

IMPACT OF ZINC ON CROP PRODUCTION AND SOIL PROPERTIES IN A SALINE-SODIC SOIL

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SUMMARY

The study was carried out in an area of 0.4 ha of saline-sodic loam soil, having pHs, ECe and SAR from 9.2 to 9.8, 9.3 to 20.9 (dSm^{-1}) and 49.8 to 129.4, respectively at Mona Reclamation Experimental Project. Rice-wheat crop rotation was followed with recommended doses of fertilizers in combination with four doses of zinc sulphate viz. 0, 10, 20 and 40 kg ha^{-1} .

The ECe and SAR were significantly affected by different treatments, being significantly higher in treatment 1 than those with all other treatments which were statistically similar. ECe and SAR at different sampling times differed significantly. Different treatments affected paddy and wheat grain yield significantly and, in general, maximum yield was found with 20 kg ha^{-1} zinc sulphate in addition to recommended doses of fertilizer. The increase in paddy and wheat grain yield, on an average was 30, 92, 54 and 14, 55, 46 per cent with 10, 20 and 40 kg ha^{-1} zinc sulphate respectively compared to that from control plots. The efficiency of treatments in increasing the crops yield was in the order of: T-3 T-4 T-2 T-1.

INTRODUCTION

In spite of suitable soil and climate, the rice yield per unit area is very low in Pakistan. The low yield can be attributed to salinity/sodicity, improper use of fertilizers and poor on-farm soil and water management practices followed by the farmers. Zinc is essential plant nutrient and its deficiency in soil plays a major role in soil fertility problems especially in rice growing areas of Pakistan (Chaudhry et al. 1969, Yashida and Tanaka

each wheat crop in the form of urea, DAP and K_2SO_4 . The four doses of zinc sulphate i.e. 0, 10, 20, 40 $\text{kg ZnSO}_4 \text{ ha}^{-1}$, replicated thrice in RCBD were tested.

Composite soil samples from 12 randomly selected points were collected from 0-15 and 15-30cm depths before initiation of the experiment and after harvesting the wheat crop each year. Soil samples were mixed thoroughly, sun dried, ground and passed through 2mm sieve and were analyzed for ECe, SAR (U.S. Salinity Lab. Staff, 1954) and mechanical analysis (Bouyoucos, 1951). The crop yields were calculated on whole plot basis being 27m x 13m.

RESULTS AND DISCUSSION

Electrical conductivity (ECe , dSm^{-1}) of soil

The electrical conductivity of the soil was significantly affected by different treatments of zinc sulphate. The ECe was considerably decreased (Table 1) by the harvest of wheat 1982-83 indicating that in addition to 48 and 41cm rainfall, 177 and 41cm canal water application to two rice and wheat crops and addition of some organic matter as crop residues decreased ECe below safe limits with treatment difference statistically significant. The ECe was significantly higher in T-1 than the other