

## Recovery from Frost Injury

### *A Summary of Observations in Los Angeles County Avocado Orchards*

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Having accumulated observations and data through two seasons since the freeze of 1937 it is now an opportune time to review the subject and report to you some of the results of trial plots carried on for the purpose of determining the best procedure in handling frost injured avocado trees.

#### **WHITEWASHING**

Whitewashing to prevent sunburn was a much discussed subject just following the freeze—with reference to trees which had suffered the killing of a large proportion of their foliage. While it is an established practice to protect exposed bark surfaces during the summer by whitewashing, many persons questioned the necessity of this during the cool months just following the freeze. Our observations indicate that it was not an essential practice. The specific effects of whitewash applied to trunk and main branches were that growth of new shoots was delayed several weeks as compared with trees not whitewashed. By the first of August, however, the growth of whitewashed trees had caught up and no difference was measurable in the degree of ultimate recovery. In most cases a sufficient amount of shading was provided by the old dead leaves hanging on the trees to prevent any damage up to the time new foliage was established in sufficient amount to prevent sunburn in the summer. No sunburn injury was observed on the trees which were not whitewashed. Thus it seems that one need not incur the expense or work of doing this job immediately following the freeze, and it would seem that one should wait until late in April to decide on the necessity for applying whitewash.

#### **PRUNING**

Pruning frost injured avocado trees is difficult to describe in general terms. One must define specific conditions of the tree and also it must be understood as to the kind of pruning employed. Suffice it to say that all the evidence collected since the freeze tends to substantiate our early recommendations to delay any kind of pruning until at least in the early summer following the freeze, and in some cases to permit the trees to go through the entire year and follow in the succeeding spring with the necessary pruning. This appears to be true to an even greater extent with avocado trees than with citrus because of the difficulty in detecting the dead wood which will ultimately have to be removed. In the avocado bark it was observed that there were many cases of injury to

the extent of causing a brown discoloration of the cambium and sap wood and that even though this was the condition there was a recovery of a new healthy cambium layer. The tree or the portion of the tree thus affected became normally healthy during the year. In many cases this condition resulted in the ultimate death of the tree or branch. Comparative trials were set up in February and March and it was observed that the effects of an early attempt to remove the apparently dead parts of the tree did not assist in the recovery of the tree. In some cases pruning seemed to cause a more extensive die back of the injured branches. The ultimate recovery of trees which were not pruned at all in 1937 and those which were pruned lightly to moderately, assuming a not too severe extent of injury and comparable conditions in both cases, was not measurably different. Where more intensive pruning was done with the result of increased stimulation of growth, the effect seemed to be that of depressing fruit yields into the second season following the freeze as compared with the unpruned or the lightly pruned trees.

## **REBUILDING**

Rebuilding of trees from a trunk sucker growing from just above the bud union has been the subject of one set of three test plots. Here again it is essential to wait until early summer, by which time it is possible to pass judgment on the extent of permanent injury to the trees and the method by which the tree can best be treated. When it becomes apparent that the tree has no chance for recovery of the original top, the old top should be cut off at a point just below the crotch of the old scaffold limbs. This should be done in late June or early July. Then follows the program of training up a good straight leader which may be selected from the many shoots which are starting to grow out of the living part of the trunk near the ground. Selection of this new leader should be made on the basis of obtaining a strong, straight shoot located as low as possible but still above the bud union and this should be tied to the old stump to maintain it in straight upward growth.

Three methods were tried in our trial plots on the Griswold ranch in La Habra Heights.

Trial A consisted of removing the old top of the tree in July, 1937, and doing nothing to select the leader for the new tree at that time. All growth was allowed to remain on the trunk until March, 1938, without doing anything to select a new leader.

Trial B consisted of first removing the dead top of the tree in July, then selecting the best sucker from the new growth on the trunk, tying it to the old stump and pinching back the growing tips of all the other new shoots. None of the temporary growth was removed until March, 1938, although three follow-up treatments were made throughout the balance of the year to keep the growing tips of the temporary growth pinched back in order to maintain a strong growth in the selected leader.

Trial C consisted of removing the old top as in the case of A and B. The new leader was selected and tied to the stump. All other growth along the trunk was entirely removed at this time, July, 1937. In March, 1938, the work of removing the old dead stumps and treating the cut surface of the stump to prevent heart rot was done. The new leaders had then attained a height of from five to seven feet in both Trials B and C.

## **CONCLUSIONS FAVOR TRIAL "C" METHOD**

The growth of the trees in Trial A was very bushy and it was difficult to obtain a selected straight leader with which to work. In Trial A the old stumps and all the growth which had been allowed to remain was then removed—one leader being selected and staked up. The growth of the new leaders in the trees of Plot A after this March work had been done was observed to be less vigorous than in either Trial B or C. Trial C at that time had the best appearance of the three from the standpoint of shaping up the leader with a promise of a good structural tree. At the present time (October, 1938) all three trials show about the same degree of growth and no difference can be measured in the vigor of the growth of the new leaders, except in those cases in Trial A where the new leaders selected in March became broken off because of not having been properly trained and where a second attempt at bringing up a new leader was necessary. Our conclusions from these trials are that the procedure followed in Trial C is the least expensive and most effective method of accomplishing good results.

In conclusion it may be said that the principal essential in treating frost injured trees, whether it be in anticipation of pruning, rebuilding from trunk shoots, or propagation with new scions on the old trunk, is to resist the desire to act too quickly in the spring following the freeze. Most effective recovery in obtaining a good tree or bringing the tree back into production can be obtained by allowing the tree to do for itself for the first six months. During this period of waiting the grower has the opportunity to observe the trees, to formulate plans for his method of handling them, and adjusting that method to the conditions observed.