



COOPERATIVE EXTENSION OF VENTURA COUNTY

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Rehabilitation of Freeze-Damaged Citrus and Avocado Trees

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For the first time since the great freeze of '89-90, we have experienced a little more than minor damage to our crops. Compared to the San Joaquin Valley, Ventura country escaped without major damage; although there were some areas harder hit like the Ojai Valley and some canyons near Santa Paula. Many parts of the SJV were hard hit.

As in the freeze of 1990, your trees must be cared for in the same way during this post freeze period. In 1990, advice was issued to the grower about the rehabilitation of their trees, both citrus and avocado. We would like to review that information for you at this time. How can we best aid tree recovery so that tree growth and yield will proceed most rapidly?

FREEZE DAMAGE

Citrus and avocado leaves appear wilted or flaccid during periods of low temperature. This is a natural protective response to freezing temperatures and does not mean the leaves have been frozen. Leaves will be firm and brittle and often curled when frozen. Leaves become flaccid after thawing, and if the injury is not too great, they gradually regain turgor and recover, leaving however, dark flecks on the leaves. Seriously frozen leaves collapse, dry out, and remain on the tree. Foliage from recent flushes are most susceptible to this damage. If twigs or wood have been seriously damaged, the frozen leaves may remain on the tree for several weeks. If the twigs and wood have not been damaged severely, the leaves are rapidly shed. Trees losing their leaves rapidly is often a good sign and is not, as many growers believe a sign of extensive damage.

Cold damage to the twigs appears as water soaking or discoloration. In older branches and trunks it appears as splitting or loosening of bark where the cambium has been killed. Bark may curl and dry with many small cracks. Dead patches of bark may occur in various locations on limbs and trunk.

Sensitivity to frost is dependent upon many variables. In general, mandarins are the most cold hardy followed by sweet orange and grapefruit. Lemons are very frost sensitive with Eureka decidedly more sensitive than Lisbon. For avocados, Hass is about as cold tolerant as lemons, while Bacon is more cold tolerant. Limes are the least cold hardy. Healthy trees are more tolerant than stressed ones. The rootstock also imparts sensitivity onto the scion.

Injury to the foliage and to young trees may be immediately recognizable but the true extent of the damage to larger branches, trunks, and rootstocks may not appear for on to four months following the freeze. No attempt should be made to prune or even assess damage from the frost until spring when new growth appears.

WHITEWASHING

The only treatment that should be done rapidly after a freeze is whitewashing. Often the most sever damage following a freeze results from sunburn of exposed twigs and branches after defoliation. Avocados and lemons are the most susceptible to sunburn, oranges not as much; but, if the tree has been defoliated, applying whitewash would be precautionary. Temperatures do not have to be extremely high to cause sunburn.

PRUNING

Pruning should be carried out to prevent secondary pathogens and wood decay organisms from slowing tree recovery. Again, however, there should be no rush to prune. Premature pruning, at the very least, may have to be repeated and, at the worst, it can slow tree rehabilitation. It should be remembered that when pruning, all cuts should be made into living wood. Try to cut flush with existing branches at crotches. Do not leave branch stubs or uneven surfaces. Tools should be disinfected in bleach or other fungicide before moving on to the next tree.

The extent of pruning is dictated by the amount of freeze damage:

Light Damage	Medium Damage	Severe Damage	Extreme Damage
Where only the foliage and small twigs are injured, pruning is not required	Where a considerable part of the top has been killed but the trunk and main crown limbs show little damage, branches should be removed back to living wood above vigorous sprouts	Where the top and crown limbs are severely damaged but there are sprouts above the bud union, the tree should be cut back to the uppermost sprout.	Where trees are killed to the bud union or the rootstock has been girdled, the trees should be removed and replaced with new trees.

IRRIGATION

Irrigate carefully! Remember that when leaves are lost, obviously evaporation from leaves is greatly reduced, and, therefore the amount of water required is also greatly reduced. A frost-damaged tree will use the same amount of water as a much younger or smaller tree. Over irrigation will not result in rapid recovery. Instead, it may induce root damage and encourage growth of root rotting organisms. This is particularly true for avocados. Irrigation should be less frequent, and smaller amounts of water should be applied until trees have regained their normal foliage development.

FERTILIZATION

Fertilization of freeze-damaged trees should be carefully considered. There is no evidence to indicate that frozen trees respond to any special fertilizer that is supposed to

stimulate growth. If trees are severely injured-with large limbs or even parts of the trunk killed-nitrogen fertilizer applications should be greatly reduced, until the structure and balance of the tree become re-established.

Trees should be watched for evidence of deficiencies of minor elements. Deficiencies of zinc, manganese, copper, and iron are most likely to develop. For citrus, these materials should be applied as sprays, and they should be used as often as symptoms are observed. Two or more applications may be required the first year.