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Nitrogen fractions and their relatioships under sorghum sunflower cropping sequence in a typic haplustert

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ABSTRACT

A field experiment on fixed plot was conducted on nitrogen fractions under sorghum-sunflower cropping sequence by using organic and inorganic fertilizer treatments at Marathwada Agricultural University, Parbhani during 2001-2002. The doses based on soil test framed in 1997 which were found to be optimum for sorghum (80:40:40 kg N, P and K ha^{-1}) and for sunflower (60:40:30 kg N, P and K ha^{-1}).The results of these studies revealed that all nitrogen fractions like total hydrolysable nitrogen, amino acid nitrogen, organic ammonium nitrogen, acid insoluble nitrogen and total nitrogen were increased significantly in all treatment combination. The combined application of organics + inorganic fertilizers caused significant increase in available nutrients status of the soil. The relationship with availability and soil properties exhibited significantly negative correlation with soil pH and significant positive correlation with organic carbon and $CaCO_3$ of soil.

Key words : Nitrogen fractions, Relationship, Sorghum-sunflower sequence

Nitrogen in soil occurs in inorganic and organic forms. Organic forms of nitrogen constitutes 95 per cent or more of the total nitrogen in surface soils and only 2 to 5 per cent of the total nitrogen is present in inorganic forms. It has long been recognized that the application of fertilizers besides organic manures is essential for increased crop production. Continuous use of fertilizers and manures give rise to various nitrogenous compounds in the soil.

The results from some sporadic long term experiments in India have shown that continuous addition of organic manures and inorganic fertilizers had favourable effect on increased soil nitrogen fractions. It is generally believed that the most readily mineralized forms of nitrogen are amino acids and hexosamines. It has also been observed that hydrolysable, ammonium and amino acid nitrogen contributed most to the available nitrogen. Pal *et al.* (1987) reported that cropping decreased the available and total hydrolysable nitrogen and organic and inorganic fixed NH_4^+-N continued to increase.

The objectives of the present investigation were considering these aspects formulated to quantify different N fractions in a *Typic haplusterts* to continuous cropping as sorghum-sunflower sequence fertilizers with their correlation studies.

MATERIALS AND METHODS

A study was conducted on fixed plot fertilizer with sorghum- sunflower cropping sequence, in progress since 1997, during 2001-2002 at MAU, Parbhani. After the completion of third cycle, all the samples were analyzed for N fractions. The experiment was laid out in a randomized block design with twelve treatments and four replications. The treatments of this experiment were the soil test based optimal doses (100 % NPK) and super-optimal dose (150 % NPK) of fertilizers worked out in 1997 which were 80 kg N, 40 kg P_2O_5, 40 kg K_2O ha^{-1} for hybrid sorghum and 60 kg N,40 kg P_2O5, 30 kg, K_2O ha^{-1} for hybrid sunflower. The treatment details are given below in Table 1.

Table 1 : Treatment details of experiment of sorghum-sunflower cropping sequence

Treatments No.	Details
T_1	100 % NPK, S, Zn, B
T_2	100 % NPK, Zn, B, (-S)
T_3	100 % NPK, S,B, (-Zn)
T_4	100 % NPK, S, Zn, (-B)
T_5	100 % NPK, S, Zn, B (50 % N through green manuring of Glyricidia)
T_6	100 % NPK, S, Zn, B (50 % N through FYM)
T_7	100 % NPK, S, Zn, B (50 % N through PMC)
T_8	100 % NPK, S, Zn, B (50% N through wheat straw)
T_9	100 % NPK, S, Zn, B (25% N through GM, FYM, PMC, WS)
T_{10}	100 % NPK
T_{11}	150 % NPK + 100 % S, Zn, B
T_{12}	Control (No manures and fertilizers)

Quantity of organic manures added on nitrogen (N) equivalent basis for *kharif* season only.