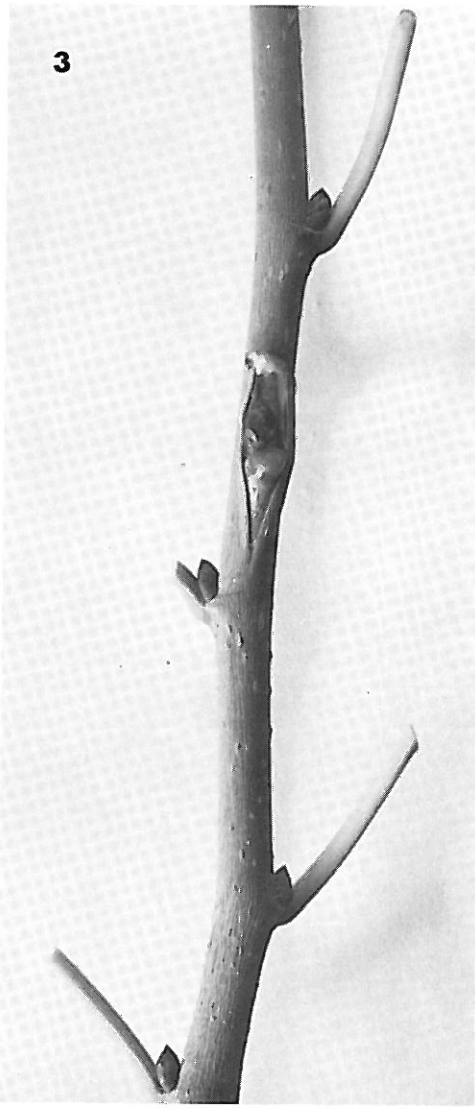
1. The angle cut on stock and scion must be straight and completed in a single cut. The length of these cuts should be three times the caliper of the stock.
2. A small cut with the wood grain on both scion and stock will greatly assist in holding the scion on the stock until tying has secured the graft.
3. Firmly securing the graft with plastic tape or rubber tie strips is essential.
4. All cuts and openings, including the top must be sealed with grafting compound.

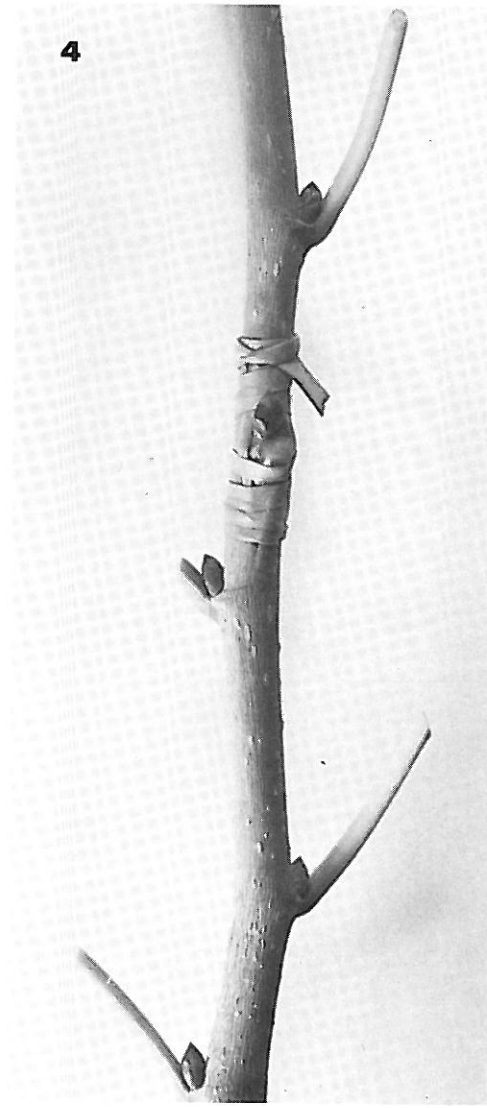
THE SNAP SHIELD BUD

technique is commonly used by the nurseryman in budding fruit trees. Its application is employed when immediate growth is forced through the newly placed bud. Forcing of this nature is consistently successful on small seedlings in the nursery row. The use of the Snap bud technique in the nursery row is limited to early spring budding, commonly referred to as "June Budding."

Equipment: Budding Knife and Rubber Tie Strips





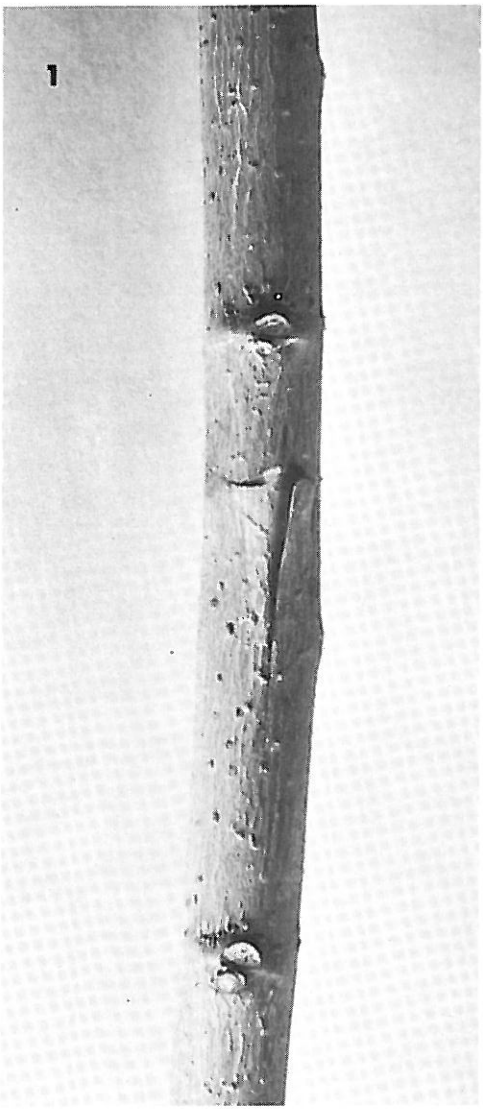


1. A vertical incision is made only through the bark, being careful not to injure the cambium cells. Following this procedure, a horizontal cut is made through the bark forming a "T."
2. In cutting the bud, a single cut is made from below the bud to an equal distance above the bud. The second cut is a cross cut above the bud resembling a shield. With thumb and index finger, the bud may carefully be "snapped" off the hardwood and immediately inserted into the incision on the stock, hence the name Snap Shield Bud.
3. The bud should be very carefully slipped into the incision being careful not to damage the cambium cells.
4. The procedure is completed by tying with a rubber tie strip, applying equal tension over the entire shield, especially immediately beneath the bud. The stock plant is cut-back within 10 days to force the newly placed bud.

THE SLICE SHIELD BUD

technique of propagation may be applied to a very wide range of plants and conditions. It may be used both in the nursery row and field propagation. The Slice Shield Bud technique in propagation also referred to as "dormant budding" is successfully used after the spring and summer growth is nearing maturity. The bud is inserted into the stock and allowed to heel-in and is not expected to grow until the lapse of one dormant season.

Equipment: Budding Knife, Plastic Tape or Rubber Tie Strips

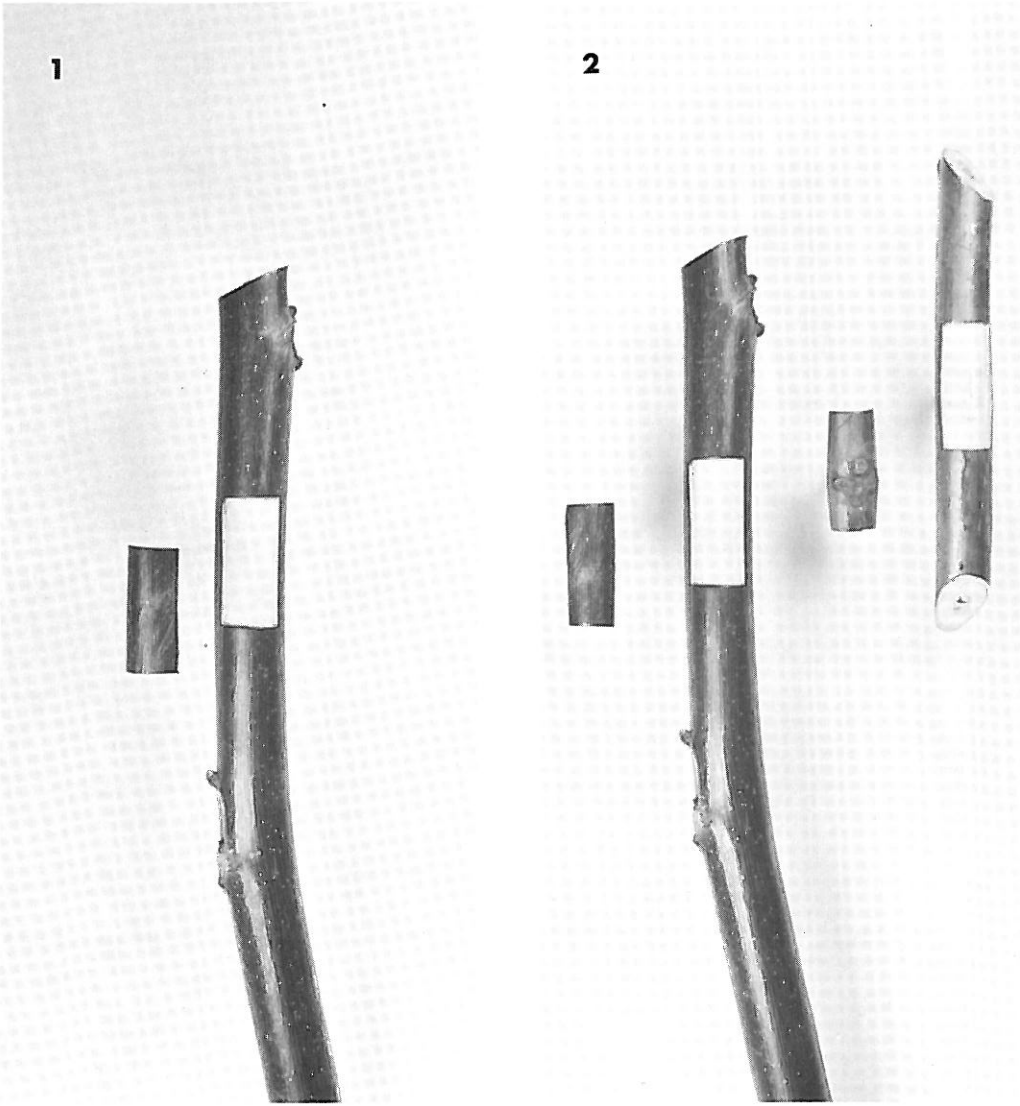


1. A vertical cut through only the bark and a horizontal cut resulting in a "T," prepares the opening or incision for placing the bud.
2. To remove the bud from the budstick requires a single straight slice beneath the bud and a horizontal cut above the bud; completely slicing the bud from the budstick, hence the name Slice Shield Bud.
3. Carefully insert the bud into the incision, avoiding any damage to the cambium cells.
4. Wrap with plastic tape or rubber tie strips, applying uniform tension over the entire area.

THE PATCH BUD

is used primarily in the propogation of walnut, pecan and persimmon trees. In most instances, immediate forcing of the newly placed Patch Bud is desirable. Patch budding may be used when both stock and scion sap is flowing.

Equipment: Patch Budding Knife, Plastic Tape or Rubber Tie Strips



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1. The Patch is removed from the stock utilizing the double bladed Patch budding knife. The two horizontal cuts are made with this knife. The less important vertical cuts are made separately.
2. An identical cut is performed to remove the bud from the scion with the bud carefully centered. While removing the Patch from the scion stock; slight rotation of the Patch around the budstick will assure the "eye" of the bud to remain attached to the Patch.
3. Carefully place the Patch with the new bud in the window ascertaining complete contact at both the top and bottom of the Patch. Small openings along the sides of the Patch are not important.
4. The newly placed bud should be securely tied with plastic tape or rubber tie strips.

Grafting Seasons and Techniques

TECHNIQUE	SEASON	STOCK CALIPER	SCION CALIPER
Wedge Graft	Dormant season	1 ½ inch and larger	1/4 to 3/4 inch
Side Graft	Dormant season	1/4 to 1 ½ inch	3/16 to 1/2 inch
Whip Graft	Dormant season	1/8 to 3/4 inch	1/8 to 3/4 inch
Bark Graft	Early spring	1 ½ inch and larger	1/4 to 3/4 inch

Mature, disease free grafting scions may be selected during the dormant season and stored in plastic bags at 34°. Avoid moisture condensation by not sealing the plastic bags.

VARIETIES	SEASON	TECHNIQUE	SCION SELECTION
Peach, Nectarine, Almond	January - March	Wedge, Side or Whip graft	December - January
Plum, Prune, Pear, Apricot, Apple, Cherry	January - March	Wedge, Side or Whip graft	December - January
Persimmon	March - April	Bark, Side or Whip Graft	January - February
Walnut	March - April	Bark or Whip graft	January - February
Pecan	April	Bark graft Whip graft	January - February
Citrus	March - April	Bark graft Whip graft Side graft	January - February

Scions may be stored in plastic bags at 34°. Avoid moisture condensation by not sealing the plastic bags.

Budding Seasons and Techniques

TECHNIQUE	SEASON	STOCK CALIPER	BUD SELECTION
Snap Shield Bud	May - June	1/8 to 1/2 inch	Mature buds from only the new growth.
Slice Shield Bud	July - September	1/4 to 1½ inch	Well matured buds
Patch Bud	April	1/2 to 1½ inch	Select during the dormant season.*

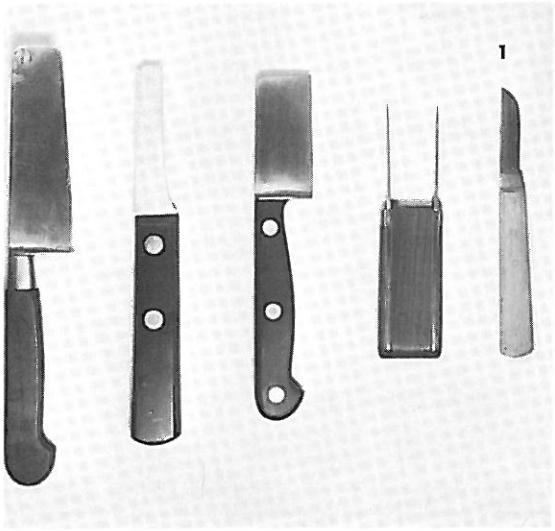
Select only well matured, disease-free budstock, removing the leaf immediately, and store at 38° in plastic bags. Avoid moisture condensation by not sealing the plastic bags.

*Exposing the dormant budstock to a warm-humid condition several days before budding will induce the bark to slip and free the patch bud.

VARIETIES	SEASON	TECHNIQUE	BUD SELECTION
Peach, Nectarine, Almond	May and June July - September	Snap shield bud Slice shield bud	Several days before budding. Store at 38°
Plum, Prune, Pear, Apricot, Apple, Cherry	August - September	Slice shield bud	Several days before budding. Store at 38°
Persimmon	April September	Patch bud Slice shield bud	Several days before budding
Walnut	April	Patch bud	January - February store at 38°
Pecan	April	Patch bud	January - February Store at 38°
Citrus	April	Slice shield bud	Select in February and Store at 38°
	October		Several days before budding. Store at 38°

Propagation Equipment and Supplies

The selection of propagation equipment for budding and grafting is of the utmost importance. Saws and pruning shears must be kept in excellent cutting condition at all times. Grafting and budding knives must be kept razor sharp at all times.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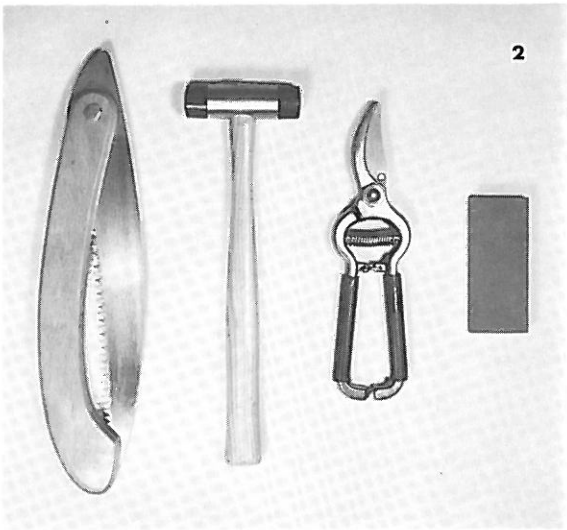
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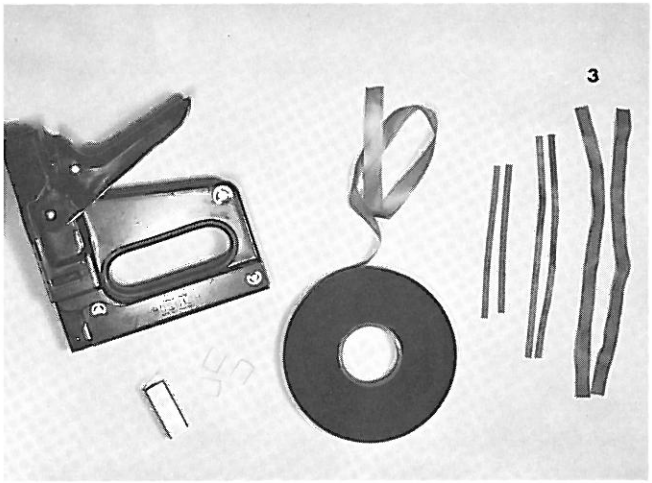
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THE SIDE GRAFTING KNIFE is a sturdy knife with a 5½ inch blade. This knife has a hand shield to protect the user from injury when engaged in making the initial cut in Side Grafting.

THE SCION KNIFE has a three inch blade ground and shaped to make straight uniform cuts in preparing the scion. This knife has a large handle, providing a safe comfortable grip.

THE WEDGE KNIFE is similar to the Side Grafting knife, with a 2¾ inch blade. This is a very sturdy built knife with a full shank extending through the handle. The Wedge knife is employed in preparing the wedge cut-out on the stock in Wedge Grafting.

THE PATCH BUDDING KNIFE has two parallel blades used in Patch budding. The parallel blades assure uniform contact on each bud.

THE BUDDING KNIFE is a small carefully constructed knife used in making the incision and removing the bud in the Snap Shield Bud and the Slice Shield Bud techniques.

THE SAW, preferably the folding type, has an arched blade 10 to 16 inches long. The saw must be kept sharp with uniform tooth set.

THE PLASTIC TIP HAMMER is used in making the Wedge Graft. It should be of medium weight. The illustrated hammer has replaceable tips.

THE SHEARS must be of good quality and capable of making large uniform cuts without distorting the cut.

THE CARBORUNDUM SHARPENING STONE must be of excellent quality. Grafting success is highly dependent on sharp knives. It is advisable to use a very fine stone for sharpening grafting and budding knives.

THE STAPLER used in Bark Grafting should be the heavy duty type, capable of driving in the 9/16 inch zinc coated staple. (not copper)

THE PLASTIC TAPE is available in rolls of ½ to 1 inch widths. This material is very useful and easily tied. Plastic tape may be used in both grafting and budding.

THE RUBBER TIE STRIPS are also used in budding and grafting. These strips are available in various widths and lengths.

GRAFTING COMPOUNDS (not illustrated) may be obtained in both the prepared ready-to-use type and grafting wax in brick form requiring a small heater to keep the compound melted for uniform application.

THE GRAFTING CASE is sturdily built of light weight aluminum. It is a convenient safe place for all the equipment used in grafting plus ample space for scions.

CARE OF GRAFTED TREES

Re-sealing:

Check every week or two and seal all openings and cracks. Continue careful observation until the new growth is two to four inches long.

Supports:

Supports such as lath may be attached to larger limbs or driven into the soil to support the new growth. Supports should be placed in positions around the tree and at such angles that will properly balance and assist in spreading the newly grafted tree. The new growth should be loosely tied to the supports.

Nurse-limb:

The nurse-limb on large grafted trees may be removed in early July.

Suckers:

Suckers and unwanted growth should be retarded regularly. Sucker growth should at no time exceed the growth on the graft.

Sunburn:

Sunburn on the trunks and limbs of large trees may be avoided by white wash or other means of covering.

Insects:

Insect pests such as flat-headed borer, twig borer, mites and aphid must be controlled promptly.

Irrigation:

Irrigation water should be used sparingly the first season following grafting.

Fertilization:

No nitrogen fertilizer of any sort should be applied to grafted trees the first season.

Zinc spray:

Zinc and other trace elements may be added when controlling insects by spraying.

Pruning:

Newly grafted trees should be carefully pruned after one season's growth. It is advisable to prune very lightly the first season and plan on future removal of crowded branches.

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