THESIS

A DIAGNOSIS OF FARMER-MANAGED IRRIGATION SYSTEM'S PERFORMANCE

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ABSTRACT

The effective and sustainable management of water for agriculture is becoming ever more important to satisfy future demands in food production. The efficiency of water use in agriculture is low under the existing irrigation practices. Poor management of irrigation water and inadequate design of on-farm irrigation setup are the main causes of high water losses. Resultantly, crop yields are reduced and irrigated agricultural areas are prone to environmental problems. Therefore, proper irrigation scheduling is essential that can conserve water, improve irrigation performance and achieve sustainability of irrigated agriculture.

This study is an effort to evaluate the surface irrigation scheduling methodology for two methods of irrigation i.e. basin and bed-and-furrow. Six plots were selected for irrigation scheduling and monitoring (for comparison purposes), three for each method of irrigation. Continuous measurement of soil moisture by gravimetric method between the irrigation intervals was made to predict the time of irrigation application. The neutron probe, Time Domain Reflectometry (TDR), Tensiometers and Aquatterr moisture meter were also checked in the field and relationships were developed with the moisture contents determined by the gravimetric method. The Tensiometere proved a better instrument for irrigation scheduling, as compared to other instruments.

The amount of irrigation application was determined by using the volume balance technique. The infiltration functions, advance parameters, discharge and soil

profile moisture deficit (SMD), as determined prior to irrigation in the top 90 cm soil profile by gravimetric sampling, were used for the cutoff time determination. Applied water depths data along with the yield data was collected to determine the water use efficiency of different plots.

Maximum water use efficiency (WUE) by irrigation scheduling was achieved by applying nine and four irrigations to bed-and-furrow and basin plots respectively at appropriate intervals. The WUE obtained by surface irrigation scheduling was 0.67 kg/m^3 and 0.64 kg/m^3 for bed-and-furrow and basin plots respectively. The analysis of other field inputs show that by using irrigation scheduling methodology field inputs are reduced and maximum water use efficiency is achieved.