A graft, however, has several growing points and loss of a single bud from the scion will not be serious. It is essential to cut back the seedling to the bud 2 to 3 weeks after budding. If the soil is somewhat dry, an irrigation shortly before budding helps get the buds to "take." Grafted or budded seedlings are usually grown in the nursery or container for 1 or 2 years before the trees are large enough to set out in the orchard.

Trees grown in containers can be started in 1 gallon cans but may need to be transplanted into 2 or 3 gallon cans to prevent root constriction and spiralling. If this occurs the trees do not become well anchored after planting in the orchard and can fall over in strong winds, especially if the soil is wet.

Top-grafting

The cultivar of an olive tree or orchard can be changed by bark grafting (fig. 13).

Directions. Top-grafting can be done at any time from early March to late April (figs. 14 and 15). Select three to five well-spaced primary scaffold branches, cutting them off near the trunk but leaving a smooth place to graft. Cutting the branches low helps eliminate future water-sprout growth and starts the grafted tree at a desirably low height. With large branches it is necessary to use enough scions (spaced 3 or 4 inches apart) to obtain satisfactory healing of the stub. It is best, however, not to attempt to graft branches much over 6 inches in diameter; beyond this diameter, the cut branch has difficulty healing.

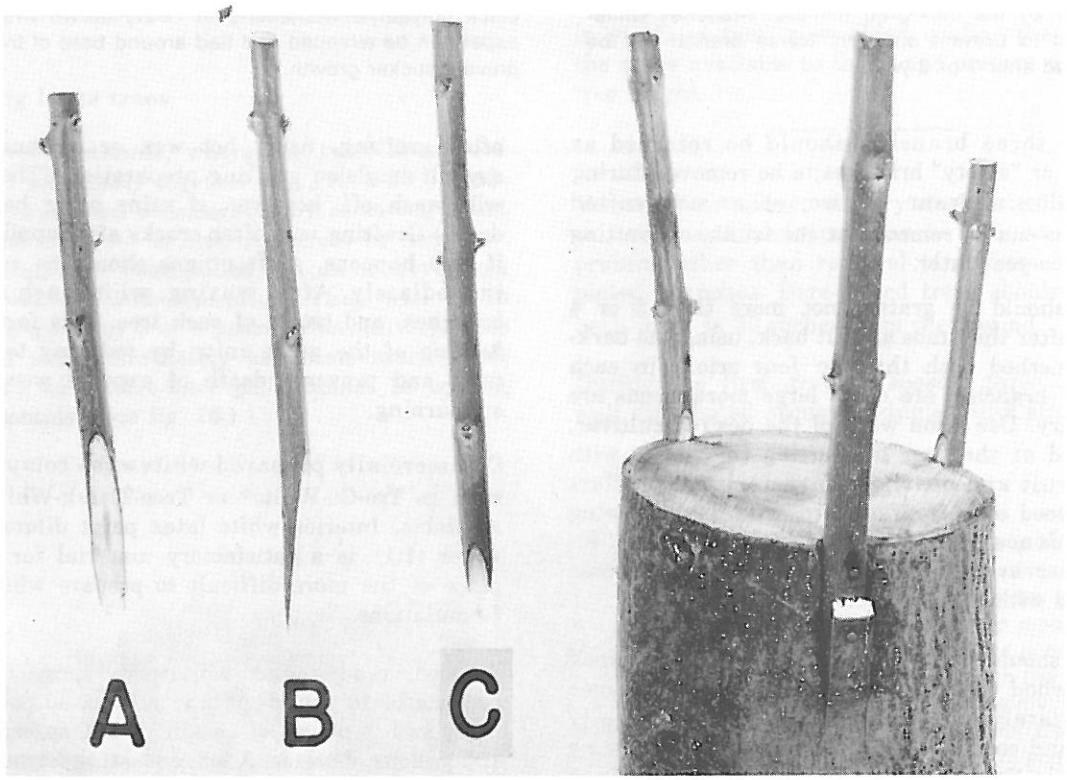

Fig. 13. Bark graft for top-working olives. *A:* side of scion resting against wood of the stock; *B:* side view of scion; *C:* opposite side from A. *Right:* scions in place, held by two flat-headed wire nails (¾-inch, 20-gauge) driven through the scion. After grafting, all cut surfaces are thoroughly covered with grafting wax. Sometimes a longer, more slanting cut can be made on the scion, which can then be inserted between the bark and wood of the stub without cutting bark.

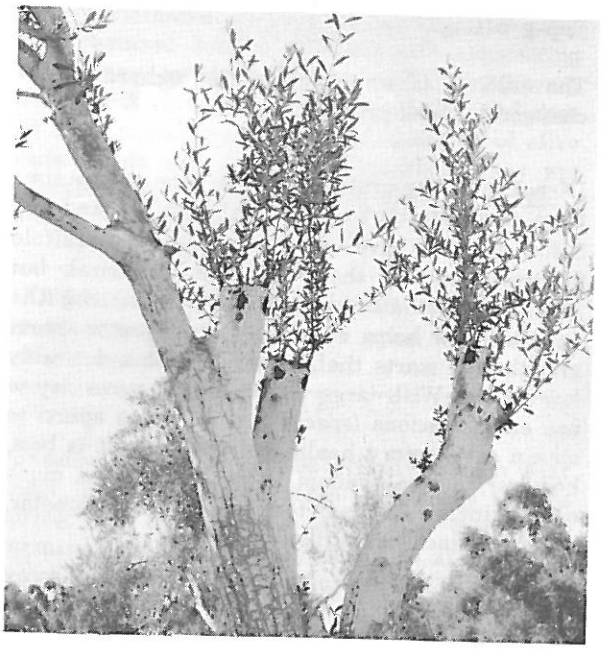

Fig. 14. Mature olive tree top-grafted to a different cultivar by the bark-graft method. Branches whitewashed to prevent sunburn. Nurse branch will be removed after 1 or 2 years.

Fig. 15. After large olive trees have been top-grafted, black polyethylene sheeting or heavy brown wrapping paper can be wrapped and tied around base of trunk to prevent sucker growth.

One to three branches should be retained as "nurse" or "safety" branches,to be removed during the following year or two; other nongrafted branches can be removed at the trunk, at grafting time or a year later.

Stubs should be grafted not more than 3 or 4 hours after the limbs are cut back, using the bark-graft method with three or four scions in each stub; if branches are quite large more scions are necessary. Use scion wood of the desired cultivar, collected at the time of grafting from trees with good fruit and bearing characteristics. Collect scion wood only from orchards and trees showing no evidence of olive knot galls (see p. 58), otherwise every grafted tree is likely to become infected with this disease.

Scions should be ¼- to ½-inch diameter, obtained from wood 1 or 2 years old. Remove leaves immediately and keep scion sticks continually moist and cool in damp burlap or similar packing material. Scions ready for insertion should be about 5 inches long, with two nodes (four buds) above the stub. Tests have shown that the bark graft gives a higher percentage of "takes" on olives than does the cleft graft.

It is important that all exposed cut surfaces be thoroughly covered with grafting wax immediately after grafting, using hot wax or a commercial asphalt-emulsion grafting preparation. (The latter will wash off, however, if rains occur before it dries.) Grafting wax often cracks after application; if this happens, graft unions should be rewaxed immediately. After waxing, whitewash scions, branches, and trunk of each tree. This facilitates healing of the graft union by reducing temperature, and prevents death of exposed wood from sunburning.

Commercially prepared whitewash compounds, such as Tre-Co-White® or Tree-Trunk-White® are available. Interior white latex paint diluted with water (1:1) is a satisfactory material for use in place of the more difficult to prepare whitewash formulations.

A good, ready-to-use whitewash spray formula consists of 10 pounds of zinc sulfate, 50 pounds of lime, and 1 pound of casein or Z-1 spreader per 100 gallons of water. A longer-lasting formulation, which requires several days advance preparation, is quicklime (CaO), 5 pounds; salt, ½ pound; wettable sulfur, ¼ pound. Add salt and sulfur while lime is slacking. Age whitewash mixture for several days before using, and dilute to a consistency easy to apply with a brush.

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If grafts grow vigorously and become top heavy by midsummer, tie them to stakes or prune them back to prevent breakage, especially in areas where strong winds may occur.

Vigorous sucker and water-sprout growth from below the graft union usually follows top working. These shoots should be removed from around the scions but can be left on the trunk for a time during the summer to nourish the tree and to protect the bark from sunburn. Head them back, however, to prevent excessive growth. Withhold nitrogenous fertilizers from newly grafted trees for 2 or 3 years. Continue irrigation, although the water requirements are considerably less because of the reduced leaf area.

During the year or two after grafting, remove the nurse branches and prune the grafts lightly, selecting the shoots to be retained permanently. Cut back the other grafted shoots gradually but retain them for a time to aid the stub in healing over. When the grafting wound heals, the excess grafts are removed. The grafted branches usually bear fruit the third season after grafting.

Moving large trees

In mature orchards, where the trees have been planted too closely together (e.g., 20' x 20'), yields can be increased considerably by removing about half the trees — as alternate trees in each row. Trees that have been pulled out can be moved to a new location and replanted. They will be in bearing again by 3 or 4 years. Alternatively, trees can be sold immediately as ornamentals. Trees infected with olive-knot galls cannot be sold as ornamentals. (See fig. 16.)

The scaffold branches should be pruned back to reduce leaf area, and trees should be dug up and moved during late winter. After replanting, the trees must be thoroughly watered and irrigations continued through the summer.

Conventional training and pruning of olive trees

Young olive trees are pruned to:

- provide a mechanically strong trunk and scaffold framework for sustaining heavy crops and resisting strong winds without limb breakage throughout the tree's lifetime (fig 17).

Bearing olive trees are pruned to:

- help obtain satisfactory consistent yields of good quality fruit, by stimulating production of new fruiting wood,
- facilitate harvesting and spraying operations for insect and disease control,
- prevent deterioration of the trees and reduction in yields as they grow older, confine the trees to the space available to them, and prevent excessive tree height.

Young trees. Olive nursery stock in gallon cans, or balled and burlapped, can be planted with no pruning other than removal of suckers or badly placed branches. Bare-rooted trees should be cut back to 24 to 30 inches from the ground.

During the first growing season, three laterals, well distributed around a single trunk and spaced

Fig. 16. There is a market for surplus mature olive trees to be dug, moved by truck to urban areas, and replanted as ornamentals. This is best done in late winter with the tops cut back more heavily than is shown here. Such trees must be free of the olive knot (*Phytomonas savastanoi*) disease.