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Research Paper :

Dynamics of sulphur fractions in a calcareous Vertic Haplustepts under AICRP-LTFE soils

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ABSTRACT

In case of sulphur status of LTFE soils, FYM played a vital role. It maintained availability of sulphur in soils, but more increment after a long run was observed in T_{11}, where P source was SSP which contains 13 % S. Total-S content of LTFE soils increased after a span of 8 years, but it was reversed in case of heat soluble-S, that was decreased after 8 years, except in treatments which received FYM and inorganic-P as a SSP (13 % S). It was required to apply S fertilization every year and application of FYM for maintaining available status of soils at long run. Water soluble fraction of sulphur declined very much after 8 years of groundnut-wheat cropping sequence as compared to initial status, but it remained stable in treatments T_4 and T_{11} which received sulphur from outside sources like $ZnSO_4$ and SSP. Whereas organic-S status of LTFE soils increased after a span of 8 years, it might be due to incorporation of plant residues to the soils from crop roots and stubbles. Sulphate-S in LTFE soils increased after 4th year and then remained stable except in T_2 and T_3 where depletion in this fraction was noticed perhaps due to the interaction with phosphorus. Non-sulphate-S fraction found significantly the highest in the treatments which received sulphur from outside as $ZnSO_4$ and SSP (T_4 and T_{11}). In case of heat soluble-S, there was overall decrease in soil status after 4th year as compared to initial status and after word it maintained level with initial status, but in treatments of FYM and SSP it was increased as compared to initial status after 8th year of experiment. Whereas total-S status of LTFE soil increased after a span of 8 years. The increment was more in treatments which were received sulphur from fertilizer sources *i.e.* T_4 and $T_{11.}$ It was required to apply S fertilization every year and application of FYM for maintaining available status of soils at long run. Depletion per cent of sulphur noted positive in case of water soluble-S and it was negative or very low in treatments which received sulphur from fertilizers *i. e.* T_{11} and T_4 . Most of the other fractions of sulphur were not depleted in most of the treatments.

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Among the major nutrients, sulphur has been recognized as an essential nutrient to plants and this was demonstrated more than one and half century ago by Justus Von Liebig in Germany. Its role in plant growth has been well documented (Hoagland and Novelli, 1954). Sulphur, inspite of being essential for physiological and metabolic activities of the plants, is an integral part of certain vitamins and enzymes which are important to life cycle of the plants. Sulphur, being vitally important for complete life cycle of plants, its presence in adequate quantities in the soil and in the form available to plants is very essential. It also plays an important role in the synthesis and formation of certain essential amino-acids like cysteine, cystine and methionine, the building blocks for the proteins. In the absence of sufficient sulphur, several essential enzymatic activities and physiological functions are inhibited. Thus maintenance of an optimum level of sulphur in the soil in relation to other nutrients is essential for maximum crop production and its quality aspects. Sulphur exists in soil as free and adsorbed sulphate and in diverse organic and inorganic compounds. In the humid region it is in the organic forms, while in arid soils the sulphate salts of calcium, magnesium, sodium and even potassium predominate (Kanwar, 1976). Knowledge of different forms of sulphur and factors affecting their distribution throughout the root zone penetration is essential in improving the sulphur nutrition of the crops growing with diversified root system. In order to study the dynamics of various fractions of sulphur in intensive agriculture on long run basis, present investigation was carried out.

MATERIALS AND METHODS

Surface soil samples (0-15 cm) were collected from the AICRP-LTFE soils conducted on groundnut-wheat sequence in RBD replicated four times at Instructional