PARSONS
ON CITRUS

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Irrigation Dollars And Sense

New technology has improved our ability to measure soil-water status. One of the earlier devices to measure soil-water status or tension was the tensiometer. A tensiometer is a water-filled tube with a porous ceramic cup at the one end and a vacuum gauge at the other.

Tensiometers have been used for more than 50 years and are still a good way to get a snapshot idea of soil-water tension at a given time. Tensiometers require some maintenance. If the soil-water tension becomes drier than about one atmosphere, the water column breaks or separates, air enters the tube, and the vacuum gauge no longer gives a valid reading. Over time, additional water needs to be added to the tube to re-establish the water column. While tensiometers are useful and relatively low cost, growers seldom make time for maintaining the water columns in them.

Other Options

Fortunately, new technology has become available that allows growers to monitor soil-water status with fewer maintenance issues. Many of these are electromagnetic (EM) sensors that can be read with a data logger that provides a record over time of changes in soil-water status. Capacitance probes take advantage of the marked difference in dielectric permittivity between water, air, and soil minerals. This allows these sensors to show changes in soil-water content.

We have worked with several capacitance probes that can provide real-time soil water measurement. One advantage of some systems is the ability to transmit soil-water content data to a site that can be accessed via the Internet. With one system that we evaluated, water content at several depths (not just one depth) could be averaged to set a trigger point to start irrigation.

The system can automatically change irrigation frequency based on tree demand and can adjust to hot, cool, dry, or rainy conditions. Thus, tree "need" determines irrigation application.

Digging Deeper

Systems that can measure soil temperature and electrical conductivity (EC) also are available. With EC monitoring, the grower can get an estimate of how deep fertilizer salts are moving into the soil. Growers also can adjust soil-water depletion levels during different seasons to apply deficit irrigation or "dry down" a field before harvest.

These systems do not replace grower judgment, but they can monitor soil-water status, show how deep the water has moved, reduce over-irrigation and nutrient leaching loss, and start irrigation based on plant water use. A grower can easily monitor soil-water status and irrigation operation online in distant fields from the office.

Growers now have the capability of a fully automated irrigation system where tree demand determines frequency and amount of irrigation applied. These advances in soil-water technology can take growers well beyond the old "kick the dirt" decisions on when to irrigate. A variety of systems are now on the market, and growers now have more ability to monitor soil-water status and adjust their irrigation. These techniques will help growers deal with Florida's need for increasing water conservation. FG