PAK. J. SOIL SCI., VOL. 13 (1-4), 1997

EFFECT OF SALINITY LEVELS ON GROWTH AND IONIC COMPOSITION OF WHEAT GENOTYPES

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ABSTRACT

Keeping in view the importance of wheat and increasing salinity problem in Pakistan, present study was conducted to select wheat varieties with a better ability to grow in saline areas where wheat is either grown inefficiently or not grown at all. Study on influence of different salinity levels on growth and ionic composition of seven wheat genotypes viz. SNH-9, WH-157, Sakha-8, Yecora, LU-26S, Kharchia-65 and KRL-1-4, were carried out in the wirenet house at the Department of Agronomy, University of Agriculture, Faisalabad, Pakistan during 1992-93. The saline treatments of 50, 100 and 150 mM NaCl were compared to control in solution culture. Salt stress imposed at one shoot stage significantly affected growth and concentration of inorganic cations in the leaf sap of all the varieties. With the increase in salt stress there was a consistent decrease in number of tillers and total leaf area. Leaf Na^+ content was markedly increased, whereas diverse response for K^+ concentration in leaf of different cultivars was observed, however, K^+: Na^+ ratio was significantly decreased.

INTRODUCTION

Salinity in soils and ground water has become a major environmental issue (Shannon *et al.*, 1994) and it is a serious problem to obtain increased crop growth and yields under irrigated agriculture throughout the world. This problem is of crucial importance in irrigated areas of Pakistan.. In our irrigated areas the average decrease in wheat yield varies from 37 per cent on slightly salt-affected to 69 per cent on moderately salt-affected lands. An annual loss of Rs.20 billion due to salinity was estimated in terms of decreased agricultural production (Qayyum and Malik, 1988). Since technology of combating salinity through amendments is extremely costly, requiring huge to suit crop plant. Evidence is accumulating about intraspecific diversity in regards to salt tolerance of crops. As characteristics of salt tolerant genotypes are identified they can be entered into conventional breeding programme to improve crop yields. Wheat has the reputation of moderately tolerant to salinity, and significant differences among different genotypes have been observed (Qureshi *et al.*, 1990).

The objective of this study was to determine if salt tolerance differences existed among wheat cultivars as measured by plant growth compared with control. In addition ion accumulation was investigated under saline media as a potential physiological reason for differences in tolerance to explore the feasibility of growing wheat in salt-affected areas under the prevailing conditions.

MATERIALS AND METHODS

The experiment was conducted in the wirenet house under natural growth conditions at the Agronomic Research Area, University of Agriculture, Faisalabad. Seedlings at 2-4 leaf stage of seven wheat varieties i.e. SNH-9, WH-157, Sakha-8, Yecora, LU-26S, Kharchia-65 and KRL-1-4 were transplanted in holes in thermopol sheets kept over half strength Hoagland's nutrient solution (Hoagland and Arnon, 1950) in brick made cemented tanks lined with polyethylene sheets. Each variety was replicated three times in each growth tank in split plot design. The nutrient solution was aerated with an air compressor during the day time for 8 hours in every 24 hours for the respiration of roots. Salinity was produced by adding calculated amount of NaCl to the medium in increments of 25 mm per day till the desired salinity levels i.e. 50, 100, 150 mM NaCl, were