Internat. J. Agric. Sci. Vol.2 No.1 January 2006 : 250-252

Manganese Fractions In Wheat Growing Soils Of Auraiya District

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ABSTRACT

A soil survey was carried out on manganese status and requirement in the wheat growing soils of Auraiya district. The pH, EC, organic carbon and calcium carbonate ranged from 5.76-7.82, 0.10 – 0.30 mmhos/cm, 0.30 to 0.4 % and 0.5 – 4 % respectively. About 86.57% of the soil samples were deficient in reducible manganese and 25% of soil samples were below the critical limit in DTPA extractable manganese. The levels of manganese @ 20 ppm in combination with recommended doses of major nutrients significantly increased the grain and straw yield of wheat crop.

Key words : Mangnese, wheat.

INTRODUCTION

Manganese plays an important role in enzyme systems that regulate various metabolic activities and control several oxidation-reduction systems. Among the 6 micronutrients, part played by manganese is remarkable. Manganese is released in weathering as Mn^{+2}, which is absorbed by plant and adsorbed on cation exchange sites. Although the stimulating effect of manganese on plant growth was reported in the first decade of 20th century its essentiality as a micronutrient element for green plants was established by Ma Hargue in 1922. Manganese is found in a number of chemical forms in soil, including dissolved, exchangeable, reducible (precipitated as sparingly soluble hydrous oxide), organically bound and residual. Divalent Mn in the soil solution is the most available form to plants. Exchangeable manganese in equilibrium with dissolved manganese is also an important form readily available to plants. In spite of above mentioned background the response of wheat to manganese is still not confirmed. Thus, the present investigation was carried out to study the effect of manganese on the straw and grain yield of wheat growing soils of Auraiya district.

MATERIALS AND METHODS

A total of 168 representative surface soil samples (0-15 and 0-30 cm) were collected from the different locations of each tehsil covering 84 sites in Auraiya district. Soil samples were processed and subjected to analysis. Soil reaction was determined by Bechman model 'H' pH meter using glass electrode EC (1: 2.5 soil water suspension) by EC meter, organic carbon by Walkley and Black method Jackson, (1973) and $CaCO_3$ by rapid titration methods Piper (1966). Fractions of manganese were analyzed as total manganese by Jackson, (1973), available manganese by Lindsay and Follet (1970), water soluble Mn by Sherman and Harmer (1942), exchangeable Mn by Sherman and Harmer (1942) and reducible Mn by Sherman and Harmer (1942). The intensity of colour was measured with the help of Klett Summerson colorimeter using green filter. The quantity of manganese in the samples was calculated from the calibration curve prepared with a series of solutions of known Mn concentration. Pot experiments were also conducted at C.C.R. (P.G.) College, Muzaffarnagar farm on entisol soil of Auraiya district with farm level of Mn @ 0, 10, 20 and 40 ppm. After mixing the soil lot thoroughly to be used in experiment, 5 kg of soil was filled in each pot. The recommended doses of nitrogen and phosphorous (120 and 60 kg/ha) were applied through urea and monocalcium phosphate respectively. Treatments namely 0, 10, 20 and 40 ppm Mn were applied through $MnSO_4$. At appropriate moisture level, the soil of each pot was pulverized and sown with 10 seeds of the wheat. Agronomical practices were also practiced. After the maturity of wheat, the crop was harvested and grain and straw yield was weighed separately.

RESULTS AND DISCUSSION

The amount of available manganese in the soil of Auraiya district varied with in range from 1.7 – 8. 2 ppm. The content of available Mn in the soil of Arvakatra, Achhalda, Bhagyanagar, Sahar, Ajeetmal, Auraiya and Bidhuna blocks of the district varied from 2 – 8.2, 2 – 7.7, 2 – 8.2, 1.9 – 8.2, 2 – 7.7, 1.9 – 7.9 and 1.7 – 8.1 ppm respectively with a mean value of 3.8, 3.9, 4.2, 3.7, 3.9,

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