THESIS

MONITORING AND EVALUATION OF SURFACE IRRIGATION PRACTICES AT A PROGRESSIVE FARM

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Submitted by:

MUHAMMAD TAHIR IQBAL

(95-PG-WRM-11)

For the Degree of

MASTER OF PHILOSOPHY

IN

WATER RESOURCES MANAGEMENT

CENTRE OF EXCELLENCE IN WATER RESOURCES ENGINEERING,

UNIVERSITY OF ENGINEERING AND TECHNOLOGY LAHORE,

PAKISTAN

1997

ABSTRACT

The research is an effort for collection and analysis of field data not under controlled condition, but under actual field conditions. Four plots were sown with cotton (CIM 240 variety). Two plots contained the bed-and-furrow surface irrigation method and the remaining two plots used basin irrigation with each plot having 2.67 acres. The water inputs and the resultant yields were monitored. The collective yield from the two bed-and-furrow plots was 0.48 kg per cubic meter of water and from the two basin plots the yield was 0.39 kg of cotton per cubic meter of water.

Six furrows in one, and four in the other, bed-and-furrow plots were monitored for the advance and recession time, along with the applied discharge and depth data. The data were used as an input for determining the power curve advance function parameters using the two-point method. These were eventually used to determine the infiltration function parameters by the alternative technique.

Using the volume balance technique, the infiltration function parameters, discharge and the soil profile moisture deficit (SMD), as determined prior to irrigation in the top 160 cm layer of the soil by using the neutron probe, were used for determining the cutoff time for the plots.

A comparison was made to assess whether the farmer irrigated the plots as per demand or not, and if not, to what extent. Considering the neutron probe estimated soil moisture deficit per event to be the same throughout the plot, the difference between the cutoff time for which the irrigation was applied and that which should have been applied was determined. The results showed that the out of 11 irrigation events in one of the bed-and-furrow plots and of 12 events in the other plot, only once were the both of the plots over-irrigated, while being under-irrigated for other events.

The basin irrigated plots were also monitored for the advance and recession time. The advance and, hence, the infiltration parameters were determined for the plots also. The volume balance technique was used to estimate the cutoff time needed for the plots based on advance and infiltration parameters, applied discharge and the SMD. It was assessed that the basin plots were always over-irrigated.

Fifteen infiltration tests were conducted at every foot to a depth of 5 feet. The objective was to determine the differential variation in the infiltration rate from soil surface to deep in profile. It was observed that the infiltration rate in the on the surface of soil was decreased due to compaction.

ENGR. MUHAMMAD TAHIR IQBAL

CEWRE, LAHORE,