

Research Paper :

Effect of tillage and organics on moisture conservation and physical properties of vertisol under sorghum in sorghum – safflower cropping system

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ABSTRACT

The effect of tillage and organics on moisture conservation and physical properties of soil was studied in field. The tillage and organics showed significant improvement on moisture conservation and physical properties of soil. Tillage with tractor plough (T_3) along with press mud compost (A_2) and pulverization with rotavation (P_2) was found superior for conservation of moisture in soil. Similar trend was observed with respect to physical properties soil.

Key words : Tillage, Organic, Vertisol and Pulverization

Vertisols and associated black soils are characterized by presence of Montmorillonite clay mineral exhibiting swelling and shrinking in wet and dry conditions, respectively. Further these soils are fine clayey with high clay content, CEC, low in water retention capacity, low in organic carbon, low in infiltration rate. Though, black soils are considered as potentially productive and thermal region is conducive to crop cultivation throughout year.

Soil tillage affects sustainability through its long-term effect on soil processes, soil properties and crop growth. Good soil tillage is a prerequisite for high crop productivity. Tillage operations (harrowing, ploughing and chiseling) reduces compatibility of soil, improve aeration and create better environment for soil microorganisms. Hirnekurubar *et al.* (1991), Bharambe (1993) and Singh and Verma (1995).

Use of inorganic fertilizers alone in intensive cropping system creates infertility and unfavorable soil physical condition and biological system. Soil health is deteriorating year after year. It can be overcome by use of organic amendments with mineral fertilizers. The manorial value of FYM is well known. The press mud compost is biocompost manure prepared by mixing pressmud and distillery effluent in the ratio of 1:2.5 and processed in the presence of bacterial culture for its bioconversion into usable form as biocompost Malewar and Hasnabade (1995) and Tompe and More (1996). Combined effect of tillage and organic residues increases moisture content of soil (Khiani and More, 1984), improve availability of nutrients enhances microbial biomass and improve yield of Sorghum (Bhagat, 1990).

MATERIALS AND METHODS

The field experiment was conducted for two years at department of Agronomy farm, Marathwada Agricultural University, Parbhani during *khariif* season of 1998-99 to 1999-2000. Topography of the experimental plot was fairly leveled. The soil was medium to deep, well drained and calcareous developed over weathered basalt. Eighteen treatment combinations were replicated four times in FRBD in *khariif* season. The tillage treatments were

T_1 - tillage with low weight wooden plough, T_2 - Tillage with heavy weight mould board plough and T_3 - Tillage with tractor plough. The organic amendment treatments were A_1 -No FYM/PMC, A_2 -PMC and A_3 - FYM @ 5 Mg ha⁻¹) and two pulverization treatments were P_1 - two harrowings and P_2 -one rotavation. Thus the eighteen treatment combinations were : $T_1P_1A_1$, $T_1P_1A_2$, $T_1P_1A_3$, $T_1P_2A_1$, $T_1P_2A_2$, $T_1P_2A_3$, $T_2P_1A_1$, $T_2P_1A_2$, $T_2P_1A_3$, $T_2P_2A_1$, $T_2P_2A_2$, $T_2P_2A_3$, $T_3P_1A_1$, $T_3P_1A_2$, $T_3P_1A_3$, $T_3P_2A_1$, $T_3P_2A_2$, $T_3P_2A_3$.

The soil moisture content in soil profile (45 cm depth) was recorded at sowing, flowering and harvest of crop as per the method described by Singh (1980). Bulk density and hydraulic conductivity was determined by the method suggested by Black (1965). Infiltration rate was determined in the field by using double ring infiltrometer as described by Black (1965).

RESULTS AND DISCUSSION

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