



## WHEN AND HOW TO PROTECT CITRUS FROM WINTER'S COLD

Louisiana has its coldest temperatures in January but freezes can begin as early as November and occur well into early March (sometimes later). Protection of citrus trees becomes important when severe freezes occur. It is difficult to pin point a "threshold" temperature at which it becomes necessary to protect citrus trees. The biggest difficulty in making such a determination is the difference between various types of citrus in their tolerance of cold.

Satsumas, for example, do not need protection until the temperatures approach 20 degrees F. Lemons, limes, and oranges generally need to be protected when the temperature dips below 26 degrees F. However, these trees may be killed or damaged at these temperatures if they are not sufficiently hardened with enough pre-conditioning cold temperatures to halt their growth.

The length of time citrus trees are exposed to sub-freezing temperatures is also significant. Exposure to sub-freezing temperatures for more than 24 to 36 hours can be devastating. But, if the temperatures moderate to above freezing prior to this time, damage is usually light.

**All ripe fruit should be harvested from trees prior to a significant freeze event.** Temperatures cold enough to damage the tree will also ruin the fruit. It takes temperatures in the mid- to low 20s five to 10 hours to freeze the fruit.

**Three factors which are basically involved in determining freeze susceptibility of citrus trees are:**

1) The type and age of the citrus. Satsumas are the most cold hardy of the commonly grown citrus species in Louisiana. Kumquats follow with just a slight less amount of cold hardiness. In order from most cold hardy to least cold hardy: satsuma, kumquat, orange, grapefruit, lemon and lime.

A citrus tree increases in hardiness as it gets older. Trees with larger, denser canopies deal with the cold better as they trap more heat.

2) Threshold temperatures are approximately 20 degrees for satsumas and kumquats, and about 26 degrees for all other citrus.

3) The duration of the sub-freezing temperature is very significant. If the temperature is below freezing for 24 to 36 hours, damage can usually be expected.

Generally, when freeze injury occurs, damage is inflicted mostly to cell membranes by freezing and thawing. The least cold hardy tissues of citrus trees are new buds, flowers, and small fruit. The more cold hardy part of the tree is the mature wood of major branches and the trunk.

If a citrus tree is gradually exposed to cooler temperatures, a process called hardening occurs and trees become more tolerant to freezing temperatures. Citrus trees are evergreen and never become full dormant, but trees that are slightly dormant (pre-conditioned by gradual cold) are less likely to be damaged by cold. So, chilly but above freezing nights (30s and 40s) that occur during fall and early winter before major freezes make the trees more cold tolerant. Severe freezes taking place when only mild weather has occurred previously are more likely to cause significant damage.

The best way to lessen cold damage to citrus is to maintain healthy trees. Cultural practices that tend to induce and maintain dormancy in winter should be used. These methods include no late summer or fall fertilization or pruning. Vigorous trees may recover from cold injury. Weak trees that are showing disease, insect damage, or nutritional deficiencies are the ones most severely damaged and are the slowest to recover after freezes.

**Seven steps are suggested to reduce freeze damage:**

- 1) Clean cultivation under the canopy of a tree, mechanically or by herbicides, prior to winter is recommended. Grass, weeds, and straw mulches prevent heat from entering the soil during the day; therefore, less heat energy is stored in the soil under the tree for release at night.
- 2) For trees too large to cover, banking the lower trunks of trees with soil or using tree wraps of bubble wrap, foam rubber or Styrofoam will help prevent cold damage to the trunk. This must be done before the first killing freeze and can be left on through the winter. Trunks should be treated with a copper fungicide before wrapping or banking to prevent foot rot. Or, the coverings may be applied during freezes and removed during mild weather. Although tree tops may still be lost during freezes, a tree can recover if its trunk and root system are intact. Banking or wraps should be removed in the spring.
- 3) If the weather has been dry, several days in advance of a cold front the soil beneath citrus trees can be irrigated. Good soil moisture acts as a cold buffer, and trees that are drought stressed may experience more cold damage. This must be done well in advance of the freeze. If this is done at the time the front arrives, evaporation may occur and result in colder temperatures near the tree.
- 4) If pruning is needed, it should be done in spring to allow tree growth to mature before winter. Do not prune in the late summer or fall. Cuts should be made at branch crotches leaving no stubs. Prune to maintain a full, dense canopy. Trees need good leaf canopies to cut wind speed through the canopy and reduce the rate of cooling. Leaves radiate heat to each other. Outer leaves may be lost to a freeze, but complete loss of inner leaves is averted by a thick canopy.

5) Fertilizer should be applied to citrus trees in late January or early February. A complete fertilizer such as 8-8-8 at the rate of two pounds per year of tree age may be used. Stop increasing the rate when you reach 15 pounds. If using 13-13-13, the rate is one and one-half pounds of fertilizer per year of tree age. Stop increasing the rate when you reach 10 pounds. Spread the fertilizer around the edge of the branches in the area of the feeder roots. Apply a subsequent application of nitrogen when good soil moisture exists in June. Late summer or fall applications of fertilizer should be avoided as they can reduce the hardiness.

6) Oil sprays used to control insects and mites decrease cold tolerance and should not be used later than August 15.

7) To protect a single smaller tree, construct a simple frame over trees and encase the tree with one or two layers of translucent plastic. This is generally most practical for smaller trees. In southeast Louisiana, such an extreme practice would be needed only on a few severely cold nights.

Before covering, the tree could be generously draped and wrapped with small, outdoor incandescent Christmas lights to provide additional warmth and increase the level of protection. Incandescent Christmas lights will not damage the tree even if they come into contact with it.

The frame and cover can stay in place indefinitely, but will need to be vented. Air temperatures within should not be allowed to go above 85 degrees to 90 degrees F. Venting should be provided on sunny warm days to prevent overheating and to maintain a supply of fresh air.

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