EFFECT OF WATERTABLE DEPTH ON SOIL SALINITY/SODICITY

Thesis by

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SUMMARY

To monitor the effect of watertable depth on soil profile salinity build-up, a field study was carried out from October,1986 to September, 1987 in village Julkey near Kahna District Lahore. An observation well was selected near the experimental site and a piezometer was installed in the field to record the watertable depth during the experimental period. The elevation of observation well was 1.5 m higher than that of the piezometer plot. The water-table depth was recorded at about one month's interval. Water samples were collected from the piezometer and the observation well which were analysed in the Land Reclamation Laboratory Centre of Excellence University of Engineering and Technology, Lahore for their chemical status.

Wheat crop was sown in the last week of November, 1986 with three treatments viz:

T_1 = Fallow (un-sown)

T_2 = Crop without gypsum application

T_3 = Crop with gypsum application

Each treatment was repeated four times in Randomized complete Block Design. Gypsum was applied at the rate of (100% GR) at the time of wheat sowing.

Wheat crop was harvested in the third week of April, 1987. Kharif fodder (Sorghum) was sown in the first week of May, 1987 with the same treatments and experimental design. A measured quantity of canal water was applied to both the crops. Soil samplings were made upto 150 cm depth with 30 cm interval at different water-table depths and analysed in the laboratory for physico-chemical status. Soil moisture was measured before irrigation, after irrigation and fortnightly by using Neutron hydro-probe.

The watertable lowered from 1.15 m to 2.89 m depth at the end of the experiment. Quality of piezometer water was not good and had high SAR value while that of observation well was marginal. Wheat and sorghum fodder yield in gypsum applied plots was not significantly higher than non-gypsum plots.

With lowering of watertable depth, pHs decreased in 0-30 cm and 0-90 cm soil depths under crops without gypsum and with gypsum application respectively. Under fallowing on the contrary pHs increased in the surface layer (0-30 cm). Under crops Electrical conductivity decreased in 0-30 cm and 0-60 cm soil depths without gypsum and with gypsum application respectively while it increased in the surface layer under fallowing. Under crops Sodium Adsorption Ratio decreased in 0-30 cm and 0-120 cm soil depths without gypsum and with gypsum respectively. SAR decreased in 0-30 cm soil layer under fallowing but even then SAR was the highest amongst the treatments. ESP behaved like SAR during the research study.

Soil moisture depletion was directly proportional to lowering of watertable. It was observed that soil moisture contents were higher during wheat crop as compared to those during kharif sorghum fodder. Soil moisture contents reduced considerably in the two upper most soil layers under fallowing and reduction was the maximum. Moisture contents were higher under gypsum applied plots as compared to those under control. Reduction in soil moisture was less in 60-90 cm, 90-120 cm and 120-150 cm soil layers.

With the application of irrigation water (68 cm) pHs, ECe and ESP were reduced in cropped plots. The reduction was higher in gypsum applied plots as compared to that in no gypsum plots. In case of fallowing there were increases in pHs and ECe while slight reduction occured in SAR and ESP values. However, soil salinity showed an increasing upward trend under fallowing and its value in 0-30 cm soil layer was the highest amongst the treatments.