Gomal Univ.J.Res. Vol.17: pp 63-70, 1997 [Printed in Dec. 1999] ISSN 1019-8180

USE OF POOR QUALITY GROUND WATER WITH GYPSUM AND ITS EFFECT ON SOIL PROPERTIES

M.S. MIRJAT, A.M.S. SHAH, A.D. BROHI, G.R. MARI, G.M. MEMON
* Associate Professor, Department of Irrigation and Drainage.
** Associate Professor, Department of Irrigation and Drainage.
*** Assistant Professor, Department of Basic Engineering.
**** Assistant Professor, Department of Farm Power and Machinery.
***** Lecturer, Department of Land and Water Management.

ABSTRACT

The study was carried out to evaluate the feasibility of using poor quality ground water and its effects on different soil properties and crop yields by the addition of gypsum in the soil profile. Results showed an increase in EC values under all treatments as compared to initial value. However, lower EC and SAR values were observed as gypsum application increased. The minimum increase was recorded under 100% gypsum application and the maximum increase was recorded under control treatment. Although, EC and SAR of the top 30 cm soil increased but were less than the permissible limits generally accepted for crop production. The EC and SAR decreased as the gypsum application rate increased from 25 to 100%. The soil pH in the top 0-15 cm depth was slightly affected by different gypsum application rates. The maximum increase of 4.3% was observed under control treatment and it decreased as the gypsum application rate increased. No significant effects on wheat yield were observed for 25, 50, and 75% gypsum application rates. However, the maximum yield was observed under 100% gypsum application rate and the minimum yield was observed under control treatment

INTRODUCTION

Although, about 85.0 million acres (34.4 million hectares) of arable land are suitable for agriculture in Pakistan, but, only 40.0 million acres (16.2 million hectares) are being irrigated currently due to shortage of irrigation water. The remaining culturable land can be cultivated by judicious planning of available surface and ground water resources (Chohan, 1989). Most of our culturable land is underlain by useable ground water that can be utilized for irrigation purposes. According to an estimate, out of 7.0 million acres, about 4.0 million acres are underlain by useable ground water in Sindh province alone (Javaid and Channa, 1992). The quality of ground water varies from place to place and ranges between good to very poor. Since, direct application of poor quality ground water is not recommended, as it deteriorates land by altering its chemical properties, it could be applied either by mixing with canal water or after adopting certain management practices at the soil to reduce its deterioration. Thus, exploitation of ground water has become the need of time in order to augment the inadequate water supplies to boost the agricultural production.

Several studies have shown that, the application of ground water having high electrical conductivity (EC) and high sodium adsorption ratio (SAR) results in a high salinity and sodium (Na) toxicity hazards. The presence of, as low as, 5% exchangeable Na may cause severe sodium injury to certain sensitive crops (Bernstein and Pearson, 1956; Bernstein and Francois, 1973b). The salts derived due to the application of such irrigation water accumulate in soil profile and cause soil dispersion and surface seal development which