Information Sheet

IS13109

Tensiometers

A tensiometer is a soil moisture monitoring tool that measures the soil water potential which is the force with which water is held in the soil. As soil dries out plants have to work harder to extract the soil water, this is shown as an increase in the reading on the tensiometer gauge.

Tensiometers consist of a sealed tube that is filled with water, a porous ceramic tip and a vacuum gauge (Figure 1). As the soil dries out water is sucked out of the tensiometer through the ceramic tip. This creates a vacuum in the tube which is registered on the gauge. When the soil wets up again, through irrigation or rainfall, water moves back into the tip and the vacuum is reduced.

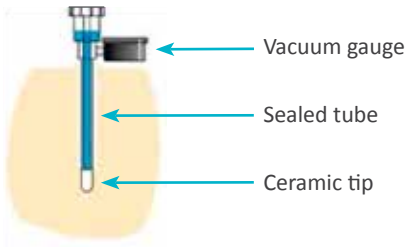
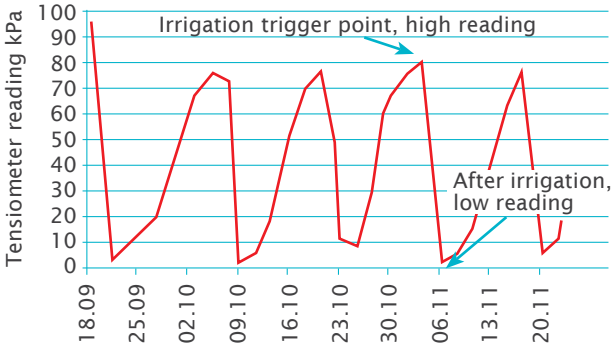


Figure 1: Components of a tensiometer.

To work effectively the ceramic tip must be in close contact with the surrounding soil. Air spaces around the tip will allow it to dry out and will give an incorrect reading.

For irrigation scheduling the tensiometer must be installed within the active root zone. A longer tube may also be installed to monitor soil moisture levels deeper in the profile. During the peak irrigation time tensiometers should be read at least 2 -3 times per week. Graphing the readings can make it easier to monitor the changes in soil water potential (Figure 2).



The practical limit of a tensiometer is about 80 kPa. At higher suctions the water column in the tube will break apart and the gauge won't register.

Air bubbles in the tube can also affect the reading because they expand as the vacuum increases. If air bubbles are a problem they can be removed with a vacuum pump or by inserting a piece of 3 mm tube into the tensiometer (Figure 3).

Figure 3: Removing air bubbles.

Tensiometers should be checked every day or so after initial installation to remove any air that has accumulated. After the first week or so the tensiometer should come into equilibrium with the soil and will require less servicing.

The tensiometer should also be checked regularly to ensure there is still water in the tube and that the column has not broken under the suction pressure. Check the manufacturer's information for when the tube should be refilled.

General guide to tensiometer readings

Reading	Interpretation*
0–8	Soil is very wet. Reduced crop growth will result.
8	Soil is at field capacity.
8–35	Best soil moisture conditions for crop growth.
35–50	Mild stress on well drained soils.
50 +	Soil is very dry. Yields will be affected.

*Readings will vary depending on soil type.

Figure 2 (left): Graph of tensiometer readings.

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RURAL WATER USE EFFICIENCY IRRIGATION FUTURES

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