RESEARCH PAPER

Asian Journal of Bio Science, Vol. 4 Issue 1 : 100-102 (April to September, 2009)

Impact of integrated nutrient management practices on yield, juice quality and nutrient uptake in sweet sorghum [*Sorghum biocolor* (L.) Moench] grown on vertisol

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(Accepted : March, 2009)

A field experiment was conducted on Typic Haplustert at Research Farm, Marathwada Agricultural University, Parbhani (M.S.), India in rainy season of 2005-06. The soil was slightly alkaline (pH 8.2) and low in available N (231 kg ha^{-1}) and moderate in availability of P_2O_5 (15 kg ha^{-1}) and high in K_2O (472 kg ha^{-1}) having DTPA extractable Zn and Fe 0.79 and 4.29 mg kg^{-1}, respectively. The experiment was laid out in Randomized Block Design (RBD) with seven treatments replicated thrice. The sweet sorghum variety used was HES-04. Inorganic fertilizers were applied as per recommended dose of fertilizer and micronutrients as per treatment through chemical fertilizers. However, Azotobacter and phosphorus solubilizing bacteria (PSB) were used for seed treatment before sowing. Vermicompost was applied @ 2.5 Mg ha^{-1} as per treatment at the time of sowing. Green stalk and grain yield ,chemical analysis , Juice extraction, total soluble solid (^{o}Brix), reducing and non-reducing sugars were determined at physiological maturity using standard procedures. The grain and green stalk yield of sorghum was significantly improved by application of inorganic fertilizers @ 50% RDF + vermicompost and micronutrients (Zn and Fe) along with seed treatment of biofertlizers. Similarly, addition of micronutrients also has contributed in increasing yield of crop. Quality of sweet sorghum in terms of juice extraction (%), ^{o}brix, reducing and non-reducing sugar was also found to increase with different integrated management practices particularly with application of 50% RDF + vermicompost + biofertilizer along with micronutrients. Comparatively higher nutrient concentration of NPK in grain and stover was found in 50% RDF along with micronutrients and Fe and Zn in stover was found higher in same treatment.

Key words : Sweet sorghum, Vermicompost, Biofertilizers, Micronutrients

INTRODUCTION

Sorghum is notable for its most efficient dry matter production among cereal crop plants. Sorghum has C_4 photosynthetic pathway and demonstrated an ability to produce dry matter at an average of 50g m^{-2} day^{-1}. This unique carbon assimilation capability in conjunction with its yet another ability to accumulate high levels of sugars in the stalk make this species a very promising for bioenergy production. Sweet sorghum is a special type of sorghum that accumulates sugars (sucrose, glucose and fructose) in stalk. Green juicy cane contributes 70-80 per cent of total biomass. It is used for grain and stem sweet juice can be used for ethanol, jaggery, syrup etc. production. Yield and soil properties were significantly improved by combined application of organic, inorganics and biofertilizers than the inorganics alone (Gawai and Pawar, 2005). The poor fertility status of the soil is one of major constraints for higher productivity. The importance and usefulness of organic manures in soil sustainability has been emphasized by Katyal (2000) and judicious use of inorganic fertilizer along with organic sources have been suggested. To sustain the crop yield and increase land productivity, combination of organic manures fertilizers not only increase the crop yield of sorghum but also improves physical and biological properties of soil (Bagade *et al.*, 2003). This is an attempt to study the impact of inorganic fertilizer, vermicompost, biofertilizer and soil test based micronutrients (Fe and Zn) on yield and nutrient uptake of sweet sorghum.

MATERIALS AND METHODS

A field experiment was conducted on Vertisol (Typic Haplustert) at Research Farm of Marathwada Agricultural University, Parbhani (M.S.) India, in rainy season of 2005-06. The soil was slightly alkaline (pH 8.2) and low in available N (231 kg ha^{-1}) and moderate in availability of P_2O_5 (15 kg ha^{-1}) and high in K_2O (472 kg ha^{-1}) having DTPA extractable Zn and Fe 0.79 and 4.29 mg kg^{-1}, respectively. The experiment was laid out in randomized block design with seven treatments replicated thrice. The sweet sorghum variety used was HES-04. Inorganic fertilizers were applied as per recommended dose of