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## FROST-DAMAGED PLANTS

*Ben Faber, Farm Advisor Ventura County and Ed Perry, Farm Advisor Stanislaus County*

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Recent freezing temperatures in many parts of California have injured some citrus trees and other frost-sensitive subtropical plants. But since the full extent of injury won't be known for several months, UC Cooperative Extension (UCCE) horticulture advisor Ed Perry suggests gardeners wait until spring before pruning and removing damaged trees and plants.

The frost injury to plants depends upon a number of factors, including species, age, health, soil moisture and location. Frost injures plants by causing ice crystals to form in plant cells, making water unavailable to plant tissues and disrupting the movement of fluids. Frost-damaged leaves appear water-soaked, wither, and turn dark brown or black. Unprotected, sensitive young trees may be killed, but frost rarely kills mature trees in California. "While you may be tempted to prune out damaged branches right away, it's best to wait until spring when new growth will show you the extent of the injury," said Perry of Stanislaus County. "Always allow plenty of time for new growth to take place, so that the damage is clearly defined. Earlier pruning often results in leaving some limbs which might continue to die back, and the removal of limbs which might recover."

If a one- or two-year-old citrus tree has been killed almost to the ground, it's important to determine whether the dead wood extends below the bud union, something best done in April or later. "If only the roots survive and grow back, you may be left with an unproductive rootstock instead of the true-to-type citrus tree you originally planted. In this case, the tree should be replaced," Perry said. "If there is enough live wood above the bud union to grow a strong shoot, a new trunk will develop."

The only treatment that should be applied rapidly after a freeze is whitewashing, according to UCCE citrus farm advisor Ben Faber of Ventura County. "Often the most severe damage following a freeze results from sunburn of exposed twigs and branches after defoliation," Faber said. "If a tree has been defoliated, paint or spray on water-diluted white latex paint to protect the bark from the sun."

The citrus fruit itself is often damaged by frost. Within a few hours after critically low temperatures, ice crystals form inside the juice vesicles, causing the vesicles to rupture. This results in water loss, causing the fruit to dry out. Frost-damaged fruit must be used quickly, because they break down rapidly and are subject to decay. Deterioration of frost-damaged fruit usually occurs within a few days to a couple of weeks, depending on storage conditions. "Pick all the frost-damaged fruit as soon as possible," Perry said. "That will remove some of the stress from a weakened tree, and allow you to use the fruit before they break down entirely." Also, decrease or withhold nitrogen fertilizer applications to severely damaged citrus trees and irrigate carefully. "Frozen trees have been thrown out of balance. They have the same amount of roots as before, which are now supplying a much-reduced top," Perry said. "The result is a tremendous amount of new growth breaking out all over the trunk and uninjured branches. It's best that the new shoots grow at a moderate rate."

The UC advisors say a quick-acting nitrogen fertilizer may stimulate excessive water sprout and sucker growth, which makes reshaping the tree more difficult. Over-irrigation may induce root damage and encourage growth of root rotting organisms. Irrigation should be less frequent and in smaller amounts until trees have regained their normal foliage.

For more information, please call: Placer County Master Gardener HOTLINE @ 530-889-7388  
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