Topworking Avocado Varieties

evaluation of more satisfactory varieties at Riverside obtained sooner by topworking than by planting new trees

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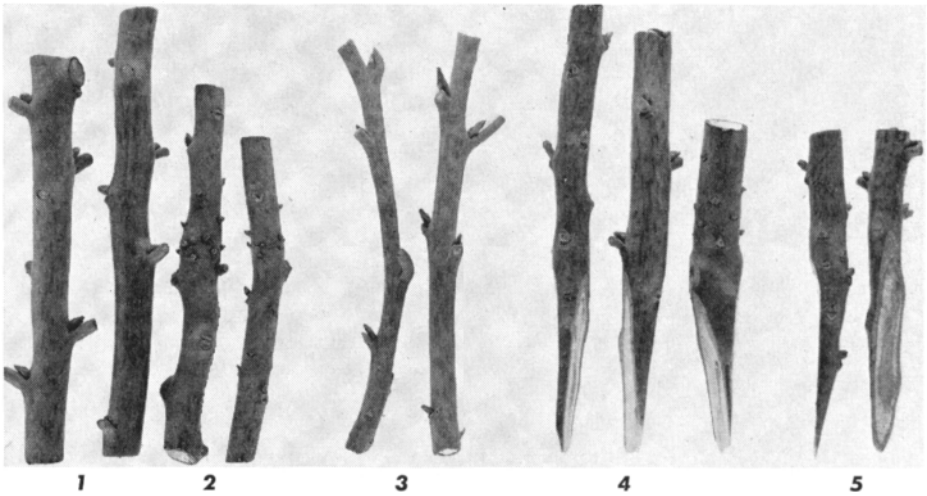
Topworking — or topgrafting — to change varieties found unsatisfactory for growing in the avocado orchard at Riverside is used instead of planting a new young tree because a topworked tree comes into production several years sooner and the quality and performance of a new variety can therefore be evaluated earlier. Topworked trees have ranged in age from six to 10 years.

When topworking was first undertaken, the practice was to insert the scions—a short section of a shoot—into two or three of the larger framework branches of a healthy tree. But because of the difficulty of training the new growth, this practice was abandoned in favor of placing the scions in the trunk and closer to the ground.

With this procedure—whether the saw kerf or the bark graft method is followed—the tree is cut off a foot or two above the ground, the exact location having been selected to give a smooth area of bark in which to place the scions. It is not necessary to leave a nurse limb as with some other trees. Four or five grafts are usually placed in the larger trunks and at least two in the smaller.

The preferred time for topworking at Riverside is February, although good results have been obtained when it was done as late as April. Recently, satisfactory results were obtained with fall topworking.



1. Desirable scions with regular buds. 2. Desirable scions with nodal buds. 3. Undesirable scions—wood immature and buds too advanced. 4. Scions prepared for saw kerf or notch graft. 5. Scions prepared for bark graft.

The Saw Kerf Graft

The saw kerf—or notch—method is preferred by some professional topworkers because it can be used at any time even though the bark will not slip. With a fine-tooth saw a single cut is made inward on the trunk to a depth of at least 1½″ for each scion. A rounded knife, commonly used by harness makers—with a blade almost the shape of a half circle—is then used to widen the cut to fit the scion. The scions should be 3½″ to 5″ in length, at least ½″ in diameter, and of well-matured wood with plump buds. Wood with a ring of nodal buds makes an excellent graft.

The scions are trimmed wedge-shaped in two directions, tightly fitted into the notch, and carefully driven into place with a light rubber-headed hammer. It is desirable to slant the scion slightly outward in the notch to make sure that the cambium layers touch in at least one place. Two or three good buds or a ring of nodal buds should be above the cut surface of the trunk.

A wound paint is then used to fill all open spaces around the scion and to cover the surface of the stump as well as any cut surfaces on the scion itself. A piece of heavy white paper is then cut to size and placed over the painted stump to reduce the danger of sunburn to the grafts when a black paint is used.

The Bark Graft

The bark graft method is quicker and easier than the saw kerf but cannot be used in the spring before the bark slips.

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Bark graft. First step is to thin the bark.

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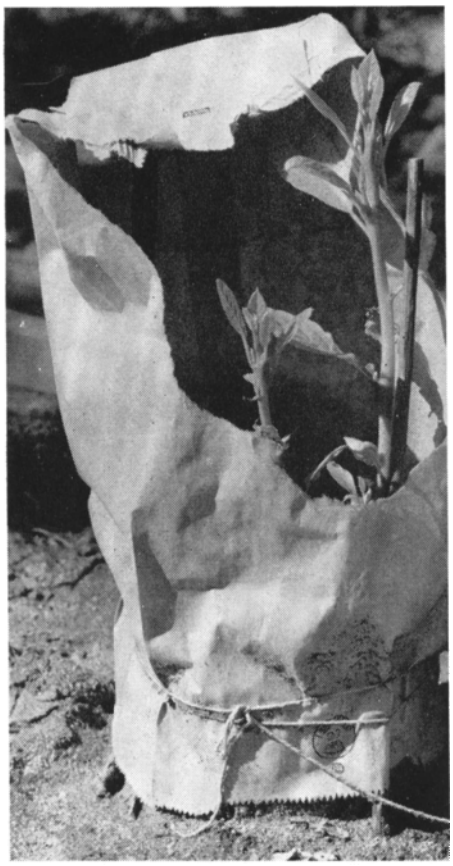

Above: Paper bag placed over stump to protect scions. Below: After several months' growth by scion, the bag is torn away to permit entrance of sunlight and unhampered growth of top.

The trunk is cut off, as with the saw kerf method, and a heavy knife, or draw knife, is used to shave down the bark—which on old trees may be as thick as ½"—to about ⅛" thick. The bark should be thinned for about two inches down the trunk, depending upon the size and length of the scion. The scion may be somewhat longer than the thinned area and prepared as shown in the upper photograph on page 9. The thin bark will cling closer to the edges of the scion than the thicker bark, and there will be less likelihood of an air pocket forming between the thick part of the scion and the bark.

After the bark is thinned, a single vertical cut is made and the scion is pushed down into place. A coating of grafting compound is then applied to the bark and to the cut surface of the stump—with particular attention to the areas around the scions. It is also applied to the face, as well as all cut surfaces, of the scion to prevent drying out.

The occasional tendency of the bark to pull away from the stump is prevented by wrapping twine three or four times around the trunk—spacing one of them as close as possible to the top of the stump.

After the scions are in place, a light bamboo rod is stuck into the ground tight against the trunk beside each graft and secured by a string tie. These stakes form a framework, over which is placed a paper sack to protect the scions from the sun and wind. Three or four pieces of lath nailed to the stump may be used instead of the bamboo stakes. Several small openings are made in the sack to provide air circulation and to prevent overheating. The sacks remain in place until the scions have made 8–12" of new shoot growth. So that the new growth will not be obstructed, it is usually better to tear off part of the top of the sack rather than remove it entirely.

Training the Top

The grafts are rather easily trained to stakes, driven into the ground and firmly tied to the stump. When growth is rapid, the new growths are tied to the stakes at frequent intervals. All scions are usually left the first season; often only one or two grow. Suckers that sprout from the trunk are allowed to grow temporarily—since they shade the trunk and keep the bark in good functioning condition—but are kept well pinched back. The suckers are left until the scions have made several feet of top growth, and longer if only one scion is growing. Later, the propagator is confronted with the prob-

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Above: Bark graft. Bark has been thinned and a vertical cut made to receive the scion. Below: Scions placed, stumps and scions painted, top of stump covered, and bamboo stakes in place.

OLIVES

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aged; 2, showing minor surface scars; 3, showing severe surface scars; or 4, showing severe surface cuts. Only fruit in the first two categories was considered marketable.

In the Spanish green process, where any fruit defects would be clearly visible, as much as 30% of the machine-harvested fruit showed sufficient scarring to make it unmarketable. Placing the fruit into brine immediately after harvesting apparently reduced the amount of visible scarring in half. By the black ripe method, however, in which any but severe scarring would be masked, the amount of visible defects was negligible. The quality of the machine-harvested fruit was equal to that of the hand-picked fruit. The quality of harvested fruit transported in brine was not appreciably different from that handled in lug boxes.

Mission fruit harvested with the type of mechanical aids now under test would show sufficient scarring so that it could not be marketed by the Spanish green process, but it apparently would be completely marketable if processed by the black ripe method.

Additional tests were made in shaking oil olives on January 25 and 26, 1955, to determine the efficiency of fruit removal and the time required for mechanical harvest. Thirteen Mission trees were shaken and the fruit collected on canvas under the trees. One man was required to operate the tractor and two were used in handling the canvas and fruit. The average amount of fruit per tree was 142.6 pounds. The shaker was able to remove an average of 94.6% of this fruit. It required 0.40 man-hour to remove a 35-pound lug box of fruit by the mechanical shaker while 0.75 man-hour was required to remove this amount of fruit by the conventional methods.

The Effect of Different Harvesting Methods on the Surface Appearance of Olive Fruits Following Processing and Canning. Mission Variety. Palermo, 1954.

Processing method	Harvesting method	Condition of fruit			
		Marketable		Unmarketable	
		Undamaged	Minor scars	Severe surface cuts	Severe surface scars
Spanish green	Machine	17%	50%	2.6%	30%
	Machine (in brine)	0	85	0.4	14.6
	Hand picked	50	47	0.0	3.0
Black ripe	Machine	99.9	0	0.0	0.1
	Machine (in brine)	99.2	0	0.7	0.1
	Hand picked	99.9	0	0.1	0.0

The type of mechanical shaker presently under test can remove 93% to 95% of Mission olive fruits, but for the oil crop the present labor saving is insufficient to justify the equipment investment.

Further studies are needed on labor-saving techniques, such as the use of catching frames and pickup machines, as well as pruning systems which will adapt the shape of the tree to the action of the shaking machine.

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AVOCADO

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lem of how many scions—if more than one grows—to use to form the top. It has been found that best results are obtained if one vigorous growing scion is selected—and the others headed back and eventually removed—as it will eventually cover the cut surface.

With topworking, a careful and continuous follow-up is necessary to get a strong, well-formed tree. After the remaining scion is two to three years old, the stump is pruned, as shown in the illustrations on this page. By cutting off the shoulder proper healing of the cut surface is encouraged.

Stump and two-year-old top before pruning.

Occasionally, even though one or more scions grow, they make a weak, spindly type of growth the first summer. The leaves are small, crinkled, and light yellow, and the bark on the branches is also light yellow. Suckers sprouting from the trunk show the same type of growth. Minor element sprays have been tried with no apparent improvement in the type of foliage. Usually, however, in the late summer the new leaves become normal in size and color, and soon the top is in good growing condition. One reason for this may be that the shock to the roots of the trees from the severing of the original top is so severe that it is months before nutrients are adequately absorbed to feed the new top growth.

This weak type of growth was found in the Riverside experiments with the following combinations: Gardner on Nabal with a Ganter root; Elsie on Nowels with a Topa Topa root; and Gae on Regina with a Mexicola root. Topworked combinations which made an excellent growth were Topa Topa on Carr with a Mexicola root; an unnamed hybrid on Gerkin with a Mexicola root; and Susan on Emerald with a Ganter root. These examples are not given, however, as an explanation of variations in top growth but in order to show the range in rootstocks, the varieties topworked, and their growth behavior.

The three components usually found in a topworked tree at Riverside are the rootstock, a sandwich of the original variety, and the scion variety or new top. Little is now known about the effect of either the rootstock or sandwich on the behavior of the scion variety, and studies on these factors are under way.

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Pictures by Kenneth Middleham.

Stump with two-year-old top pruned.