

Research
Paper

Influence of tillage and organics on yield and nutrient uptake of sorghum under sorghum – safflower cropping system

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ABSTRACT

An investigation was carried out to assess the influence of tillage and organics on yield and nutrient uptake of sorghum under sorghum – safflower-cropping system grown on Vertisols. The experiments were conducted for two successive years at Agronomy farm, Marathwada Agricultural University, Parbhani. The treatments comprised of three levels of tillage (T_1 - Tillage with low weight wooden plough, T_2 – Tillage with heavy weight mould board plough and T_3 – Tillage with tractor plough), three levels of organic amendments (A_1 – No FYM/PMC, A_2 – PMC @ 5 Mg ha⁻¹ and A_3 - FYM @ 5 Mg ha⁻¹) and two levels of pulverization (P_1 - two harrowings and P_2 - one rotavation). Thus, eighteen treatment combinations were replicated four times in factorial randomized block design. The recommended dose of N, P_2O_5 and K_2O was applied at the time of sowing through urea, single super phosphate and muriate of potash, respectively. However, FYM and PMC were applied twenty days before the sowing of sorghum. Standard procedures were adopted for noting the observations, chemical analysis and interpretation of the data. The study revealed that the highest (grain and fodder) yield and the uptake of N, P and K were observed with the treatment including tillage with tractor plough (T_3) along with the press mud compost (A_2) and pulverization with rotavation (P_2).

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KEY WORDS : Tillage, Organics, Nutrient uptake, Yield

The development of tillage practices for rain fed crop production has been and will be a dynamic process. Tillage creates improved physical conditions of soil that bring about better water-nutrient and temperature relations. Different tillage operations may influence the physical properties such as soil porosity, air filled porosity, hydraulic conductivity (Singh and Singh, 1996). As a result soil becomes permeable, aerated and having good physical conditions for crop production. Deep tillage decreases soil bulk density. It also removes mechanical impedance of soil, which is the hindrance to root penetration and thereby accelerate the crop production. Deep tillage breaks the hard layers to help the roots to extend in the deeper layers (Campbell et al, 1974). It facilitates easy uptake of water as well as nutrients by the roots from different soil layers efficiently, which consequently increased the root growth and yield of crops (Varsa *et al*, 1997). Application of organic sources of nutrients as supplement to inorganic fertilizers has provided a befitting solution not only to the problem of soil degradation (Ray and Gupta, 2001) but also to the growing concerns about the sustainability of this system. Organics have a positive influence on the

biological indicators of soil health, *viz.*, soil microbial biomass, organic carbon, and C and N mineralization (Samrah and Bordoloi, 1994).

The present investigation was planned to determine the effect of different tillage systems in combination with organics on yield and nutrient uptake of sorghum.

RESEARCH PROCEDURE

A field experiment on a sorghum- safflower cropping sequence was initiated during 1998-99 to 1999-2000 in the Agronomy farm, Marathwada Agricultural University, Parbhani (MS.). The soil of experimental field belongs to order Vertisol. The soil is moderately well drained, with pH 7.97, organic carbon 4.2 gkg⁻¹, available nitrogen 196 kgha⁻¹, available phosphorus 12.78 kgha⁻¹ and available potassium 356.68 kgha⁻¹. The experiment was laid out in Factorial Randomized Block Design with 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