

Thesis

**DETERMINATION OF OPTIMUM SPACING OF
HORIZONTAL DRAINS BY FIELD EXPERIMENTS IN
FORDWAH EASTERN SADIQIA (SOUTH) PROJECT**

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ABSTRACT

Wide spread waterlogging and salinity in irrigated areas are the crucial problems of Pakistan's agriculture. Besides many tubewells and surface drainage projects, seven horizontal pipe drainage projects have been completed to control waterlogging and salinity in different areas of Pakistan. Depending upon different hydro-pedological conditions, these projects were designed for different drain depths and drain spacings.

This study was conducted to determine the optimum drain spacing for the design of subsurface horizontal pipe drainage for Fordwah Eastern Sadiqia South Project, Phase-II. Three subsurface drainage trial sites located in areas of different soil profiles were selected.

The layout of the trial sites was designed with different combinations of drain depth and spacing. This includes two depth treatments of 1.65 m (5.5 ft) and 2.40 m (8 ft), with drain spacings ranging from 175 to 3000 ft. Three rows of observation wells/piezometers perpendicular to the lateral drains, and a single row on one side of the collector were installed to monitor the water table. In addition, weirs were fixed in the manholes and sumps for discharge measurement to correlate the observed discharge to the designed discharge.

The discharge of selected laterals, at some points on each collector and in the sump was measured. The data regarding groundwater table and pumping hours was also collected. The results indicate that drainage system lowered the watertable at all the sites when the pumps were in operation. Analysis of the recorded watertable data revealed that a spacing between S2 (350

ft) and S3 (700 ft) at 5.5 ft laterals depth was adequate for the trial site-I. At site-II the performance of drain spacing ranging from 500 ft to 1000 ft was satisfactory at lateral depth of 8 ft and the spacing of 600 ft is adequate at a lateral depth of 5.5 ft. Generally the discharge at both the sites was less than 1.00 mm/day, which was much less than the design discharge of 1.50 mm/day.