

## Topworking Avocado Trees in Los Angeles County

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Because of the many unproductive and inferior types of seedling and budded trees and the need for converting them to better varieties, top-working is oftentimes practiced. A number of methods are used by practical workers in the field, a few of which are discussed below.

The first method to be discussed has been described by Carter Barrett. It differs from cleft grafting in that the operator places a scion in the side of the branch or the trunk of the tree. This method is also called the slot-graft method, and is simple and practical for the amateur. It eliminates most of the tree surgery that is inevitable with older methods, and can be done in the late summer or fall, as well as in the spring. This particular method does not necessitate cutting off the top at the time the grafting is done; therefore if the grafting does not grow at the first trial the work can be repeated without waiting a year.

To do the work well, one must have good tools. Tools to be used should consist of the following: A folding pruning saw, pair of pruning shears, a hookbill pruning knife with square end, a hammer, pliers, muslin patches about three inches square, and some lath and finishing nails.

Regarding the wax to use, there are two considerations to be taken into account. Where the scion does not need to be completely covered, it is best to use a mixture of half beeswax and half resin, by bulk. Where the scion needs complete coverage, as it does in certain slender wooded types, the best thing to use is paraffine wax, which is paraffine with added resins. This latter wax can be applied quite hot, without injury. Complete coverage prevents all drying out before the scion heals in, which is particularly important where light wooded scions have to be used in heavy trees with thick bark. Where paraffine is used, it is more essential that the work be shaded thoroughly from the sun.

For this method the tree should be at least four inches in diameter, as it is necessary to have as flat a surface as possible upon which to place the scion. A tree of lesser diameter will have too great a curvature of the trunk. If possible the grafting should be done on the main trunk and the whole of the new top grown from one scion, although as

a matter of insurance two or more scions should be placed at the time of grafting. By using the growth from one scion placed in the main trunk, it is quite easy to attain the ideal framework for an avocado tree. A central leader is the strongest type of framework that can be grown, reducing staking and wiring to a minimum.

To be ideal, the scion should be between one-half and three-fourths of an inch in diameter, six to seven inches long, slightly curved, and have two or three strong internodal buds. In most varieties other than the Fuerte, it is very difficult to find scions of the right size with internodal buds in condition, therefore the grafter will have to depend in most instances on the nodal buds. Scions for fall grafting should be cut from wood grown the preceding spring and summer, and ordinarily should be hard enough to use by the middle of September. Scions should be used as soon after cutting as possible, although if properly packed they can also be used very successfully a month later. In warm locations grafting can be done as late as December. Grafts placed in the fall will not start growth until the following spring, but will be six weeks ahead of scions placed in the spring.

In using the wax, the operator should see that it is thoroughly melted, and the brush should always be removed when the operation is completed. An ordinary two inch vulcanized paint brush proves very satisfactory. However, where the scion must be completely covered with paraffine, a camel's hair brush is better as the tender buds will not be so easily injured. The beeswax mixture should not be applied hot enough to smoke, but the paraffine mixture can be safely applied at a rather high temperature. A comparatively flat place should be selected on the north side of the trunk in order that partial shading may be obtained. A sufficient portion of the tree should be cut away to allow light to penetrate, also to allow freedom of motion in working. Following are the details of the operation:

1. Cut out a conical piece of bark about two inches wide with the point of the hookbill pruning knife. If the bark is very heavy, the piece cut out will have to be larger.
2. Trace two parallel cuts down the trunk from the bottom of the conical cut out a little farther apart than the diameter of the scion to be used.
3. With the point of the knife roll back the tongue of bark which has been made by the two parallel insertions, far enough to allow the cut portion of the scion to lie against the cambium of the stock just below the conical cut out.
4. Make one long sweeping cut on the curved side of the scion so that it will stand out from the trunk of the tree, and on the other side of the scion make the cut slightly concave. This latter cut does not need to be made as carefully as the first one that lies against the cambium of the stock.
5. The straight, smoothly-cut side of the scion should then be placed against the cambium of the stock in the slot formerly made, rolling back the tongue of the bark. The bark should then be placed back on top of the scion, and four or five nails driven through the center of the tongue and scion into the stock.
6. The little projecting ears at the top of the tongue should be cut off in order that the wax may be thoroughly applied to all cut surfaces. Where it is necessary to wax the entire scion, it is generally easier to do so if the uncut top is waxed before being nailed

in. After waxing the cut surfaces, place a muslin patch over the slot but not over the top of the scion, thus preventing the bees from taking the wax. The patch can be stuck on by painting over with hot wax.

Six weeks following the grafting, cut off 75% of the top of the tree, especially the main limbs. Where possible, cut so that the remaining branches will shade the scion and trunk from the sun. Shade should be provided even though it may be necessary to do so artificially. Great care must be exercised to keep the top in check in order that the scion will have every opportunity to grow; yet a sufficient number of nurse limbs must be left to maintain a safe balance with the root and thus prevent starvation.

The tree should be observed once or twice a month, and as soon as the scion reaches a height of two feet it should be staked. The stake should be a two by three piece of clean lumber, ten or twelve feet long. The new top will need to be kept staked for at least the first fifteen feet of growth.

The stock can generally be stubbed at the scion in the second year of growth. Stubbing should be done so that the trunk on the opposite side to the scion is lower, and there should be no projection of the scion above the union. All wounds should be sealed with the beeswax and resin mixture at a high temperature.

The second method presented here is one practiced and described by J. G. France, Farm Advisor in San Diego County. It is called the Renshaw or wedge graft method, and has been used successfully on limbs from, one to eight inches in diameter.

This method, according to Mr. France, is accomplished most successfully from December to April, with the preference for the winter months. The tools required consist of a pruning saw, a small "hack" or miter-box saw used for sawing out the wedge, a sharp knife for shaping the scions, a small wooden mallet or hammer for driving in the nails, and a brush for applying the covering material.

In selecting the scion, well matured wood of good size with strong buds, is essential. Scions three-eighths to seven-eighths of an inch, with at least two good buds on the outside of each one after it is placed in the cleft, are the most desirable. If possible scion wood should be selected in advance.

Before removing the scion from the branch of the tree, the leaves should be clipped off, as well as a part of the branch beyond the scion. The scion should not be cut off the tree until after the wounds of the outer portion of the branch have healed. However, if this procedure is not feasible, scions may be cut and kept covered in moist sand until used.

The next operation is to cut off the limbs to be grafted. It is almost essential to make the cuts high enough in the tree in order to leave a number of branches until the new top is well established. In making the cuts, particularly on large limbs, it is well to cut the branch off several inches above the point where the graft is to be placed, then cut the stub back to the point desired. By following this practice, there is less danger of loosening the bark on the stock at the point of the graft. After sawing off the stub, the wound should be neatly trimmed with a sharp knife, and the operator is then ready to saw out the wedge.

The position of the cut should be so selected that when the scions are placed one of

them will be on the outer edge of the limb. The miter-box saw is used to saw out the wedge. A cut is made at the end of the limb about one and one-half inches deep. The width of the wedge cut out should be proportioned to the size of the scions; ordinarily, one-fourth of an inch is ample. The rough edges left by the saw are carefully trimmed so that a clean straight edge of bark is exposed. The scions are then trimmed with a sharp, clean knife to a double-wedge shape which will fit tightly into the cleft, bringing the cut edges of the middle or inner bark of the scion and the stock together. The scion should fit so tightly that it is necessary to drive it into the cleft with a mallet or light hammer. Two scions should be inserted in each cleft, one on each side. In the case of grafting very large limbs, two or more wedges should be cut, and numerous scions placed—even though in most cases only one scion will be allowed to remain permanently. The scions should be so cut that at least one strong bud will be on the outer side.

After the scions are all placed, cut surfaces should be completely sealed with a good grafting wax or pruning compound. A paper sack with holes cut in the corners for ventilation should then be tied over the graft for protection from sun and wind; after the grafts have started to grow, the sack may be removed. Frequently the grafts grow very rapidly, and will require some staking to prevent their being broken off. If more than one scion grows, the strong or best-placed one should be selected for the new top, the others retarded by pinching back. However, they should not be removed entirely during the first growing season. As the grafts get a good start, the remaining limbs of the original tree may be removed, but this should be done gradually during the growing season. At the end of the first season of growth, all scions not to be used are removed by making a slanting cut of the limb with a pruning saw. All the branches of the original tree that were left below the grafts should also be removed. Suckers that may start from the original tree should be eliminated as soon as it is definitely established that the grafts will grow. However, if the grafts do not grow, the suckers should be left, and may be budded as soon as they are of sufficient size and maturity.

The third method given here has been described by G. R. Calkins. Three main objectives should be kept in mind in using this method. They are: (1) Work toward a well-balanced top by inserting scions in the best positions on the main stump; (2) Develop new shoots by careful training and pinching of new growth in order that the top may be strong enough to resist winds; and (3) Protect the stump from sunburn and the cut surface from decay.

In following this method, the top of the tree is entirely cut off at a point about three feet from the ground. However, the distance from the surface of the ground depends upon the type of the tree with which one is working. Several grafts are put in the stump after the tree has been cut off. All cut surfaces should be carefully waxed, and to prevent sunburn, covered with an inverted, tough paper bag, in which small holes have been cut to provide ventilation. If more than one graft grows, considerable care must be exercised in selecting the one or two which are to remain. The balance should be suppressed gradually by systematically pruning them back rather than by cutting them off entirely.