University of California Cooperative Extension • Tulare County

# Citrus Notes

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# Post-Freeze Citrus Culture

## Crop Salvage or Removal

It is generally not worthwhile removing frozen fruit except if it has some economic value. Salvaging should be coordinated with the requirements and the experience of packing houses and marketing organizations. Crop value may be difficult to evaluate as deterioration and decay occur with injured fruit. Following the temperatures of December 22, 1990, most lemons were only usable for 7-10 days. Navel oranges began to behave in a similar manner at 2 weeks. In some past freezes, Valencia oranges have filled in their damaged zones when the juice vesicles were able to continue to grow. Decisions on fruit removal may involve consideration of the aggravation of red scale control from the presence of scale infested fruit left on the tree, or the interference of the frozen fruit with the new crop harvest.

## Should Frozen Fruit Be Stripped

Lemon fruits that are damaged will drop mainly on their own and there are no trials to show effects of delayed harvest on subsequent crop. The multiple blooms of coastal districts suggest lemon trees can carry multiple crops.

Navel oranges are harvested over an extended season, November to June, and any adverse effect of delayed picking has become a "built-in" cultural practice. Freeze damaged navels shed fairly easily except when treated with 2,4-D which will cause abscission to be slower and less complete. After the 1937 freeze a navel orchard was divided to allow natural drop on half and stripping of the rest. Next year's crop favored the stripping by about 8%, hardly a significant difference.

Similar orchard treatments were done with Valencias following the 1937 freeze with the results demonstrating this variety's general tendency to have a smaller crop after a delayed harvest. The frozen fruit effect is about 50% of the response for late picked sound fruit. In other words, the picking of sound Valencias in September, October and November causes a greater reduction on the subsequent crop than leaving frozen fruit to drop on its own.

Good fruit may be found as a more thorough assessment is made in each orchard. Some salvage is a possibility whereas stripping results in an immediate expense. With potential income so devastated by this year's freeze, the expense of dropping fruit may be better applied to culture for next year's crop, particularly for high priority items like water.

## Care of Trees

Continue to preserve the canopy from additional freezes. Dormant wood will tolerate a temperature of 20° for 4 hours. Mature leaves will stand 23-29°. In the spring when new growth has begun, this temperature will be considerably higher, probably near 30°. A reminder: the exposed surface temperatures may be several degrees below air temperature so protection may need to start above the danger point.

Delay pruning for 6-12 months to determine the degree of damage and the ability of the tree to recover. The extent of dieback has been found to become worse for trees that are pruned shortly after injury. Recovery is best when trees are allowed to define their own injury limit. It is also not necessary to provide dressings or other painted-on coverings to wounded bark such as frost or frozen splits, since most of these treatments have resulted in greater bacterial and fungal infections. It may not be necessary to respray the Bordeaux since it will have a substantial tree life under most normal rainfall conditions.

Medium-sized trees or juvenile trees that have exhibited moderate to severe damage can be allowed to recover on their own before any rehabilitation efforts are begun. In

cases where tree losses are involved it may be more useful to consider intersetting and growing a new orchard in between the established planting.

Newly planted trees that were subjected to lethal temperatures should also be allowed to demonstrate their degree of injury. Salvaging trees is possible if the freezing has not gone below the bud union. Bringing up a new shoot and even using the old dead trunk as the stake has been a common practice. If nursery stock is in short supply, it might make economic sense to let the rootstock resprout and attempt budding in the field. The main drawback here is that nursery operations are spread out over an extended acreage.

## Cultural Programs

Irrigation requirements will be modified by trees with smaller canopies. The canopy may be reduced as a consequence of leaf loss. The timing or scheduling of irrigations should be made according to evapotranspiration requirements based on the new canopy size. Arrange applications to be shallow, involving just the rooting zone and avoid deep percolation losses. Avoid saturated conditions that may injure roots. If water supplies are adequate for using a larger flow for winter frost protection, consider redesigning the system to achieve this objective.

Nutrition may also be adjusted downward since the plant may be starting a new canopy. Consider foliar applications of urea to the new flush for the nitrogen requirement and for stimulation of flower formation. Zinc applications as foliar sprays will probably be necessary on new growth.

Pest control programs will reflect the effect of the freezes. One of the more important things will be the regrowth of the canopy so that attention will be necessary for control of citrus thrips. These insects have the ability to distort new growth and the canopy may suffer. Both California red scale and the Aphytis parasites may have experienced mortality as a result of the effect of the freezing temperatures on tree canopies and fruit. This is an opportune time to monitor the flights of male scale with pheromone traps to determine if treatment requirements will be necessary and also provide the most accurate timing. In orchards where parasites have been liberated it may be helpful to collect twigs and fruit to determine the impact of the freeze on the parasite population.

## Soil Management

While it is desirable to maintain as little weed growth as possible, especially to retain the advantages of bare ground during frost episodes, evaluate the label of the residual herbicide being used to see if there are special uses or methods of use that apply to stressed trees.

## Freeze Damaged Citrus Trees

It is impossible to determine the full extent of severe injury for several months.

In very severe cases dieback may continue for the entire season. No pruning should be done for 6-12 months.

Time should be given for new growth and dying back. Early pruning often leaves limbs continuing to die back and removal of some limbs that would recover.

Early pruned trees do not recover as soon as trees pruned later. Different degrees of injury require different treatment:

1. **Light damage. Foliage and small twigs only are damaged.**

Require no special treatment. No special pruning during season following freeze. All foliage should be retained to nourish root system and support crop that develops.

2. **Medium damage. A considerable part of the top is killed but the trunk and main crown limbs show little damage. No pruning for several months until full extent of damage is visible.**

Save as much framework as possible.

Cut below all serious bark injuries.

When injured limbs are removed cut back to good strong new shoots that are best available.

In some cases distribution of the framework branches can be controlled to some extent by a very light pruning the first season, but nothing is lost by delaying pruning a full year.

After injured branches have been cut to new leaders, further pruning consists of gradual thinning over a period of years of excessive sprouts. Otherwise, they will crowd and interfere with the growth and branching of the leaders forming the new framework.

3. **Severe damage. Where the top and crown limbs are mainly killed but the trunk shows little injury.**

No action until full extent of injury is known – usually after midsummer.

Remove entire top of the tree cutting below all large areas of injured bark.

Numerous sprouts on trunk will have appeared by then. New head of tree must be developed from these. Select uppermost good sprout and cut off trunk just above this sprout, sloping the cut downward away from the sprout.

Then choose 2-3 other sprouts properly spaced to form a new head and favor their growth by pinching back sprouts that crowd them.

All sprouts that are formed should be left until a balance between root and top is established. The unnecessary sprouts should then be gradually removed.

4. **Very severe damage. Where the top is killed and the injury extends well down the trunk, but is followed by the appearance of strong sprouts above the bud union. Here a new trunk and head must be formed. This can be produced by a strong shoot coming from above the bud union.**

Cut off branches, leaving the trunk as a support for the special sprout.

Favor this sprout by pinching back other shoots which crowd it. When the new head is the size of a 2 year old, remove the old trunk carefully with the cut starting just above the base of the new trunk and sloping downward.

The cut surface should be painted after drying.

During the year following the freeze and until the old trunk is removed, all sprouts should be allowed to grow but their growth controlled by pinching back.

5. **Trees killed to a point below the bud union. In most cases trees killed to the bud union should be replaced.**

If the tree is retained, a shoot from below the bud union must be trained and budded to the desired variety as soon as it is large enough to take a bud (1/4 – 3/8 inch in diameter). Place bud at height of 18-24 inches.

This allows shoots to grow around base of tree without shading the bud.

Interplanting: In the cases of #4 and #5 the trees may not make a good recovery.

Interplanting with new trees increase returns during recovery and reduces the impact if some older trees fail to develop.

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