RESEARCH PAPER

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Physio chemical response of appropriate zinc application on wheat (*Triticum aestivum* L.) under sodic soil condition

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An experiment was conducted with wheat varieties and zinc application method in sodic soil at Main Experiment Station, N.D.University of Agriculture and Technology, Kumarganj, Faizabad in *Rabi* season 2005-06. The specific objective is to identify the economical and effective method of zinc application with reference to growth, yield and quality of wheat under sodic soil condition. Twelve treatment comprised of four methods of zinc application *i.e.* control and 0.5,1.0, zinc sulphate seed soaking and basal 20 kg ZnS04 ha-[1] and three wheat varieties (NW1012, PBW343 and Malviya 468) were tested in three replications. Seeds were soaked as per treatment for four hours and dried in shade for 24 hours before sowing. Seeds soaking and basal application with $ZnS0_4$ increased plant height, number of tillers plant-[1], chlorophyll content, total soluble sugar and grain yield plant-[1] over control. Overall performance of NW1012 variety of wheat showed superiority over Malviya 468 and PBW 343. Basal application of ZnS04 was found more effective over seed soaking method with respect to yield and quality of wheat under soil condition.

Key words : Soil sodicity, Wheat, Chlorophyll, Total soluble sugar, Yield

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INTRODUCTION

Wheat (*Triticum aestivum* L.) is the most important cereal crop in the world. Uttar Pradesh is the first in respect of area (9.56 mha and production (25.57 mt) but the average productivity is much lower (2.79 t ha^{-1}) than Punjab and Haryana (Anonymous, 2007).

Wheat is one of the important cereals due to its relatively higher niacin and thiamine content. In addition, it is also rich in "glutein" which provides spongy cellular texture of bread and baked product. With shrinking of arable land due to urbanization and industrialization the wheat cultivation is now also being pushed to marginal lands including salt affected soils. Salt affected soils contain excessive concentration of chloride and sulphate of sodium, calcium and magnesium (saline soil) or an excess of exchangeable sodium (alkaline or sodic soil) along with carbonate and bicarbonates (Ahmed, 1996).

Excessive exchangeable sodium, high pH and poor physical properties of soils are known to adversely affect the growth, yield, chemical composition and nutrient uptake of the plants. The adverse affects of soil sodicity are also mediated through the unavailability of certain micro nutrients like zinc and iron. The availability of zinc in salt affected soil is closely related with variability in pH. The reduced availability of zinc in sodic soil has been attributed to the presence of certain inherent edaphic factors which may cause precipitation of zinc in the form of insoluble hydroxides, carbonates or phosphate due to increased adsorption and fixation of zinc on soil colloids.

In zinc stressed plants, protein synthesis is inhibited and amino acids are accumulated up to inhibitory level (Cakmak and Marschner, 1990). Zinc deficiency also affects the metabolism of phosphorus, nitrogen, carbohydrate and nucleic acid (Cakmak and Marschner, 1988). Zinc is intimately related to protein metabolism and play a key role in regulating the auxin concentration in plants and thus directly and indirectly regulate the crop growth. The sustainable productivity of salt affected soils is possible if appropriate soil and nutrient technology is employed. The present investigation is, therefore, undertaken with to identify effective method of zinc