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Full Length Research Article

Evaluation of vermicompost and biofertilizers on soil properties and yield of sweet sorghum

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Abstract: Field experiment was conducted on sweet sorghum to study the evaluation of inorganic fertilizer, organic manures, biofertilizers and micronutrients on soil properties at Experimental Farm, Annamalai University during season of summer 2009. The experimental field consisted of chemical fertilizer, vermicompost, biofertilizer (Azospirillum + Phosphobacteria) and micronutrient (Zn and Mn). The result shows that application of 75% RDF + Vermicompost + Biofertilizers (T7) had registered higher grain yield, stalk yield, total biomass and dry matter, compared to rest of the treatments.

Key words: Grain yield, Biomass, Vermicompost, Sweet sorghum, Biofertilizers and Dry matter.

INTRODUCTION

Among sorghum cultivars, sweet sorghum (*Sorghum bicolor*) is one of the important versatile growing crop for both kharif and rabi seasons. It has been growing due to its commercial importance in Tamilnadu, Andhrapradesh, Maharashtra, Karnataka and Madhyapradesh. Sweet sorghum is grown as multipurpose millet crop in dry lands, used as grain, stover, fodder and bio ethanol purpose. It is a short duration, drought tolerant and wide adaptability, shallow rooted crop with high water use efficiency and exhibits quick growth rate and rapid sugar accumulation. It has a photosynthetic potential producing 40-50 t ha^{-1} millable cane with 15-20 t ha^{-1} grain yield and accumulating dry matter of 50 gm^{-2} day^{-1}. Sweet sorghum stover also serves as an excellent feedstock for ethanol production. Stover contains lignin, hemi-cellulose and cellulose. Sweet sorghum stalks contain upto 75% juice, and 12-23% of sugar. Due to improper management practices and erratic rainfall and productivity can be low in rainfed regions. Integrated approach of land utilization to manage the natural resources with efficiency in rainfed regions is essential to meet the requirements of farming community and their deteriorating livestock, enhance and land productivity and also to create continuous and stable farm income. In order to achieve an intensive production of grain with good quality, it is necessary to follow simultaneously all management practices through integrated nutrient management (INM) to sustain the productivity and to improve the soil fertility. This system enhances the use of organic, biofertilizers and inorganic fertilizers in judicious combination to soil than alone to sustain soil productivity (Bagade *et al.,* 2003 and Patel, 2015).

MATERIALS AND METHODS

Field investigation was conducted at Experimental Farm, Annamalai University, Annamalainagar. The soil of experimental field is low in available N, medium in P and high in K_2O with pH is 7.1. Experiment was laid out with randomized block design and replicated thrice with seven treatments. Plot size of 5 × 4 m was formed in main field. Biometric observations were taken up in different growth stages of crop. Package of practices were followed according to recommended dosage as per treatment schedule. Statistical analysis were done. The variety SSV-7073 was sown with the spacing of 60 × 30 cm. The treatment schedule were as follows

T_1 – Recommended dose of fertilizer (90:45:45 kg NPK ha^{-1}), T_2 – 75% RDF + Vermicompost @ 5 t ha^{-1}, T_3 – 75% RDF + $ZnSO_4$ @ 0.05% at 20 and 45 DAS, T_4 – 75% RDF + Azospirillum + Phosphobacteria @ 600 g ha^{-1}, T_5 – T_2 + $ZnSO_4$ @ 0.05% at 20 and 45 DAS, T_6 – T_2 + Azosprillum + Phosphobacteria @ 600 g ha^{-1}, T_7 – T_5 + Azosprillum + Phosphobacteria @ 600 g ha^{-1}. The soil of the experimental site was clay soil in texture organic and inorganic fertilizers were applied as per treatment schedule. All cultural practices were performed as per recommendation. Observations were recorded from five random healthy plants of each treatment on growth, yield and its attributes. The experimental data recorded were subjected to statistical analysis using analysis of variance technique suggested by Panse and Sukatme (1984).

RESULTS AND DISCUSSION

The results shows from the present investigation as well as relevant discussion has been presented. The results of the field investigation during summer 2016 shows that application of 75% Recommended dose of fertilizer + Vermicompost + Micronutrients had registered the highest grain yield, green stalk yield, biomass and dry matter due to the synergistic effect of both bioinoculants.

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Table 1. Influence of inorganic fertilizers, vermicompost, biofertilizers and micronutrients on grain yield, green stalk yield, total biomass and dry matter of sweet sorghum

Treatments	Grain yield (kg ha^{-1})	Green stalk yield (kg ha^{-1})	Biomass (kg ha^{-1})	Dry matter (kg ha^{-1})
T_1 – Recommended dose of fertilizer (90:45:45 kg NPK ha^{-1})	1014	23.91	24.94	5164
T_2 – 75% RDF + Vermicompost @ 5 t ha^{-1}	1038	24.04	25.12	5210
T_3 – 75% RDF + $ZnSO_4$ @ 0.05% at 20 and 45 DAS	978	23.54	24.53	5033
T_4 – 75% RDF + *Azospirillum* + Phosphobacteria @ 600 g ha^{-1}	972	23.61	23.68	4991
T_5 – T_2 + $ZnSO_4$ @ 0.05% at 20 and 45 DAS	1160	24.88	26.08	5547
T_6 – T_2 + *Azosprillum* + Phosphobacteria @ 600 g ha^{-1}	1063	24.29	25.34	5318
T_7 – T_5 + *Azosprillum* + Phosphobacteria @ 600 g ha^{-1}	1232	25.34	26.59	5615
S.Ed.	26.12	0.84	0.86	25.25
CD (P=0.05)	52.24	1.68	1.72	51.50

Table 2. Influence of inorganic fertilizers, vermicompost, biofertilizers and micronutrients on physico-chemical properties of soil

Treatments	pH	Electrical conductivity (d Sm^{-1})	Organic carbon (g kg^{-1})
T_1 – Recommended dose of fertilizer (90:45:45 kg NPK ha^{-1})	7.23	0.20	4.69
T_2 – 75% RDF + Vermicompost @ 5 t ha^{-1}	7.06	0.15	6.47
T_3 – 75% RDF + $ZnSO_4$ @ 0.05% at 20 and 45 DAS	7.21	0.21	4.73
T_4 – 75% RDF + *Azospirillum* + Phosphobacteria @ 600 g ha^{-1}	7.09	0.16	4.85
T_5 – T_2 + $ZnSO_4$ @ 0.05% at 20 and 45 DAS	7.14	0.18	5.95
T_6 – T_2 + *Azosprillum* + Phosphobacteria @ 600 g ha^{-1}	7.03	0.13	6.77
T_7 – T_5 + *Azosprillum* + Phosphobacteria @ 600 g ha^{-1}	7.15	0.18	6.70
S.Ed.	0.04	0.11	0.15
CD (P=0.05)	0.08	0.22	0.31

It is well known fact and this could be ascribed of yield attributes, which in turn resulted reproductive structures ultimately reflected in to greater grain and stover yield. Similar findings were correlated with Kachapur *et al.* (2001), Sree Devi (2006), Ponnuswamy *et al.* (2002) and Singh *et al.* (2015). Similar reported were founded by Sherchan *et al.* (2004). The increase in dry matter production of grain and stover in sweet sorghum by biofertiliers recorded higher yields. Biofertilizers may have utilized organic compounds as carbon and energy source and produce organic acids and exudates there by solubilized and mobilized the insoluble inorganic nutrients. Apart from making nutrients available they might have produce growth promoting substances in rhizosphere which may have improve plant growth and stimulate microbial development. The above results were in correlated with Arbad *e al.* (2008); Jat *et al.* (2003). Application of micronutrients had recorded the highest growth and yield attributing characters. This might be due to the synergistic effect of biofertilizers with inorganic fertilizer as well as extraction of nutrients from surface and substance due to extension root system. These results were correlated with Sherchan *et al.* (2004); Guled *et al.* (2003) and Meena and Baskaran *et al.* (2005) and Gawai and Pawar (2005).

REFERENCES

Arbad, B.K., Syed Ismail, Shinde, D.N. and Dhange, S.J. 2008. Impact of integrated nutrient management practices in soil properties and yield in sweet sorghum in vertisol. *Asian J. Soil Sci.,* 3(2): 329-332.

Bagade, Rajshri, Ingole, P.D. Raut, B.D. Dongore, S.T. and Mohammed Sajid. 2003. Effect of integrated nutrient management on yield uptake of nutrient and quality of rainfed sorghum. *P.K.V. Res.,* 27(1): 44-52.

Gawai and Pawar, V.S. 2005. Yield and yield components of sorghum as influenced by integrated nutrient management system and its residual effect on chickpea. *Ann. Agric. Res. New Series,* 26(1): 97-100.

Guled, M.B., Gundlur, S.S., Hirmath, K.A. and Surkod, V.S. 2003. Effect of organic and inorganic fertilizer on uptake of major nutrients by rabi sorghum. *Kar. J. Agrl. Sci.,* 16(2): 304-306.

Jat, S.H., Sumeriya, H.K. and Mehta, K. 2003. Influence of integrated nutrient management on content and uptake of nutrient of sorghum. *Crop Res.,* 26(3): 390-394.

Kachapur, M.D., Roodagi, L.I. and Chittapur, B.N. 2001. Influence of vermicompost on the productivity of kharif sorghum. *Kar. J. Agric. Sci.,* 14(3): 779-780.

Meena, S. and Baskaran, T.L. 2005. Impact of organic wastes with bio-inoculants on the yield and uptake of nutrients by sorghum. *Crop Res.,* 30(1): 128-130.

Panse, V.G. and Sukatme, P.V. 1984. Statistical methods for agricultural workers. ICAR, New Delhi, 199-200.

Patel, B.K. 2015. Effect of land configuration and integrated nutrient management on productivity of different varieties of sorghum grown on fluvenic ustochops, *Ph.D. Thesis,* Submitted to NAU, Gujarat.

Ponnuswamy, K., Subbiah, P., Santhi, P.and Sankaran, N. 2002. Integrated nutrient management for rainfed sorghum. *Crop Res.,* 23(2): 243-246.

Sherchan, D.P., Upreti, R. and Maskey, S.L. 2004. Effect of manganese on production of maize in the acid soils of Chitwan valley. *In:* Proceedings of an International Workshop. Micronutrient in South and South East Asia (Sep. 8-11, 2004), Kathamndu, Nepal, pp. 169-180.

Singh, K., Joshi, Y.P. and Chandra, H. 2015. Effect of integrated nutrient management on growth, productivity and quality of sweet sorghum. *Indian J. Agron.,* 62(2): 291-296.

Sreedevi, P. 2006. Effect of vermicompost and poultry manure on soil fertility, plant nutrient, yield and quality of onion. *M.Sc. (Ag.) Thesis* submitted to Andhra Pradesh, Agrl. University, Hyderabad.

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