

## Publications



### TR-102

#### Rapid Response Tensiometer for Evaluating Preplant Irrigation Efficiency

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- [Full Text](#)

A study of the potential of using rapid response tensiometers to evaluate preplant irrigation was conducted at the Texas Agricultural Experiment Station, Lubbock and Halfway, Texas. Sites used for the study were an Olton loam soil at Lubbock and a Pullman clay loam at Halfway. Soil water potential was measured with both portable rapid response and permanently installed tensiometers. Soil water content was measured with a neutron probe.

Since preirrigations are performed during freezing weather, it was necessary to

develop a technique to keep the permanent tensiometers from freezing.

Substituting a methanol-water mixture (30% by volume), the water in the tensiometers protected the tensiometers down to temperatures of  $-18.8^{\circ}\text{C}$ .

Soil water potential values for "field capacity" ( $-14$  to  $-17$  cbars at 60 cm;  $-15$  to  $-18$  cbars at 120 cm) were significantly lower than those obtained during a previous study ( $-23$  to  $-25$  cbars at 60 cm;  $-34$  to  $-35$  cbars at 120 cm). Data obtained were insufficient to explain the differences.

It was possible to install the rapid response tensiometers in 10 minutes or less. However, considerable problems were encountered once the rapid response tensiometers were installed. These included cracked bulbs and soil clay plugging the pores of the tensiometer bulbs which eventually resulted in slow response time and inaccurate readings. As long as the tensiometers were working properly, readings obtained compared favorably (within  $-5$  cbars) with those from the permanent tensiometers.

Both permanently installed tensiometer and the neutron soil moisture probe provided good data for evaluating the efficiency of preplant irrigation from furrow irrigation. As expected, more water was applied to the soil close to the point of application with decreasing amounts applied with increasing distance from the point of application. The application efficiency was affected by the distance from the water source, flow rate, amount of water applied, and initial soil water content. Application efficiencies ranged from 22 to 76%. In general, the most efficient applications were those in which small amounts were applied to dry soils at fast flow rates.

Infiltration rates calculated using rate of advance data were comparable to those previously determined with infiltrometers.

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