

Research Paper :

## **Influence of tillage and organic amendments on nutrient availability and productivity of vertisols**

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### **ABSTRACT**

The status of soil nutrients and crop productivity of sorghum in sorghum- safflower cropping system under various tillage and organic amendment treatment was studied. In general, yield of sorghum was increased due to tillage with tractor plough, amending the soil with the help of press mud compost followed by pulverization with rotavation. The status of organic carbon and availability of N, P and K was also increased due to tillage with tractor plough, amending the soil with the help of press mud compost followed by pulverization with rotavation.

**Key words :** Tillage, Organic amendments, Pulverization, Sorghum-safflower system

The decline in soil fertility and productivity due to nutrient imbalance has been recognized as one of the most important factors limiting crop yields (Nambiar and Abrol, 1989). Indiscriminate use of high analysis of chemical fertilizers also results in the deficiency of nutrients other than the applied fertilizers and disturbs the natural equilibrium of nutrient elements in soils (Singh *et al.*, 1999). The beneficial effect of tillage and organic amendments on status of organic carbon, availability of NPK and yield of sorghum might be due to improved physical properties, maximum microbial population and their activity. The present study was carried out to evaluate the influence of tillage and organic amendments on nutrient availability in the soil and productivity of sorghum in sorghum-safflower cropping system.

### **MATERIALS AND METHODS**

A field experiment on sorghum-safflower system was studied in 1998-1999 and 1999-2000 at Agronomy Farm, Marathwada Agricultural University, Parbhani, Maharashtra. The soils belong to the order vertisol. The soil of experimental field was clayey in texture with bulk density of  $1.32 \text{ Mg M}^{-3}$ , alkaline in reaction (pH-7.97) with normal EC of  $0.38 \text{ dsm}^{-1}$ , calcareous in nature, medium in organic carbon ( $4.2 \text{ g kg}^{-1}$ ), low in available nitrogen ( $196 \text{ kg ha}^{-1}$ ), medium in available phosphorus ( $12.78 \text{ kg ha}^{-1}$ ) and high in available potassium ( $356.68 \text{ kg ha}^{-1}$ ). Eighteen treatment combinations comprising three tillage treatments  $T_1$  (Tillage with low weight wooden plough),  $T_2$  (Tillage with heavy weight mould board plough),  $T_3$  (Tillage with tractor plough), three levels of organic

amendments  $A_1$  (No FYM/PMC),  $A_2$  (PMC@  $5 \text{ Mg ha}^{-1}$ ),  $A_3$  (FYM @  $5 \text{ Mg ha}^{-1}$ ) and two levels of pulverization ( $P_1$ - two harrowing and  $P_2$ - one rotavation) were replicated in four times in FRBD. The recommended doses of N, P and K were applied to soil in different plots. After harvest of sorghum in both years of study soil samples were collected from 0-15 cm layer from each plot and analyzed for organic carbon (Walkley and Black, 1934), available N (Subbiah and Asija, 1956),  $0.5 \text{ M NaHCO}_3$  (pH- 8.5) extractable P (Olsen *et al.*, 1954) and  $1 \text{ N NH}_4$  OAC extractable K (Jackson, 1973).

### **RESULTS AND DISCUSSION**

The results obtained from the present investigation are summarized in Table 1 and 2.

#### **Organic carbon content:**

The data presented in Table 1 on organic carbon content in soil at surface layer (0-15 cm) as affected by tillage and organic amendments indicate that tillage treatments with their depth significantly increased organic carbon content of soil in both the year. Tillage with tractor plough recorded higher values of organic carbon content ( $5.1$  and  $5.3 \text{ g kg}^{-1}$ ) in soil over other treatments. Among organics, PMC proved superior to build up greater organic carbon ( $5.2$  and  $5.4 \text{ g kg}^{-1}$ ) status of soil than FYM ( $4.9$  and  $5.1 \text{ g kg}^{-1}$ ) and control ( $4.5$  and  $4.7 \text{ g kg}^{-1}$ ) treatments. The combined effect of treatment was found to be inconsistent and was not reached to the level of significance to their respective control, in both the years of study except, TxA interaction was found beneficial to