

Improve Your Scheduled Garden Irrigation with Tensiometers

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What are Tensiometers?

Home gardeners manage every aspect of their vegetable, herb or flower production, including choosing to irrigate. It can be challenging to optimize water budgeting and scheduling irrigation activities. Fortunately, a tool called a tensiometer can help.

Tensiometers are simple, reliable instruments that can help you understand soil moisture levels at the root level, which is more important to plants than surface moisture levels. It measures the energy status of water in the soil in units of negative pressure, or tension, which describes the force plant roots must exert to pull water from the soil.¹ You can automate tensiometers to control irrigation as water levels reach a preset value. With their simple design and rugged construction, these tools have been the standard instrument to measure soil water status for many years.

How to Install and Operate a Tensiometer

Before you install

1. Select the correct size of tensiometer depending on your crop.
2. Prepare your tensiometer for use according to manufacturer instructions.

TENSIOMETER COMPONENTS

Tensiometers consist of a round glass or plastic tube reservoir with a porous ceramic tip at the bottom and a fixed measuring gauge that records pressure at the top (see Fig. 1, right).

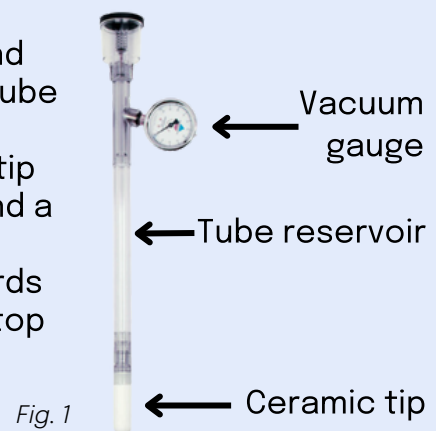


Fig. 1

The tube shows how much water is in the tensiometer. As water moves from the sealed tube to the soil through the porous tip, it creates a partial vacuum. This force is what the gauge reads, and indicates how much energy the plant must expend to extract water from the soil. The porous tip simulates how roots work.

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How to Install and Operate a Tensiometer

Installing your tensiometer

1. Make a hole the same width as your tensiometer, 1-2 inches shy of the root zone.
2. Mix a slurry with soil from the planting site, and pour into the hole. This will improve the accuracy of the readings.
3. Push the tensiometer into the hole, placing the ceramic tip about 1-2 inches further into the soil than the bottom of the hole, where the plants roots are located.

Tensiometer readings and Irrigation Scheduling

You can monitor the moisture status of your soil by periodically checking the tensiometer gauge reading. In your soil, a reading of 0 indicates that the soil is saturated with water. As soil dries, less water is available, and it's harder for plant roots to extract water. This tension will increase tensiometer readings until it reaches a certain level and you will need to irrigate. Plant variety, soil texture and growth stage will influence what tensiometer reading indicates you should irrigate. Table 1 shows examples of common crops in Virginia and the tension point at which you will need to irrigate.

Crop	Tension Point (in centibar, cb)
Broccoli	25-30
Corn	50-80
Lettuce	34-50
Potato	30-50
Tomato	45-70

Table 1

Maintaining your Tensiometer

With normal use, air can become trapped within the tensiometer. This reduces response time until the tensiometer ceases to function. It's important to maintain your tensiometers in the field periodically. Every time you check your tensiometer gauge, inspect the tube for air accumulation. If there is more than ¼ inch of air under the cap, remove the tab, refill the tube with water and use a vacuum pump to remove the air.

Additional Reading and Resources

Comprehensive step-by-step instructions to prepare and maintain your tensiometer:

1. How to Use a Tensiometer, compiled by Resource Conservation District of Monterey County. <https://shorturl.at/uHM08>.
2. Kati W. Migliaccio, Teresa Olcyk, Yuncong Li, Rafael Munoz-Carpena, and Tina Dispenza. Using Tensiometers for Vegetable Irrigation Scheduling in Miami-Dade County. <https://edis.ifas.ufl.edu/publication/TR015>

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