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Dynamics of Iron fractions in the LTFE's soils

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ABSTRACT

The dynamics of Fe fractions in the selective treatments were studied by collecting the surface soil samples (0-15 cm) from the LTFE's conducted on groundnut-wheat-fodder sorghum at instructional farm, Junagadh Agril.University, Junagadh during the year 1979-80 (1st year), 1989-90 (10th year) and 1999-2000 (20th year) after completion of crop cycle. The selected treatments were T_1- Control, T_2-FYM @ 25 t/ha at an interval of 3 years, T_3- ½ RD of NP, T_4-1/2 RD of NP+K, T_5- RD of NP and T_6-RD of NP+K to respective crops. On a long run, after 20th year the values of water soluble-Fe were recorded highest in T_2 (0.722 ppm) and T_1 (0.504 ppm) and the lowest in T_5 (0.082 ppm) and T_3 (0.130 ppm). The significantly highest exchangeable-Fe was recorded in T_5 (2.084 ppm), at 10th year. The DTPA available and reducible Fe was found significantly higher under T_1 and T_2, while application of fertilizer registered mostly a decline in long term at 20th year. The total and residual-Fe content did not showed any significant differences either through treatment or through years. The percentage availability and available total-Fe were not affected significantly in pooled years, but Y x T interaction was found significant and in the initial years T_5 and T_6, while in the 20th years T_1 and T_2 recorded the highest values.

Key words : LTFE's soil, Fe fraction, water soluble-Fe, Exchangeable-Fe, DTPA available- Fe, Total- Fe, Per cent available- Fe

Inspite of high total iron in soils, its availability to crops is a major problem in many soils. The various forms of iron in soil are the immediately available, the available pool, available on decomposition and potential medium long term sources of available iron (Katyal and Deb, 1982). The DTPA available iron in Indian soils is greatly varies from traces to 982 ppm (Kanwar and Randhawa, 1974). This variation is mainly attributed to the soil types and their characteristics nature of chemical extractants used and agro-ecological condition (Sangwan and Singh, 1993). Considering this fact, there is a urgent need to study the dynamics of different forms of iron under intensive agricultural system and hence, the present investigation was planned.

MATERIALS AND METHODS

Surface soil samples (0-15 cm) were collected from the selective treatments of the LTFE's conducted on groundnut-wheat-fodder sorghum in RBD at Instructional Farm, Junagadh Agricultural University, Junagadh during the year 1979-80 (1st year), 1989-90 (10th year) and 1999-2000 (20th year) after completion of crop cycle. The treatment selected were T_1-Control, T_2-FYM @ 25 t/ha at an interval of 3 years. T_3- 1/2 RD of NP, T_4- 1/2 RD of NP + K, T_5- RD of NP and T_6- RD of NP + K. These soil samples were sequentially extracted for different Fe fractions as per the procedure described by Jackson (1973) and Viets (1962) as water soluble, exchangeable, DTP A available, and reducible form. Total Fe status was determined by digesting the soil using HF: $HClO_4$ (5: 1). These extracts were analyzed for their Fe content on Atomic Absorption Spectrophotometer. Residual form of Fe was calculated by deducting water soluble + exchangeable + DTPA available + reducible (*i.e.* available total) from the total Fe status of the soil. The per cent available Fe status was calculated as available total of the total Fe status of the soil.

RESULTS AND DISCUSSION

Fe-water soluble:

Pooled differences in water soluble-Fe as affected by different treatments were not significant, but Y x T interaction was significant and in a long run after 20th year the highest values were recorded in T_2 (0.722 ppm) and T_1 (0.504 ppm) and the lowest in T_5(0.082 ppm) and T_3 (0.130 ppm (Table 1). The results are indicative of enhancing water soluble iron utilization by the application of fertilizers in a log run. Overall, there was a numerical increase in the water soluble-Fe content over a period of time, mainly by virtue of under utilized content in T_1 and T_2.

Fe -exchangeable:

Data presented in Table l showed that exchangeable Fe content significantly affected only at 10th year and the highest value was recorded in T_5 (2.084 ppm).