Florida blueberry growers continue to realize significant profit when they market their crop partly due to the fact that the harvest from the state has very little competition from other production regions within the United States or in other countries. The cultivars of southern highbush blueberries, predominately released from the UF breeding program that has been headed by Dr. Paul Lyrene, have enabled growers in the state to produce this valuable crop during their unique “harvest window” that begins in late March and runs until significant volume from production areas to the north ends the commercial harvest usually in early to mid May. One downside to producing blueberries in this time frame is the challenge of overcoming freezing temperatures that often occur during the blueberry flower and fruit development period. For this reason, freeze protection of some kind is necessary to consistently produce commercial blueberry crops in most Florida production regions. The most common method for accomplishing this is overhead irrigation systems that protect the crop by coating it with ice, thus maintaining the buds, developing flowers and fruit at a temperature of 32° F.

Overhead irrigation for freeze protection is effective but has some negative factors. The potential breakage of blueberry limbs by excessive ice buildup, the use of copious amounts of water are (to provide the 0.25 ac/inches of water per acre each hour that is common in many systems), the associated cost of pumping these volumes and the fact that failure of the system for even a relatively short period of time during the freeze protection event could lead to a complete crop loss from plant tissue temperatures plummeting due to evaporative cooling. For these reasons, overhead irrigation for freeze protection should only be used when absolutely necessary.

As blueberry buds develop, the temperature that could harm them increases as the temperature drops below 20° F when floral buds are tight (Stage 1) to just below freezing when fruit is set on the plant (Stage 7). If growers utilize tools such as the Florida Automated Weather Network (FAWN) and its “Cold Protection Toolbox”, other forecast sources such as “Weather Watch” and weather measuring instruments such as appropriately placed and maintained orchard
thermometers and hand held units such as Kestrels®, they will be able to determine if freeze protection of the their crop is necessary. If a grower knows that the stage their crop is at can withstand temperatures in the high teens and the low for the night will be 25° F, there will be no need for freeze protection. In the EDIS document “Protecting Blueberries from Freezes in Florida” (HS 968) many concepts of freeze protection are covered, including a chart that compares precipitation rate of the irrigation/freeze protection system, temperature and wind speed to determine if the system should be operated. There may be situations when critical temperatures will be met but running the system may subject the crop to additional damage because the precipitation rate is not sufficient to overcome evaporative cooling related to very high winds during the night.

Extension programs such as “Winter Weather School” have increased the knowledge of blueberry growers and other producers in west central Florida about the importance of utilizing forecasts and weather conditions compared to their crop stage to help them make decisions on whether to utilize freeze protection or not. During the freezes this year, a majority of the growers did no freeze protection as temperatures generally stayed significantly above critical temperatures for the stage of development of the blueberry crop.

To demonstrate the potential water and application cost on an acre of blueberries, I will utilize 2009 FAWN data from the Brooksville station and compare it to approximate blueberry growth stage in the region last season during some of the significant freeze events. The comparison will be running during freezing conditions versus only running when critical temperatures were approached. Significant freezes started on January 17, 21 and 31; February 4 and 21 when there was a total of 104 hours below freezing. During this time there were 57 hours when freeze protection was necessary to protect a vulnerable blueberry growth stage. Assuming a precipitation rate of 0.25 inches of water per hour, 6,788 gallons of water are applied to an acre during each hour of freeze protection. The remaining 47 hours did not need freeze protection even though temperatures were sub-freezing. This represents a savings of 319,036 gallons (11.7 acre inches) of water and $392.65 (Parvin and Walden 1999) to operate the irrigation system per acre.

A properly managed and maintained overhead freeze protection system can protect a blueberry crop from freeze while saving money and a precious natural resource. This is an important consideration in this era of rising production costs, potential reduction in profit margins and ever dwindling water supply.

References:
