Tensiometers help irrigation scheduling

NEWARK, Del. — Getting the most from an irrigation system requires skillful management. One way to make better scheduling decisions, says University of Delaware extension agricultural engineer Tom Williams, is to use a tensiometer.

This device consists of a sealed, water-filled plastic tube with a porous tip on one end and vacuum gauge on the other. It measures soil suction or moisture tension, indicating the soil's moisture status without directly measuring available water.

The tip of the tensiometer is placed into the soil in the active plant root zone. As the soil dries, it draws water out of the tube through the porous tip, creating a partial vacuum which is registered on the gauge on a scale ranging from 0 to 100 centibars. After rain or irrigation, water from the soil is drawn back into the tube, decreasing the vacuum. Thus, the gauge reads high when the soil is dry and low when it's wet. A reading of 0 to 5 means the soil is wet; a reading of 70 to 100 means it's very dry.

The ideal range for plant growth, according to Williams, is 10 to 50 centibars. Irrigation should begin when tensiometers read 30 to 50, depending on soil type, so that the root zone can be rewet before gauges read 60 or above.

"When to start irrigating depends on both soil type and irrigation rate," the specialist says. "On a sandy soil, you should irrigate at a lower reading than on a loam soil. With a loamy sand, start when the gauge reads 25. Begin at 40 centibars on a sandy loam, and 50 on a silt loam soil. Experience may lead you to change these guidelines, but they'll put you in the ball park. If your irrigation system can't cover the entire field before the tensiometers read 60, begin at lower readings. Also, some crops may require wetter soils. Most plants, however, will be stressed if the tensiometers read above 60."

Tensiometers must be installed properly in order to give accurate readings. Place them in the plant row with ceramic tips 7 to 10 inches deep, in the major active root zone. Make sure tips have good soil contact with no voids or stones.

It's easier to install these devices when the soil is wet, Williams says. First, take a pipe or soil probe slightly smaller in diameter than the tensiometer and drive it into the ground to the desired depth. Withdraw the pipe and insert the tensiometer. Then mound the soil around the tube so that water will drain away from it. The longer tensiometers remain in place, the more accurate their readings, so install them soon after plant emergence and leave them until the end of the growing season.

To get representative readings, place tensiometers in three locations that are typical for the field so an average can be obtained. It will be obvious if one tensiometer is malfunctioning. Choose sites that are easily accessible for daily reading and servicing.

"It's a good idea to fill the tubes with water and let the ceramic tips soak in a bucket of water a couple of days before installation," Williams says. "Also, remove air in the water and in the gauge, using the hand vacuum pump provided with the service kit. This is necessary for accurate readings. And use the gauge on the pump to check the gauge on the tensiometer."

Sometimes it is useful to install a deep tensiometer (18 inches) next to a shallow one (8 inches) to indicate whether irrigation was adequate to rewet the soil through the root zone. If the reading of the deep unit drops after irrigating, you know water has penetrated that far.

Read tensiometers daily because readings can change quickly on drought-prone soils when the evapotranspiration rate is high. Also make sure to keep water in the tubes. The usual procedure is to refill them daily after taking readings.

Remove tensiometers before harvest or before freezing temperatures occur. Before storing them, drain the water and scrub the soil from the ceramic tips. Then put them where they can't freeze because it is difficult to remove all the water from the vacuum gauge, and freezing will make it useless, Williams warns.

Magnetic switches can be placed on vacuum gauges to turn on irrigation systems or sound an alarm when an indicator reaches a preset level. Time clocks can be used to turn off the system after it has been started by a tensiometer. Relying on a tensiometer to shut the system off would probably lead to overwatering, the specialist says.

Properly installed and maintained tensiometers can take some of the guesswork out of scheduling irrigation. Growers can purchase these devices from the following sources:

Irrometer Company, P.O. Box 2424, Riverside, CA 92516, Soilmoisture Equipment Corp., P.O. Box 30025, Santa Barbara, CA 93105; Cannon Enterprises, P.O. Box 416, Templeton, CA 93465.

Noxious weed additions sought

HARRISBURG — The Pennsylvania State Grange has requested the State Noxious Weed Control Committee to add two new weeds to the noxious weed control list. In a letter to State Secretary of Agriculture Penrose Hallowell, chairman of the committee, the State Grange asked that autumn olive and spear (bull) thistle be declared noxious, prohibiting their sale of propagation in the Commonwealth.

Under the Noxious Weed Act of 1982, weeds can be designated for state control be petitioning the Nixous Weeed Committee established by the law to consider adding or subtracting weeds to the current list. Prior to the act, separate legislation was required for each addition.

Autumn olive presents a major problem for farmers because of its long, thorny stickers which can easily puncture tractor tires. Spear thistle crows out other plant growth and spreads quickly, eventually contaminating large areas of farmland. Farmers in Berks County, in particular, have noted that these two weeds are causing considerable problems in their fields. Both weeds have been used for wildlife food and ground cover.

The Grange requested Hallowell to "take positive action to alleviate this problem and ensure the eradication of the two weeds."