

Placement of Soilmoisture Tensiometer for Irrigation Control

Soilmoisture Tensiometers are invaluable for proper irrigation control. By giving continuous readings of soil moisture conditions at known depths, Soilmoisture Tensiometers make it possible to plan irrigation frequency to correspond with plant requirements. Accurate penetration depth of the irrigation water can be known and controlled so there is no waste of water or leaching of fertilizer. Areas where over irrigation or poor drainage is causing saturated soil – such as directly above a deep impenetrable layer – can be easily identified so corrective steps may be taken.

To serve the grower properly, however, Soilmoisture Tensiometers must be properly used.

The location of “stations” and the number of Soilmoisture Tensiometers required at each station will depend upon depth of the root systems, variability of the soil, nature of the topography and the irrigation layout.

Since the basic purpose is to measure the moisture conditions in the root zone, it is imperative that the porous tip of the Soilmoisture Tensiometer is located directly in the active feeder root system of the growing plant. It is equally important that it is located where the irrigation water will reach it.

The Soilmoisture Tensiometers are left in place throughout the growing season to give continuous soil suction readings in the zones selected.

Shallow-Rooted Plants

For plants with shallow root systems of less than 18” in depth, such as certain row crops, a single Soilmoisture Tensiometer with porous tip located three-quarters of the way down into the root zone can give adequate information. The Soilmoisture Tensiometer may be properly placed for the young plant and then lowered periodically as the root system develops, as shown in the diagram to the left.

Deep-Rooted Plants

For plants and trees with large root systems it is necessary to use two Soilmoisture Tensiometers at each selected station, as shown in the diagram to the left. One shallow unit is placed with tip approximately one-quarter of the way down the root zone. One deep unit is placed with tip approximately three-quarters of the way down into the root zone. In an orchard with an average root system, the shallow unit would be at 12” to 18” in depth and the deep unit would be at 24” to 36” in depth.

By using two Soilmoisture Tensiometers at a station, the grower knows the moisture condition throughout the active root zone. When the shallow unit indicates high soil suction values, irrigation is started. Irrigation is continued until the reading on the deep unit drops – indicating that the irrigation water has penetrated to that depth and the whole active root zone has been re-wetted.

Location of Station

Careful selection of a Soilmoisture Tensiometer station is important. The following factors should be kept in mind in selecting a station.

Relationship to Plants

- For row crops, locate the Soilmoisture Tensiometer station directly in the row.
- For orchards, locate the station at the drip line of a tree on the tree side of the first furrow, preferably on the south or west side.
- If sprinkler irrigation is used, it is important to locate the Soilmoisture Tensiometers to make sure they are not shielded by a low hanging branch or flooded by runoff.
- Install the Soilmoisture Tensiometer by inserting the body of the Tensiometer into a hole made by a length of standard pipe / rod or by a soil sampling tube. Make sure that the porous tip of the Tensiometer is in good contact with the soil. Lightly tamp the surface soil around the Tensiometer body to make a good seal.

Type of soil

Rates of penetration and storage capacity vary greatly between different soil types.

Therefore, the Soilmoisture Tensiometer installation should be made where the soil is most representative of the field to be irrigated. Additional stations should be located where soil type is radically different in order to provide information on proper irrigation timing for those different areas. In large level fields of uniform deep soil that are subject to uniform irrigation practice, a single Tensiometer station may serve as a guide for several acres.

Topography

On hilly fields place Soilmoisture Tensiometer stations at the high and low areas where drainage conditions may be different.

By placing Tensiometer stations in the most productive area of an irrigated plot observations can be made about the moisture conditions in each area. Then changes in irrigation practice can be made so moisture conditions in the unproductive area match those of the productive area.

Irrigation Layout

Where furrow or basin irrigation is practiced, place one Tensiometer station near the upper end and one near the lower end of long runs so the head of water and timing can be adjusted to make the distribution as uniform as possible.

When to Irrigate

In general, if soil suction values are kept below 70 centibars in the active root zone (reading of 70 on Bourdon dial type gauges or 700 on manometer type units) well established plants will not suffer from lack of water. In sandy soils where water storage capacity is small, it is best to start irrigation at lower readings especially if a delay in the irrigation procedure is likely.

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If Soilmoisture Tensiometer readings remain at 0-10 centibars for days at a time, this indicates a harmful saturated condition. Steps should be taken to withhold irrigation water and/or improve drainage.

It is very useful to plot Soilmoisture Tensiometer readings on a graph during the growing season. In particular, the rate of increase in soil suction that is shown on the graph indicates when irrigation will be required.