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PARSONS
ON CITRUS

Freeze Warning: Don't Get Burned

Even though growers have concentrated on disease and pest control during the past few years, they cannot ignore environmental factors that can reduce yield. The past two winters have reminded growers that freezes can still impact them, even in southern parts of the citrus belt. Freezes can cause greater damage to trees affected by greening or other diseases than to healthy trees. While recent freezes have not been as damaging as the five major freezes in the 1980s, they have still affected growers noticeably. Last year, January had an unprecedented series of cold nights. In Lake Alfred, seven out of nine nights were below freezing in early January 2010.

Prior to 1980, it was not known if microsprinkler irrigation would provide any freeze protection for citrus trees. In fact, some growers were reluctant to use water for freeze protection because of the disastrous effects that occurred with overhead sprinklers in the windy December 1962 freeze. During that freeze, ice loading of several hundred pounds on top of mature trees broke down the canopies. Also, because of inadequate irrigation application rates and sprinklers that froze up, evaporative cooling chilled wetted branches below the ambient air temperature.

Cold Cases

Our earlier work showed that, contrary to earlier opinions, microsprinkler irrigation could provide some freeze protection. Microsprinklers were particularly effective in protecting young trees. As long as the water ran continuously during the freeze night, microsprinklers could save the bud union and protect wood throughout most of the iced zone. Placement of the microsprinkler in relation to the tree was important. If growers had the microsprinklers on the south side of the tree, damage could occur on windy nights. Winds come out of the north or northwest during advective freezes, and the wind can blow water away from the trunk. With alternate wetting and drying due to variable wind, evaporation can cool the trunk temperature below air temperature and kill the young tree. Hence, microsprinklers should be placed on the north side of the tree so water is continuously blown in to the lower part of the canopy.

The amount of air temperature warming depended on the volume of water applied, but was around 1°F to 2°F in the lower part of the canopy and less than 1°F higher up in the canopy. If a grower can afford it and has adequate pumping capacity, application rates of 2,000 gallons per hour (gph) per acre are recommended. With traditional tree densities of 140 or 100 trees per acre, one 15 or 20 gph microsprinkler per tree is adequate. With densities of 200 trees per acre, one 10 gph microsprinkler per tree is good. With even higher tree densities, a lower output emitter would be adequate, but the smaller orifice size could cause more frequent plugging.

Keep A Close Watch

In Florida, freezes usually come as one or two night events. When growers run their irrigation systems for only a few nights, the aquifer usually recovers in a reasonable time. However, the nearly continuous freezes in January 2010 were unprecedented. The pumping nearly every night lowered the water table to near record low levels. This led to sinkholes developing in some locations, particularly in strawberry growing areas that used large quantities of irrigation water on multiple nights.

Microsprinkler irrigation benefited citrus trees in the major freezes in the 1980s. But because of limited fruit hardiness and very cold temperatures, it was assumed that this irrigation would not benefit the fruit during freezes. However, work we carried out in 2010 showed that microsprinklers could provide some benefit to the fruit.

In spite of other concerns, growers still need to prepare for possible freezes and check out irrigation systems in advance.