Annals of Arid Zone 54(1&2): 59-61, 2015

Short Communication

Effect of Vermicompost and Fertility Levels on Growth and Yield of Pearl millet *(Pennisetum glaucum* L.)

Rakesh Choudhary*, L.R. Yadav and S. Parihar

Swami Keshwanand Rajasthan Agricultural University, Bikaner 334 006, India

Pearl millet is one of fourth most important food crop in India after rice, wheat and sorghum and it is well adapted to drought, low soil fertility and alkaline soil. It's generally grown as a rainfed crop during kharif season in Rajasthan. Rajasthan has largest area of pearl millet in the country (54.89 lakh ha) with a production of 60.91 lakh tons and productivity of 1110 kg ha^{-1} (Anonymous, 2010-11). It is nutritionally better than many cereals as it is a good source of protein (11.6%) and minerals (i.e. Fe 2.8%). Increased uses of chemical fertilizers without adequate organic matter has not only aggravated multi-nutrients deficiencies in soil plant system but also deteriorated soil health. Organic manures are well known (vermicompost) for improving soil fertility and increasing efficiency of fertilizer. Vermicompost is a rich mixture of macro and micro plant nutrients and also improves microbial activity in soil. The integration of chemical fertilizers with organic manures will maintain soil fertility and sustain crop productivity. The interactive advantage of combining inorganic and organic sources of nutrients generally proved superior to the use of each component separately (Singh and Yadav, 1992). Keeping in view of the above situation, the present investigation was carried out to study the effect of various doses of RDF in combination with vermicompost on pearl millet growth and yield.

A field experiment was conducted during kharif season of 2010 at Agronomy Farm of SKN College of Agriculture, Jobner (Rajasthan). The pearl millet (HHB-67) was sown at 45 cm x 10 cm spacing on 10th July, 2010 and harvested on 25th September, 2010. The experiment was laid out in factorial randomized block design comprising of four levels of vermicompost (control, 2, 4 and 6 t ha^{-1}) and four levels of fertility (control, 50% RDF, 75% RDF and 100% RDF) with three replications. The experimental soil was loamy sand in texture, slightly alkaline in reaction (pH 8.2), low in organic carbon (0.13%), available N (128.3 kg ha^{-1}), available K (154.3 kg K_20 ha^{-1}) and medium in P (16.1 kg P_20_5 ha^{-1}). Vermicompost was applied as per treatments at the time of sowing and thoroughly incorporated in open furrows with the help of spade. The recommended dose of fertilizer (RDF) for pearl millet was 60 kg N and 30 kg P_2O_5 ha^{-1}. 50% dose of N and full dose of P was applied as basal at 8-10 cm depth by *pora* method prior to sowing in each treatments and the remaining dose of nitrogen was applied as top dressing at 30 DAS under all the treatments.

Results show that plant height and effective tillers per metre row length was significantly improved with the application of vermicompost and RDF. The plant height was significantly at par with the different levels of vermicompost but at 100% RDF it was significantly higher over 50% RDF. Application of 100% RDF increased the plant height by 15.6, 9.2 and 3.2% over control, 50 and 75% RDF, respectively. Effective tiller per metre row length was increased successively with the higher doses of vermicompost and RDF (Table 1). It is established fact that vermicompost improves the physical and biological properties of soil including supply of almost all that essential plant nutrients for the growth and development of plant, ultimately increased the plant height and number of effective tillers per meter row length. The results are in agreement with finding of Rajput (2008) and Narolia *et al.* (2009).

Grain weight per ear head was recorded at par with 4 and 6 t ha^{-1} vermicompost and significantly higher over 2 t ha^{-1} and control. The increase in weight of grains per ear head with 4 t ha^{-1} vermicompost over control and 2 t ha^{-1} was to the extent of 19.3 and 6.5%, respectively. Application of 75% RDF registered

*E-mail: rakeshnitharwal9@gmail.com

Table 1. Effect of vermicompost and fertility level on growth and yield parameters of pearl millet

Treatments	Plant Height (cm)	Effective tillers/ meter row length	Grain weight per ear head (g)	Test weight (g)	Yield (t ha^{-1})	
					Grain	Stover
Vermicompost						
Control	160.8	18.2	5.81	6.99	1.26	3.89
2 t ha^{-1}	171.0	21.7	6.51	7.30	1.64	4.64
4 t ha^{-1}	177.2	23.5	6.93	7.54	1.85	5.20
6 t ha^{-1}	180.6	25.1	7.24	7.64	1.99	5.54
CD (P = 0.05)	11.4	1.2	0.39	0.51	0.11	0.32
Fertility levels						
Control	15.8	19.2	5.64	6.93	1.39	4.05
50% RDF	168.5	21.5	6.46	7.25	1.65	4.68
75% RDF	178.2	23.1	7.11	7.53	1.80	5.10
100% RDF	184.0	24.4	7.28	7.77	1.92	5.43
CD (P = 0.05)	11.4	1.2	0.39	0.51	0.11	0.32

a significant increase in grain weight per ear head by 26.1 and 10.1%, over control and 50% RDF, respectively. These results are in agreement with those of Rajput (2008), Singh (2003) and Maliwal *et al.* (1985).

Grain and stover yield of pearl millet was increased successively with the higher doses of vermicompost and RDF (Table 1). The grain yield at the application of 6 t ha^{-1} vermicompost (1.99 t ha^{-1}) was increased by 51.4, 20.1 and 7.3%, however, stover yield was increased by 42.0, 19.3 and 6.8% over control, 2 and 4 t ha^{-1}, respectively. Application of 100% RDF significantly increased grain yield by 37.7, 16.4 and 6.5, whereas, stover yield by 33.9 16.2 and 6.5% over control, 50 and 75% RDF, respectively. The test weight was recorded higher with the application of 4 and 6 t ha^{-1} vermicompost over control. Application of 100% RDF improved the test weight significantly over control and 50% RDF and it was at par with 75% RDF. These results are in agreement with those of Singh and Singh (2001), Girase *et al.* (2009) and Kajla *et al.* (2006).

Combined effect of vermicompost and fertility levels (Table 2) on effective tillers, grain weight per ear head and grain yield of pearl millet were found to be significant. Application of 4 t ha^{-1} vermicompost with 75% RDF found at par with all the vermicompost levels at 100% RDF, 2 and 6 t vermicompost ha^{-1} at 75% RDF and 6 t vermicompost ha^{-1} at 50% RDF but found significantly higher over rest of treatment combinations. Application of 4 t ha^{-1} vermicompost along with 75% RDF registered an increase of 86.5, 31.8 and 12.8% over control, 2 and 4 t vermicompost, respectively. These results are in agreement with those of Sasireka *et al.* (1998), Ranwa and Singh (1999), Kajla *et al.* (2006) and Jakhar *et al.* (2006).

Table 2. Interactive effect of vermicompost and fertility levels on effective tillers

Vermi-compost levels (t ha^{-1})	Fertility levels (% RDF)														
	Effective tillers					Grain weight per ear head					Grain yield (kg ha^{-1})				
	Control	50	75	100	Mean	Control	50	75	100	Mean	Control	50	75	100	Mean
Control	13.00	17.10	20.00	22.40	18.13	4.00	5.33	6.90	7.00	5.81	748	1157	1458	1688	1263
2	18.40	20.80	22.70	24.00	24.48	5.61	6.50	6.80	7.25	6.54	1337	1572	1766	1898	1643
4	21.50	23.20	24.25	25.00	23.49	6.05	6.80	7.35	7.40	6.90	1627	1863	1924	1997	1853
6	24.40	24.85	25.45	25.80	25.12	6.90	7.20	7.40	7.45	7.24	1839	1986	2046	2080	1898
Mean	19.33	21.49	23.10	24.30		5.64	6.46	7.11	7.28		1388	1645	1799	1916	
	V	F	VXS			V	F	VXS			V	F	VXS		
CD (P=0.05)	1.21	1.21	2.42			0.39	0.39	0.79			114.19	114.19	228.39		

Application of 6 t ha^{-1} vermicompost with 75% RDF gave significantly higher grain weight per ear head (7.35 g) over without vermicompost under control, 50% RDF, 2 t vermicompost ha^{-1} under control and 50% RDF and 4 t vermicompost with control (no fertilizer application). Application of 4 t ha^{-1} vermicompost along with 75% RDF registered an increase of 83.7, 31.0 and 21.5% over control without fertility levels under vermicompost dose control 2 and 4 t ha^{-1}, respectively. These results are in agreement with those of Kajla *et al.* (2006) and Kavimani *et al.* (2001).

Application of 4 t ha^{-1} vermicompost with 75% RDF gave significantly higher grain yield (1924 kg ha^{-1}) over 0, 2 and 4 t vermicompost ha^{-1} under fertilizer application, 0 and 2 t vermicompost ha^{-1} under 50% RDF and no vermicompost under 75% RDF. However, it remained at par with all treatments of vermicompost under 100% RDF, 2 and 6 t vermicompost ha^{-1} under 75% RDF, 4 and 6 t vermicompost ha^{-1} under 50% RDF and 6 t vermicompost ha^{-1} under no RDF. Application of 4 t ha^{-1} vermicompost along with 75% RDF registered an increase of 141.0% over absolute control. These results are in agreement with those of Kajla *et al.* (2006), Kavimani *et al.* (2001) and Singh and Singh (2001).

It is concluded that application of 4 t ha^{-1} vermicompost + 75% RDF resulted in significantly higher grain yield (1924 kg ha^{-1}). Combined application of vermicompost and fertility levels was significant affect effective tillers and grain weight per ear head and yield of pearl millet.

References

Anonymous 2011. Economic Survey, Government of India.

Girase, P.P., Wadile, S.C., Choudhary, P.M. and Chitodkar, S.S. 2009. Response of pearl millet *(Pennisetum glaucum)* to different fertilizer levels in medium deep black soil under rainfed conditions. *International Journal* of *Agricultural Sciences* 5: 236-238.

Jakhar, S.R., Singh, M. and Balai, C.M. 2006. Effect of farmyard manure, phosphorus and zinc levels on growth, yield, quality and economics of pearl millet *(Pennisetum glaucum). Indian Journal* of *Agriculture Science* 76: 58-61.

Kajla, M., Thakral, S.K. and Pahuja, S.S. 2006. Yield attributes and yield of wheat as affected by organic and inorganic source of nutrition. *Haryana Journal* of *Agronomy* 22: 85-87.

Kavimani, R., Annadurai, K., Vijayabaskaran, S. and Rangaraju, G. 2001. Effect of farm yard manure and nitrogen on growth and yield of pearl millet under rainfed alfisol. *Madras Agricultural Journal* 87: 713-714.

Maliwal, P.L., Manohar, S.S. and Dhaka, S. 1985. Response of pearl millet *(Pennisetum americannum* L.) to different levels of phosphorus, zinc and FYM. *Indian Journal of Agronomy* 30: 314-317.

Narolia, R.S., Poonia, B.L. and Yadav, R.S. 2009. Effect of vermicompost and inorganic fertilizers on productivity of pearl millet *(Pennisetum glaucum). Indian Journal* of *Agriculture Science* 79: 506-509.

Rajput, S.C. 2008. Effect of integrated nutrient management on productivity and monetary returns of pearl millet *(Pennisetum glaucum). Research on Crops* 9: 248-250.

Sasireka, K.P., Rangasamy, A. and Sekar, I. 1998. Effect of organic and inorganic source of nitrogen and molybdenum on yield and quality of bajra-hybrid napier grass (Co_2). *Madras Agricultural Journal* 85: 97-102.

Singh, G.B. and Yadav, D.V. 1992. INSS in sugarcane and sugarcane based cropping system. *Fertilizer News* 37: 15-22.

Singh, B. 2003. Response of pearl millet [*Pennisetum glaucum* (L.) R. Br. emend stuntz] to vermicompost and fertilizer levels. *M.Sc. (Ag.) Thesis*, submitted to Rajasthan Agricultural University, Bikaner, Campus, Jobner.

Singh, V. and Singh, R. 2001. Effect of fertilizers and farm yard manure on pearl millet-wheat sequence and dynamics of potassium in an alluvial soil. *Annals of Plant and Soil Research* 3: 1-6.

Ranwa, R.S. and Singh, K.P. 1999. Effect of integrated nutrient management with vermicompost on productivity of wheat (*T. aestivum*). *Indian Journal of Agronomy* 44: 554-559.