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EFFECT OF BRACKISH WATER ON CROP YIELDS AND PROPERTIES OF A SOIL TREATED WITH AMENDMENTS

M. Rashid[1], M. Y. Shakir and M. Jamil[2].

ABSTRACT

A long term study was initiated during 1987 to study the ameliorative role of gypsum with or without FYM in using brackish water for crop production. During first phase of study, the results showed that gypsum application with FYM kept the SAR of soil at a level of 5.0 but ECe increased. To maintain the ECe at low level 40% leaching fraction was included during second phase of study but ECe again increased and could not be kept at low level. However, SAR remained within safe limits. During all the period of study, the yields of most of crops were not affected negatively by the use of brackish water.

INTRODUCTION

Use of underground water for irrigation has become a requirement as canal water is not available in enough quantity. Unfortunately, most of the sub soil water is not suitable for irrigation and 75% tube wells are pumping unfit water in Pakistan (Malik *et al.*, 1984). Continuous use of brackish water resulted in deterioration of soil health and reduced crop yields (Chauhan *et al.*, 1989; Sharma and Manchanda, 1989; Prunty *et al.*, 1991; Hussain *et al.*, 1993). The ill effects of brackish water can be minimized by use of certain amendments (Goyal and Jain, 1984; Manchanda *et al.*, 1985; Ghafoor *et al.*, 1992; Schuman and Meining, 1993).

Keeping in view these facts, a long term

MATERIALS AND METHODS

This long term project was initiated during 1987-88 and methodology was discussed in detail in a paper (Saleem *et al.*, 1993) which includes the results of first phase of this study. The crop rotation followed during the second phase was also maize-berseem-rice-wheat. The analysis of tube well water is presented in table-1. The quantity of gypsum was calculated by the equation developed by Eaton (1965). The soil analysis (table-2) after harvest of wheat 1990-91 indicated that EC_e was developed beyond the figure of 4.00 dS m^{-1} , therefore it was decided to include 40% leaching fraction in this plan. Before starting the application of additional water for leaching, irrigation to maize 1991 was done with pure canal water in all the treatments to leach down the salts. As a result, the EC_e in all the plots was decreased and all the plots became non saline (table-3). The application of additional 40% water for leaching started with berseem crop 1991-92 and then was kept continuous upto the end of this phase i.e. wheat 1993-94. Kharif crop during 1993 could not be planted because of breakdown of the tube well. Wheat was planted during 1993-94 instead of berseem because it was too late to sow berseem when tube well started functioning. During this period of study one crop each of maize, berseem and rice and two crops of wheat were harvested. Soil analysis after maize 1991, wheat 1992-93 and wheat 1993-94 is being reported in this