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Effect of organic sources of nitrogen fertilization on yield and yield attributes pearl millet [*Pennisetum glaucum* (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. 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/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.

Keywords: Pearl millet, F.Y.M., vermicompost, poultry manure, yield and yield attributes

Introduction

Pearl millet [*Pennisetum glaucum* (L.) R. Br. emend Stuntz] is one of the important millet crop of 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) In India. Most of the Indian soils particularly the light textured ones are deficient in nitrogen which is one of the basic plant nutrient. 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) [1]. 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 [*Pennisetum glaucum* (L.) R.Br. emend Stuntz]” was undertaken during kharif 2016.

Material and Method

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 75°28' East longitude, 26°05' 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

Yield attributes

Results presented (table 1) that yield attributes viz., number of effective tillers, ear length, number of grains per ear and test weight of pearl millet improved by 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 as compared to other treatments.

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 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).

Table 1 Effect of organic source of nitrogen fertilization on yield attributes of pearl millet

Treatments	Effective tillers/ m row	Ear length (cm)	Grains/ear	Test weight (g)
FYM @ 125% of RDN	25.1	29.2	1325	7.62
FYM @ 100% of RDN	23.9	28.3	1296	7.44
FYM @ 75% of RDN	21.6	25.8	1189	6.88
FYM @ 50% of RDN	20.2	24.4	1125	6.37
Vermicompost @ 125% of RDN	26.0	30.4	1378	7.75
Vermicompost @ 100% of RDN	24.9	28.8	1301	7.53
Vermicompost @ 75% of RDN	22.6	26.8	1241	7.19
Vermicompost @ 50% of RDN	21.9	26.2	1205	6.96
Poultry manure @ 125% of RDN	23.8	27.8	1275	7.48
Poultry manure @ 100% of RDN	22.6	27.2	1269	7.26
Poultry manure @ 75% of RDN	21.1	25.0	1159	6.67
Poultry manure @ 50% of RDN	19.7	23.9	1095	6.23
RDN through fertilizer	25.7	29.9	1361	7.68
SEm ±	1.19	1.25	58	0.36
CD (P=0.05)	3.47	3.63	170	1.06
CV (%)	9.13	8.05	8.22	8.99
Control	18.1	23.0	1079	6.15

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	25.40
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 manure @ 125% of RDN	1885	5434	7319	25.75
Poultry manure @ 100% of RDN	1815	4901	6716	27.03
Poultry manure @ 75% of RDN	1530	4384	5894	25.62
Poultry manure @ 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	7.00	8.12
Control	1150	3439	4589	25.06

Discussion

Nitrogen content in grain and stover was significantly increased due to application of 100% RDN through fertilizer and nitrogen, phosphorus and potassium content and uptake were significantly increased due to application of VC @ 125% RDN. 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. The higher values of yield attributes like effective tillers per metre row length, number of grains per ear head, ear head length and test weight coupled with the

higher crop dry matter observed with these treatments might have been the most probable reason of higher grain and stover yield. The increase in grain yield of pearl millet with these treatments was also largely due to high harvest index that showed high partitioning of the plant assimilates towards the sink. The findings of present investigation are supported by Khan *et al.* (2000) ^[4] in pearl millet and Kumawat and Jat (2005) ^[7] in barley.

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) ^[4] in pearl millet-hybrid napier, Jain and Poonia (2003) ^[6] in pearl millet and Singh and Singh (2005) ^[9] in wheat, Parihar *et al.* (2012) ^[8] and Togas (2016) ^[10] in pearl millet.

Conclusion

Based on the results of one year experimentation, it is concluded that application FYM @ 100% of RDN (1840kg/ha, ` 33990 and B:C ratio 2.71) and PM @ 100% of RDN (1815kg/ha, ` 35295 and B:C ratio 3.02) were equally effective in increasing grain and stover yield of pearl millet.

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