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FRACTIONS OF PHOSPHORUS AS INFLUENCED BY GRADED LEVELS OF PHOSPHORUS FERTILIZER IN SALINE SOIL

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ABSTRACT

A field experiment was conducted in saline soil to quantify the fractions of P under maize crop. Seven levels of P viz., 48.75, 65.00, 81.25, 97.50, 113.75 and 130.00 kg ha^{-1} of P_2O_5 in the form of super phosphate were added in the soil. The results revealed that the concentration of Ca-P and Fe-P was increased with progress of time in all the levels of P added. Whereas, a gradual decrease in the concentration of organic P, saloid P and Al-P in all the levels of P added over a period of time was noticed. No appreciable change in the reductant soluble P-fraction was observed in different days interval. A non-significant increment in the concentration of all the above fractions with increase in levels of P added was observed. The mean values ranged from 961 to1009 kg, 497 to 512 kg, 239 to 321 kg, 88 to 97 kg, 82 to 91 kg and 79 to 89 kg ha^{-1} in Ca-P, organic P, saloid bound P, Al-P, Fe-P and reductant soluble P, respectively was recorded.

Key words : P levels, Organic P, Reductant soluble P, Fractions, Maize.

Phosphorus in a biological system is present in organic and inorganic form and is involved in various chemical and bio-chemical reactions. Phosphorus atom can form co-valent multiple bonds which are flexible in nature, show higher energy characteristics, form a variety of linkages with other ions and show intrinsic stability that facilitates atom exchange in soils (Tomar, 2000). Soil inorganic phosphorus (IP) exists as salts of orthophosphoric acid such as water soluble, Al - P, Fe- P, Ca-P and occluded P. The principal organic P (OP) compounds present in soil are inositol phosphate, phospholipids, nucleic acids and other unidentified esters and phosphoproteins. Since, these forms of soil P have different solubilities, the availability and uptake depend upon their amount in the soil. Though all forms of P in the soils are key to supply the nutrient to the soil solution, the relative proportion of their contribution to the labile pool form from which plants absorb the nutrient (Ravindra and Ananthanarayana, 1999). The proportion of the each of these fractions governs the response to applied P.

Salt affected soils are spread widely covering the Indo-gangetic plains, arid regions and coastal areas. The most extensively salt affected soils prevailing in India which is constituting about 9.38 M ha. Salt affected soils are deficient in phosphorus. The transformation and availability of applied and soil P and crop responses to P application greatly differ in saline soils. In saline soils, P availability decreases due to higher retention of soluble phosphate, antagonistic effect of Cl^- and SO_4^{2-} on plant absorption of P and restricted root growth (Abdul Rashid, 2006). Keeping these points in view, the present investigation was planned to quantify different forms of soil P in order to adjust the fertilizer recommendation for maize crop in saline soils.

MATERIALS AND METHODS

A field experiment was conducted in saline soil to quantify the fractions of P under maize crop at different stages of crop growth. Seven levels of P viz., 0, 48.75, 65.00, 81.25, 97.50, 113.75 and 130.00 kg ha^{-1} of P_2O_5 in the form of super phosphate were added in that soil. The soil was loam in texture, saline in reaction (pH 7.8, EC 4.1 dSm^{-1}). The total P content was 2000 kg ha^{-1}, low in available P (0.10%). The percentage distribution of different fractions of P in that soil were viz., saloid bound P 14.30 %, Al- P 4.74 %, Fe- P 3.93 %, reductant soluble P 4.00 %, Ca- P 47.00 % and organic P 26 %. Chang and Jackson (1957) developed a procedure for fractionation of soil P and was modified by Peterson and Corey (1966). According to their procedure, different fractions of P are determined by treating the soil sample successively with normal ammonium chloride for loosely bound or saloid bound P, 0.5 N ammonium chloride for