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Using Tensiometers for Irrigation Scheduling in Tropical Fruit Groves ¹

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Tensiometer selection

For most tropical fruit groves, a 6-inch tensiometer is suitable, since that is in the active root zone. Reliable determination of the irrigation rate also requires the installation of a longer (12-18 inches) tensiometer to sense conditions near the bottom of trench or below root zone. Both high tension (0-100 cbar) and lower tension (0-40 cbar) tensiometers are available commercially and they are suitable for use in tropical fruit groves.

Calibration and Preparation:

New tensiometers should be tested and calibrated before installation. The Miami-Dade Cooperative Extension Service provides pro bono testing and calibration services to all growers in south Florida. To schedule this service please call Miami-Dade County Cooperative Extension Service at 305-248-3311.

Site Selection

The sites selected for tensiometer installation should be representative of the soil types and tree conditions in your grove. If your grove conditions vary considerably, more than one set of tensiometers should be installed in different locations. For example, if you have marl and gravelly soils in the same grove, one set of tensiometer should be installed in each soil type. If you have lychee and avocado trees in the same grove, at least one set of tensiometers should be installed in each crop planting.

Tensiometers should be located inside the irrigated zone under the tree canopy. If your grove was trenched, tensiometers must be installed over trenches.

Installation

Proper installation is essential to assure effective contact between the ceramic tip of the tensiometer and the surrounding soil. Installation should proceed as follows. First, a small area should be cleared to remove grass and plant residues. A 22-24 inches long, pointed steel rod, 7/8 to 1 inch diameter, may be used to drill a hole deep enough to accommodate

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the entire length of the tensiometer. Using water make thick slurry of the soils taken from the grove in which the tensiometer is being installed. For installation in rocky soils, soil sieved through a 1/8-inch screen should be used. Pour some slurry into the hole and push the tensiometer to the bottom of the hole. Add more slurry until it overflows. Gently move the tensiometer back and forth to assure that good contact with soil has been achieved. Flag tensiometer location(s) in some way to make it highly visible. This can prevent damage to tensiometers. Wait 2 to 3 days before taking readings.

and if necessary more water should be added; 2) growth of algae; and if necessary, algae should be removed and the tensiometer should be cleaned; 3) questionably high readings. Plant roots may be growing around the tensiometer's tip. In these cases the instrument should be removed and reinstalled in a different location.

Irrigation scheduling

In general, the following guidelines can be used to interpret tensiometer readings for irrigation scheduling in gravelly or sandy soils:

1. **Readings of 0-8:** Soils are saturated or nearly saturated as a result of rain or irrigation. Therefore discontinue irrigation to prevent the waste of water and the leaching of nutrients.
2. **Readings of 10-20:** Crops should be irrigated. Irrigation should be initiated at 10-15 cbar during flowering and fruit set and at 15-20 cbar for the remainder of the season.
3. **Readings of 30 and higher:** Plants probably show symptoms of water stress.

Duration of irrigation can be determined by using the deeper (12-18 inches) tensiometer. If the deeper tensiometer reading drops 1-2 cbar after irrigation, then shorten the irrigation time until the irrigation no longer registers on the deeper tensiometer. On the other hand if the reading of the deeper tensiometer increases to 25 cbar or more, then the irrigation time should be increased.

Maintenance

All tensiometers should be cleaned, calibrated and reinstalled every 4-6 months. Each time the tensiometer is read, the following should be checked: 1) water level in the body tube and in the reservoir;