

## **FREEZE PROTECTION OF CITRUS AND TROPICAL PLANTS**

The Rio Grande Valley will occasionally receive a damaging freeze. When a freeze is predicted, what should you do to protect tender plants? First, some facts: Fact one, on calm, clear nights plant leaf temperature can be as much as 4 degrees Fahrenheit (F) below air temperature. Fact two, reported temperatures are measured at the 5ft above the ground. Fact three, if clouds blanket the Earth, then plant leaf temperatures will not drop to 32F until air temperature does.

Freezes on calm, clear nights are called radiational freezes because the Earth's heat is radiated in to a cold sky. On such nights even a flimsy barrier can provide tender plants some protection. If it is windy and the temperature is below freezing, then the barrier has to be of a heavier material that insulates well, be anchored to the ground around the plant, and be nearly air-tight to be effective. Cardboard boxes are excellent material for the barrier. They are lightweight, easily available, excellent insulators, cheap, and readily disposable.

Plants also vary in sensitivity to cold. Among the most "tender" or most easily damaged by cold are papaya, croton, ficus, Jacob's coat, bougainvillea, hibiscus, tomato, and pepper. Their foliage and fleshy stems are damaged at 32 degrees F. But a radiational freeze with reported temperatures as warm as 34 degrees F can cause leaf damage. Slightly more tolerant plants (or those damaged at about 30 degrees F) are lemon, lime, avocado and various ornamental shrubs and trees.

Relative to other citrus, grapefruit and oranges are quite cold tolerant. Their leaves defoliate at about 28 degrees F, but their fruit does not usually freeze under calm wind conditions unless the temperature is 26 degrees F for about 5 hours. If you have a few trees use home insulation, water pipe insulation, or newspapers wrapped around the trunks of trees smaller than 2 to 3 inches in diameter. But any material ceases to insulate if it gets wet. So newspaper and cardboard should be wrapped with plastic.

Two practical materials every homeowner has access to are soil and cardboard boxes. Cardboard boxes come in many sizes. Simply place the box over the plant with the closure flaps sticking out flat on the ground. Then anchor the flaps with soil, bricks, or rocks/concrete chunks. If the plants are larger than the boxes available, the plant tops can sometimes be forcibly stuffed into the upside down boxes, or the closure flaps can be used to extend the height of the boxes. Once the box is over the plants, a brick or other weight on top helps hold the box in place, especially if its windy or the foliage stuffed into the box is trying to lift it off the ground. Cardboard boxes can also be dismantled to flat sheets and be draped over plants.

If predicted temperatures are low enough to freeze the plants to the ground, soil is the plant owner's best ally. Shovel the dirt, or soil, up around the trunk to a depth of at least 6 inches, or to a depth above the plant's bud union. (Citrus grown in the Valley is budded onto sour orange rootstock and nursery-grown avocados are usually grafted.)

The trunk of the plant will not freeze below this soil line and the plant will produce shoots in the spring from the surviving trunk if the soil is removed immediately after the freeze. This technique is especially valuable for trees such as avocado, papaya, and citrus. But it is also the most practical method to salvage large tropical shrubs such as hibiscus, bougainvillea, and croton. The large undamaged root system will produce a sizeable top again within a year--much faster than replacement plants could. Most plants produce few, if any, vegetative shoots below ground, so if they are frozen to the ground they are usually killed. However, Hawaiian ti and Indian carnation are two species that will initiate growth from below ground. Bananas and cannas freeze to the ground but come back readily from underground "pups" and faster if the dead tops are removed, so it is not necessary to protect them.

Water gives up 80 calories of heat per gram when it freezes, so if water is sprayed or misted onto plants at the right rate, the temperature of the ice-coated leaves, stems, and branches will be kept from falling below 32 degrees F. The problem is that the ice gets so heavy it breaks the limbs. It is, however, one of the only ways to provide enough heat to plants if the wind is blowing and the temperature is below freezing. Therefore, it is worth trying with valuable trees or shrubs which otherwise would be lost if nothing is done. The soil conducts heat out of the ground much better if it is moist than if it is dry. Thus watering the ground around plants 1 or 2-days prior to a predicted freeze will increase heat flow out of the ground compared with a dry soil. Water applied 12 to 24 hours before the freeze will still be draining downward and will interfere with heat flow up out of the ground so pay attention to the weather forecasts.

Whatever you do, do not wrap the top of the plant with garbage bags or thin plastic, as the temperature inside and outside a plastic sheet will be virtually the same as the air temperature. Insulating material, a blanket, sleeping bag, beach towel, piece of rug, or a tarpaulin is better than a thin sheet of plastic. This way the plants will be protected from radiational freezes, at least.

A few people wash frost from the grass of their lawns with water from a garden hose before the sun comes up the morning of a frost. Only areas of the lawn not shielded from the sky by buildings or trees will have frost. Washing off the frost prevents damage to leaf cells due to rapid warm-up by the sun.

For very expensive or rare specimen plants, heater tapes can be wrapped around the trunk to keep them from freezing. Indoor/outdoor Christmas lights are usually available in winter, but must be used with extreme caution. They should not touch any combustible material and are not very effective if it is windy. If an almost air-tight enclosure of cardboard and plastic sheeting that is open to the ground has been constructed around a specimen plant, a single 60-watt light bulb will usually keep the interior above freezing even if it is windy.

(Source: Dr. Craig Wiegand (retired) Soil Scientist from the Agricultural Research Service, USDA, Weslaco, TX. He researched freeze protection of citrus and is a certified Master Gardener)

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