

Research Paper :

Impact of tillage and organics on nutrient content and nutrient uptake of *kharif* sorghum

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ABSTRACT

A field experiment was conducted to study the effect of different tillage and organic amendment treatments on nutrient content and uptake by *kharif* sorghum on Vertisol. The study revealed that the highest concentration and uptake of N, P and K was obtained with the treatment including tillage with tractor plough (T₃) along with press mud compost (A₂) and pulverization with rotavation (P₂).

Key words : Tillage, Organics, Nutrient concentration and Nutrient uptake

Soil tillage affects sustainability through its long-term effect on soil processes, soil properties, nutrient uptake and crop growth. Tillage operations reduce compactability of soil, improve aeration and create better environment for soil microorganisms, ultimately increase the uptake of nutrient by crops. Continuous use of inorganic fertilizer has resulted in reduction in yield and deteriorated soil quality. Integrated nutrient application with inclusion of organics is the recently felt need to increase production and sustain soil health. Hence, the present study was carried to find out the effect of tillage and organics on nutrient content and uptake in sorghum.

MATERIALS AND METHODS

A field experiment on sorghum- safflower system was studied in 1998-99 and 1999-2000 at Agronomy Farm, Marathwada Agricultural University, Parbhani (M.S.). The experimental site had pH-7.97, EC-0.38 dsm⁻¹, organic carbon-4.2 g kg⁻¹, available nitrogen 196.0 kg ha⁻¹, available phosphorus 12.78 kg ha⁻¹ and available potassium 356.68 kg ha⁻¹. The experiment was laid out in Factorial Randomized Block Design with eighteen treatment combinations comprising three tillage treatments T₁ (tillage with low weight wooden plough), T₂ (tillage with heavy weight mould board plough), T₃ (tillage with tractor plough), three levels of organic amendments A₁ (No FYM/PMC), A₂ (PMC @ 5 Mg ha⁻¹), A₃ (FYM @ 5 Mg ha⁻¹) and two levels of pulverization (P₁- two harrowing and P₂- one rotavation) were replicated four times. Nitrogen, phosphorus and potassium were applied in the form of urea, single super phosphate and muriate of potash,

respectively. The grain and fodder samples were collected, dried in hot air oven at 65°C, powdered and digested using diacid (H₂SO₄ : HClO₄) in the ratio of 4:1 and analyzed for the content of nitrogen, phosphorus and potassium using the procedure of Jackson (1973).

RESULTS AND DISCUSSION

The results obtained from the present investigation are summarized below :

Nitrogen:

The results of the study indicated that the tillage with tractor plough (T₃) significantly increased the nitrogen content in grain (1.77 and 1.79 %) and fodder (0.71 and 0.75%) in both the years of study (Table 1). This was followed by the treatment tillage with heavy weight mould board plough (T₂), which recorded 1.71 and 1.76 % in grain and 0.65 and 0.70 % in sorghum fodder and T₁ (tillage with wooden plough) recorded 1.58 and 1.65 % in grain and 0.55 and 0.56 % in fodder. The effect of pulverization was also found significant and beneficial to enhance the absorption of nutrients by crop and rotavation treatments (P₂) proved its superiority over harrowing treatments (P₁). The different organic treatments showed differential response on concentration of nitrogen by sorghum. Among organics, treatment A₂ recorded significantly greater values of (1.77 and 1.81% N in grain and 0.69 and 0.73 % N in fodder) nitrogen content followed by A₃ and A₁ treatments. The data with regard to nitrogen uptake is shown in Table 2. Among the treatments, T₃ recorded the highest total nitrogen (grain