

**THESIS**

**FIELD EVALUATION OF DIFFERENT QUALITY IRRIGATION WATER  
EFFECTS ON SOIL SALINITY AND CROP YIELD IN BARREN LANDS**



**Submitted By**

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## ABSTRACT

Land and water are the fundamental resources for sustenance of human being on the globe. Wheat requires extra amount of water under the traditional continuously flooded irrigation method. In irrigated agriculture, water quality is related to its effects on soil, crop and management necessary to compensate the problems linked to it. Soil salinity is one of the most important factors that limit crop production in arid and semi-arid regions.

The purpose of the present study was to investigate and compare the effects of irrigation water of varying quality on soil salinity and crop yield under traditional warabandi supply system and management allowed deficit (MAD) based irrigation scheduling method. The study was conducted on 0.4 hectare (1 acre) farm located in Chak No. 149/150 N.B. in District Sargodha. The soil in the selected farm was saline and of loam type. Total twelve plots were constructed, each plot measuring 70 ft x 45 ft in dimensions. Six irrigation water treatments were tested in the field with irrigation water of varying quality and different irrigation scheduling. Two plots were used for each of the water treatment. Out of six treatments, three treatments were tested under traditional warabandi supply and the remaining three were tested under MAD based irrigation scheduling. Water samples from canal and tubewell were collected before initiation of the experiment to estimate Electrical Conductivity (EC), Total Dissolved Solids (TDS) and Sodium Adsorption Ratio (SAR). Soil sampling was done to monitor salinity/sodicity changes in the soil profile. Soil samples were collected from 0-15, 16-30, 31-60 and 61-90 cm soil depth to estimate  $EC_e$ , SAR and pH of soil at different growth stages of the wheat crop.

The results of the present study revealed that the selected parameters were reduced in the upper 0-15 and 15-30 cm soil layers in all the treatments. The maximum reduction was found in Treatment 2 where only canal water was applied with MAD based irrigation scheduling. The maximum reduction in soil  $EC_e$ , SAR and pH was found in Treatments 2, 4, and 6 where irrigation water was applied with MAD based irrigation scheduling. Average yield of wheat from the plots irrigated with that of canal water remained 63 percent more than that of irrigated with tubewell water. It was also noted that the average yield of wheat obtained from the plots irrigated with MAD based irrigation scheduling is higher than those irrigated with traditional warabandi supply.

The results suggest that in the loam soil, low quality tubewell water (having EC 8.67 dS/m, SAR 2.0 and RSC 2.5 meq/L) can be applied alternately with canal water to the wheat crop during Rabi season. Consequently, area under crops can be increased by adopting this technology without deteriorating the soil potential for higher production.