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EFFECT OF ORGANIC SOURCES OF NITROGEN FERTILIZATION ON GROWTH AND YIELD OF PEARL MILLET [*Pennisetumglaucum* (L.) R. BR. EMEND STUNTZ]

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ABSTRACT
A field experiment was conducted at Agronomy farm, of S.K.N. College of Agriculture, Jobner (Rajasthan) during kharif 2016 on loamy sand soil, which consisted fourten treatments of fertilizers/manures (control, FYM @ 125% of RDN, FYM @ 100% of RDN, FYM @ 75% of RDN, FYM @ 50% of RDN,VC @ 125 % RDN, VC @ 100% of RDN, VC @ 75% of RDN, VC @ 50% of RDN, PM @ 125% of RDN, PM @ 100% of RDN, PM @ 75% of RDN, PM @ 50% of RDN and 100% RDN through fertilizer) and were tested in randomized block design with three replications. Recommended dose of fertilizer for pearlmillet was 60 kg N and 30 kg P2O5/ha. Results indicated that application of VC @ 125% RDN, FYM @ 125% of RDN, FYM @ 100% of RDN, VC @ 100% of RDN, VC @ 75% of RDN, PM @ 125% of RDN, PM @ 100% of RDN and 100% RDN through fertilizer remaining at par with each other and significantly increased plant height, dry matter accumulation, total number of tillers, chlorophyll content effective tillers, ear length, grains per ear, test weight, grain, stover and biological yield, protein content over control. Phosphorus and potassium content in grain and stover were significantly increased due to application of VC @ 125% RDN.

INTRODUCTION

Pearl millet [*Pennisetumglaucum* (L.) R. Br. emend Stuntz] is one of the important millets cropof hot and dry areas of arid and semi-arid climatic condition particularly of Rajasthan. It is nutritionally better than many cereals as it is a good source of protein having higher digestibility (12.1%), fats (5%), carbohydrates (69.4%) and minerals (2.3%). India is the largest producer of pearl millet having 7.9 m ha area with an annual production of 9.18 m tones and with productivity of 1198 kg/ha (Anonymous,2014-15) In India. Most of the Indian soils particularly the light textured ones are deficient in nitrogen which is one of the basic plant nutrients. Integrated use of chemical fertilizers with organics manures has been found to be quite promising not only in maintaining high productivity but also in providing greater stability in crop production. It is the right time to evaluate the feasibility and efficiency of organic sources not only for improving and building up soil fertility but also to increase the fertilizer use efficiency. Integration of chemical fertilizer with organic manures has been found quite promising not only in sustaining the soil health and productivity but also in stabilizing the crop production in comparison to the use of each component, separately (Nambiar and Abrol, 1992 and Singh and Yadav, 1992). In view of poor efficiency of FYM, vermicompost has been advocated as a good source of organic manure along with inorganic sources for use in integrated nutrient management practices in field crops. Vermicompost also helps in reducing C:N ratio and in increasing humus content of the soil and provides a wide range of nutrients in the readily available form to plants, such as nitrate, soluble phosphorus, exchangeable potassium, calcium, magnesium (Talashilkar *et al*., 1999).Considering these facts in view, the present investigation has been planned to explore the effect of organic sources of nitrogen fertilization through fym, poultry manure and vermicompost on growth, yield and quality of pearl millet [*Pennisetumglaucum* (L.) R.Br. emend Stunz]" was undertaken during kharif 2016.

MATERIALS AND METHODS

The field experiment was conducted at Agronomy farm of S.K.N. College of Agriculture, Jobner during Kharif season of the year 2016. The soil of the experimental field was loamy sand in texture and alkaline in reaction in plot no. D-1 near well No. 1 of S.K.N. college of Agriculture, Jobner. It is situated 45 km away from Jaipur in western side at 75028I East longitude, 260 05I North latitude and an altitude of 427 metres above mean sea level in Jaipur district of Rajasthan. This region falls under agro climatic zone III A (Semi-arid Eastern plain zone) of the Rajasthan. It was poor in organic carbon, low in available nitrogen and phosphorus and medium in available potash. The experiment consisted of fourteen treatment combinations involving Control, FYM (125%, 100%, 75% and 50% RDN), Vermicompost (125%, 100%, 75% and 50% RDN), Poultry Manure (125%, 100%, 75% and 50% RDN) and RDN through fertilizer. Pearl millet variety 'RHB-177' was used as a test crop. In treatment RDN through fertilizer, half dose of nitrogen and full dose of phosphatic fertilizers was drilled as per plan through urea and DAP at the time of sowing and remaining half dose of urea was applied as top dressing in split. Sowing was done on July 20th, 2016 by 'kera' method in rows spaced 45 cm apart using a seed rate of 4 kg/ha. The

experiment was laid out in randomized block design and replicated three times. The treatments were randomly allotted to the plots using Fisher's random number table (Fisher, 1950). The lay out plan of the experiment with allocation of the treatments.

RESULTS AND DISCUSSION

Growth

Results presented (Table 1) that growth attributes viz., plant height, dry matter accumulation, chlorophyll content and total tillers per metre row length at different growth stages. The maximum values of these parameters were observed with vermicompost 125% RDN, FYM @ 125% of RDN, FYM @ 100% of RDN, VC @ 100% of RDN, VC @ 75% of RDN, PM @ 125% of RDN, PM @ 100% of RDN and 100% RDN through fertilizer.

The growth in terms of plant height, dry matter accumulation, total tillers per metre row length and chlorophyll content was recorded better due to application of vermicompost 125% RDN than rest of the treatments. However, it remained at par with FYM @ 125% of RDN, FYM @ 100% of RDN, VC @ 100% of RDN, VC @ 75% of RDN, PM @ 125% of RDN, PM @ 100% of RDN and 100% RDN through fertilizer. Vermicompost improves the physical and biological properties of soil including supply of almost all the essential plant nutrients for the growth and development of plants.

Yield

The beneficial effect on yield attributes might also be due to the increased supply of all the essential nutrients by vermicompost, poultry manure and FYM that might have resulted in higher manufacture of food and its subsequent partitioning towards sink. Application of vermicompost @ 125 % RDN recorded significantly higher grain, stover and biological yield as compared to other treatments except FYM @ 75% of RDN, FYM @ 50% of RDN, VC @ 50% of RDN, PM @ 75% of RDN, PM @ 50% of RDN and over control (Table 2).The results reveals that different treatments of manures

Table1:Effect of organic source of nitrogen fertilization on growth and growth attributes of pearmillet

Treatments	Plant stand/ m row length		Plant height (cm)			Dry matter accumulation			number of total tillers		Chlorophyll content (mg/g)
	20 DAS	At harvest	30 DAS	60 DAS	At harvest	30 DAS	60 DAS	At harvest	60 DAS	At harvest	
Control	8.3	8.2	64.3	109.5	160.5	93.4	140.6	238.5	19.1	18.9	2.6
FYM @ 125% of RDN	8.8	8.7	75.9	141.6	198.5	128.4	179.4	311.1	26.1	26	2.92
FYM @ 100% of RDN	8.7	8.6	74.8	138.6	195.6	122.1	170.6	299.4	25	25.2	2.87
FYM @ 75% of RDN	8.4	8.2	67.9	121.5	175	107.8	158.6	268.5	21.8	22	2.86
FYM @ 50% of RDN	8.4	8	66.3	114.6	171.6	99.5	147.1	253.6	20.9	20.8	2.77
Vermicompost @ 125% of RDN	8.8	8.5	78.3	145	199.5	131.1	187.6	319.8	27.6	27.5	3.02
Vermicompost @ 100% of RDN	8.7	8.4	75.1	139.4	197	126.9	176.8	306.2	25.4	25.8	2.94
Vermicompost @ 75% of RDN	8.5	8.2	71.3	130.9	186.5	114.6	164.3	281.9	23.6	23.5	2.92
Vermicompost @ 50% of RDN	8.5	8.1	67.2	124	174	109.5	158.9	276.6	22.9	22.8	2.73
Poultry mannure @ 125% of RDN	8.6	8.3	73.6	135.8	191.5	121.6	171.5	295.3	24.5	24.9	2.97
Poultry mannure @ 100%of RDN	8.5	8.2	72.3	131.6	185	119	166.6	288.4	24.2	24.1	2.89
Poultry mannure @ 75% of RDN	8.4	8.1	66.9	117.2	175.9	102.6	151.3	261.6	21.3	21.2	2.78
Poultry mannure @ 50% of RDN	8.4	8	65.1	112.6	169.8	96.1	144.5	247.6	20.2	20.1	2.76
RDN through fertilizer	8.8	8.3	76.8	143.6	199	129.9	184.7	315.8	27	26.9	3.01
SEm+	0.51	0.51	3.15	6.8	8.3	6.2	7.9	14.7	1.24	1.23	0.09
CD (P=0.05)	NS	NS	9.15	19.75	24.11	17.9	22.9	42.8	3.6	3.56	0.25
CV (%)	10.4	10.5	7.67	9.13	7.8	9.34	8.31	9	9.12	9.08	5.21

Table 2: Effect of organic source of nitrogen fertilization on grain, stover and biological yield and harvest index

Treatments	Grain yield (kg/ha)	Stover yield (kg/ha)	Biological yield (kg/ha)	Harvest Index
FYM @ 125% of RDN	1901	5532	7433	25.58
FYM @ 100% of RDN	1840	5030	6870	26.78
FYM @ 75% of RDN	1510	4258	5768	26.18
FYM @ 50% of RDN	1460	4288	5748	25.4
Vermicompost @ 125% of RDN	2105	5978	8083	26.04
Vermicompost @ 100% of RDN	1949	5477	7426	26.25
Vermicompost @ 75% of RDN	1640	4536	6176	26.55
Vermicompost @ 50% of RDN	1513	4206	5719	26.46
Poultry mannure @ 125% of RDN	1885	5434	7319	25.75
Poultry mannure @ 100%of RDN	1815	4901	6716	27.03
Poultry mannure @ 75% of RDN	1530	4384	5894	25.62
Poultry mannure @ 50% of RDN	1408	4197	5605	25.12
RDN through fertilizer	2055	5877	7932	25.91
SEm+	101	254.94	263.41	1.22
CD (P=0.05)	299	757.38	782.54	NS
CV (%)	10.28	9.15	7	8.12
Control	1150	3439	4589	25.06

numerically improved the harvest index of pearlmillet but could not bring a significant variation.

The growth attributes was recorded better due to application of vermicompost 125% RDN than rest of the treatments. Thus, balanced nutrition due to release of macro and micro nutrients due to application of vermicompost, poultry manure and FYM under favourable environment might have helped in higher uptake of essential nutrients. The results of present investigation are in conformity with those of Thakral *et al*. (2000), Yadav and Beniwal (2003), Parihar *et al*. (2012), Togas (2016) in pearlmillet and Patidar and Mali (2004) in sorghum.

The application of organic sources of N like FYM, vermicompost and poultry manure improve the rhizosphere conditions and provide a balanced nutritional environment favourably both in rhizosphere and plant system. The results obtained in the present investigation are in close conformity with the finding of Khan *et al*. (2000) in pearlmillet, Nehra *et al*. (2001) in wheat and Patidar and Mali (2004) in sorghum.

Application of vermicompost @ 125% RDN recorded significantly higher grain yield as compared to other treatments except FYM @ 75% of RDN, FYM @ 50% of RDN, VC @ 50% of RDN, PM @ 75% of RDN, PM @ 50% of RDN and over control. Similar results were also obtained by Jayanthi *et al*. (2002a) in pearl millet-hybrid napier, Jain and Poonia (2003) [6] in pearl millet and Singh and Singh (2005) in wheat, Prasad, S. K., Singh, M. K. and Singh, R. 2014, Parihar *et al*. (2012) and Togas (2016) in pearlmillet.

REFERENCES

Jain, N. K. and Poonia, B. L. 2003. Integrated nutrient management in pearlmillet and optimizing fertilizer requirement in succeeding wheat. *Crop Research*. **26(1):** 62-66.

Jayanthi, C., Malarvizhi, P., Fazullah Khan A.K., Chinnusamy. C 2002. Integrated nutrient management in forage oat. *Indian J. Agronomy*. **47(1):**130-133.

Khan, H., Jain, P.C. and Trivedi, S. K. 2000. Nutrient management in pearlmillet (*Pennisetumglaucum* L.) under rainfed condition. *Indian J Agronomy*. **45(4):** 728-731.

Chouhan,M., Gudadhe, N. N., Dinesh Kumar., Kumawat, A. K. AND Kumar,R. 2015. Transplanting dates and nitrogen levels influences on growth yield attributes and yield of summer pearl millet. *The Bioscan*. **10(3):** 1295-1298.

Nambiar, K.K. M. and Abrol, I.P. 1992. Long term fertilizer experiments in India an over view. *Fertilizer News*. **34:** 11-20.

Nehra, A. S., Hooda, I. S. and Singh, K. P. 2001. Effect of integrated nutrient management on growth and yield of wheat. *Indian J. Agronomy* .**46(1) :** 112-117.

Parihar, C. M., Rana, K. S. Jat, M. L., Jat, S. L., Parihar, M. D., Kantwa, S. R., Singh D. K. and Sharma, S. 2012. Carbon footprint and economic sustainability of pearlmillet-mustard system under different tillage and nutrient management practices in moisture stress conditions. *African J. Microbiology Research*. **6(23):** pp. 5052-5061.

Prasad, S. K., Singh, M. K. and Singh, R. 2014. Effect of nitrogen and zinc fertilizer on pearl millet (*Pennisetum glaucum*) under agri-horti system of eastern Uttar Pradesh. *The Bioscan*. **9(1):** 163-166.

Singh, J. and Singh, K.P. 2005. Effect of organic manures and herbicides on yield and yield attributing characters of wheat. *Indian J Agronomy* **50(4) :** 289-291.

Talashilkar, S.C., M.B. Jadhav and N.K. Savant, 1999. Effect of Calcium Silicate slag on plant growth, nutrient uptake and yield of sugarcane on two soils of Maharashtra state, India. Proceedings of the Conference on Silicon in Agriculture, September 26-30, 1999, Fort Lauderdale, USA., pp.31-31.

Thakral, S. K., Kumar, S. and Singh, S. 2000. Response of pearlmillet to organic manures and fertilizers under saline soil conditions. *Haryana J. Agronomy*. **16:** 76-78.

Togas, R. 2016. Intergrated nutrient management in pearlmillet. M.Sc. Thesis, Sri Karan Narandra Agriculture University, Jobner.

Yadav, N.D. and Beniwal, R.K. 2003. Response of pearlmillet to N and FYM under rainfed condition. Arid zone Research Association of India 5 .pp. 276-279.

Anonymous, 2014-15. Economic Survey. Government of India, Ministry of Finance and Company Affairs, Economic Division, New Delhi

F**isher, R.A. 1950.** Statistical methods for research workers. Pub. Oliver and Boyd, Edinburgh, London.

Patidar, M. and Mali, A.L. 2004. Effect of farmyard manure, fertility levels and biofertilizer on growth, yield and quality of sorghum (*Sorghum bicolor*). *Indian J. agronomy*. **49(2):** 117-120.

Singh, G. B. and Yadav, D.V. 1992. Integrated plant nutrition system in sugarcane. *Fertilizer News*. **37:** 15-22.