Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2017; SP1: 887-889

Mohinder Singh
Assistant Professor (Agronomy), Faculty of Agricultural Sciences, SGT University Gurugram, Haryana, India

Ram Avtar
Department of Gentics and Plant Breeding, CCSHAU, Hisar, Haryana, India

Vijya Laxmi
Assistant Professor, Biotechnology, Faculty of Agricultural Sciences, SGT University, Gurgoan, Haryana, India

Yashpal Yadav
CEO, Dev Agri Tech Pvt Ltd Gurgoan, Haryana, India

Correspondence
Mohinder Singh
Assistant Professor (Agronomy), Faculty of Agricultural Sciences, SGT University Gurugram, Haryana, India

Effect of different fertilizer scheduling on yield and yield attributes of pearlmillet in South West Haryana

Mohinder Singh, Ram Avtar, Vijya Laxmi and Yashpal Yadav

Abstract
Pearl millet (*Pennisetum glaucum* L.) locally known as bajra is an important cereal due to its high nutritional quality and its adaption to dry environment. In the present study, we investigate the growth and yield of pearlmillet in relation to different fertilizer treatments at crop research area of SGT University, Gurugram (Haryana) during Kharif season, 2017 to evaluate the effect of cultivars and integrated nutrient management on test weight, yield stover yield and harvest index of pearl millet. Experiment was carried out with three cultivars namely, (Dev-9999, HB- 67 improved and HHB-197) as main plot with four nutrient doses viz. (Control, 75 % RD, 100% RD and 5t vermicompost+100%RD+Biomix) as sub plot treatments. Higher test weight (11.3g), grain yield (4091kg/ha) and stover yield (9636 kg/ha) was recorded with Dev 9999 follwed by HHB 197 and HHB 67 improved, while higher harvest index was recorded in HHB 67 improved (31.2) followed by Dec 9999 and HHB-197.

Keywords: Pearl millet, Nutrient, Fertilizer, Growth, Yield.

Introduction
Pearl millet (*Pennisetum glaucum L.*) is an important cereal, forage and stover crop for arid and semi-arid regions of India (FAO, 2010) [5]. It is locally known as bajra and one of the important crop after rice, wheat and sorghum. It is considered as major food and feed source of humans and livestock's inhabitants of dry areas due to its to its high nutritional value and adaptation to poorly fertilized soils in dry or rainfed area (Ali, 2010) [1]. The new challenge is of food security to rapid population growth and strong effects of climate change in dry and rainfed regions (Lobell *et al*., 2008) [6], thus pearl millet may be contribute the increased food production in climate change senerio. In addition, pearl millet has potential for climate-resilient agriculture with higher mineral, macronutrient and nutritional quality as a result there has been a great importance of pearl millet in India (Vershney *et al*., 2012, Saleh *et al*., 2013 and Campell *et al*., 2014) [16, 10, 4]. Bajra can be grown on marginal land in wrost agroclimatic condition, where major cereals fails. Hence, in India bajra holds the fourth most important position followed by rice, wheat and sorghum. In last few years, yield plateau has been recorded in major cereal crops. Mweu *et al*. reported that growth and yield of Pvs-Pm 1005 and Pvs-Pm 1002varieties of pearl millet were superior as compared to six pearl millet varieties in semi-arid conditions of South Eastern Kenya (Mweu *et al*., 2016). Additionally, the concept of Integrated Nutrient Management (INM) is a continuous improvement of soil productivity on long-term basis through appropriate use of chemical fertilizers as well as biofertlizers along with organic manures for optimum growth, yield and quality of different crops and cropping systems in specific agro-ecological situations. It has been reported that, different cultivars and their date of sowing in the presence different fertilizers doses affect the growth and development of the plants (Abd-El, 2011 and Cottenie, 1980) [2, 3]. Since information on pearl millet cultivars and integrated nutrient management is meager. Sandy soils, deeper water table, low organic matter in soil prevails in south Haryana, thus in the present work we study the performance of different cultivars and nutrient management on growth and yield of pearl millet under semi-arid conditions of Haryana.

Materials and Methods
The experiment was conducted in kharif seasons of 2017 at research farm, Faculty of Agricultural Sciences, SGT University, Gurugram on sandy loam soil. Three pearl millet cultivars (Dev-9999, HB- 67 improved and HHB-197) with four nutrient doses *viz.* (Control, 75 % RD, 100% RD and 5t vermicompost+100%RD+Biomix) were selected for this study. The sowing was done on 13th July, 2017. The seedbed was prepared two days prior to sowing. Seed rate was 5 kg ha^{1}. Urea for nitogen and SSP for phosphorous was applied to plots manually. The doses were T1-NP (0:0) control, T2- N:P (93.75:46.88), T3-N:P (125:62.5), T4-

N:P (156:78.12:0)+ 5t Vermicompost (VC)+Biomix 100ml/kg (Azatobactor, Azospirillum and PSB).

Result and discussion

Test weight

Higher test weight (11.3 g) was recorded in Dev-9999, which was statistically at per with significantly with HHB-197 improved (11.2 g) but statistically higher than HHB-67 (9.4). Test weight of HHB-197 was statistically higher than HHB-67 improved pearlmillet cultivar. Fertilizer scheduling also favored the increase in test weight with increase in fertilizer dose. Test weight recorded at 125% RD + 5T VC + biomix (11.5 g) was significantly higher than rest of treatments. The test weight recorded with 100% RD was significantly higher than 75% RD and Control. Test weight recorded with 75% RD also reported significantly higher than the control. Singh (2017) [14, 15] also recorded similar result. There was no interaction recorded between cultivars and fertilizer doses.

Table 1: Effect of nitrogen and phosphorous scheduling on test weight, grain yield and stover yield and harvest index of pearlmillet cultivars

Cultivars	Test Weight (g)	Yield (kg/ha)	Stower Yield (kg/ha)	Biological Yield (kg/ha)	HI%
Dev-9999	11.3	4091	9636	13727	30.2
HHB-67 improved	9.4	3110	7200	10310	31.2
HHB-197	11.2	3413	8318	11731	29.8
CD at 5%	0.74	195	278	429	NA
Fertilizer dose Kg/ha					
(T1) Control	9.74	2951	7910	9223	32.4
(T2) 75 % RD	10.3	3447	9012	11355	31.0
(T3) 100 % RD	10.8	3743	9272	12755	29.7
(T4) 125 % RD+ 5T VC+ Biomix	11.5	4014	10345	14359	28.6
CD at 5%	0.21	150	408	522	1.2

Grain yield

Data in Table 1 reaveled that grain yield was influenced by genetic factors of respective cultivars. Significantly higher grain yield (4091 kg/ha) was recorded in cultivar Dev-9999 than HHB-197 (34.13 kg/ha) and HHB-67 improved (31.10 kg/ha). Grain yield recorded with cultivar HHB-197 was statistically higher than HHB-67 improved. Similarly, Maqsood & Ali (2007) [7] and Sarr *et al*., (2008) [11], also reported significant differences in pearl millet genotypes with respect to grain yield and straw yield. Data in the Table 1 also revealed that increase in fertilizer dose from control to maximum also resulted in significant increase in grain yield. Grain yield recorded at 125% RD+5T VC+ biomix was significantly higher than the rest of treatments under study. Grain yield recorded at 100% RD was significantly higher than the 75% RD and control. Grain yield recorded at 75% RD (3447 q/ha) was aslo found significantly higher than the control (2951 q/ha). Similar result also reported by Obeng *et al*., (2012) [9] and Singh *et al*., (2017) [14, 15]. No significant interaction was recorded in grain yield between cultivars and different fertilizer doses.

Stover Yield

Stover yield of cultivar Dev-9999 (9636 q/ha) was significantly higher than HHB-197 (83.18 q/ha) and HHB-67 improved (7200 q/ha). Similarly, Maqsood & Ali (2007) [7] and Sarr et al. (2008) [11] also reported significant differences in pearl millet genotypes with respect to grain yield under different conditions. Data in Table 1 also reveled that increase in fertilizer dose from control to maximum also resulted in significant increase in stover yield. Stover yield recorded at 125% RD+5T VC+ Biomix was significantly higher than the rest of treatments under study. Stower yield recorded at 100 RD was statistically higher than the 75% RD (9012 q/ha) and was significantly higher than control (7910 q/ha). Stover yield yield recorded at 75% RD was aslo found significantly than the control. Similar results were also reported by Singh *et al*., (2017) [14, 15].

Biological yield

Data in Table 1 reaveled that genetic factors of respective cultivars influenced biological yield. Significantly higher biological yield (13727 kg/ha) was recorded in cultivar Dev-9999 than HHB-197 (11731 kg/ha) and HHB-67 improved (10310 kg/ha). Biological yield recorded with cultivar HHB-197 was significantly higher than HHB-67 improved. Similarly, Sarr e*t al*., (2008) [11], also reported significant differences in pearl millet genotypes with respect to biological yield. Data in the Table 1 also revealed that increase in fertilizer dose from control to maximum also resulted in significant increase in biological yield. Biological yield recorded at 125% RD+5T VC+ biomix was significantly higher (14359 kg/ha) than the rest of treatments under study. Biological yield recorded at 100% RD (12755 kg/ha) was significantly higher than the 75% RD (11355 kg/ha) and control (9223 kg/ha). Biological yield recorded at 75% RD was aslo found significantly higher than the control. Similar result also reported by Obeng *et al*., (2012) [9] and Singh *et al*., (2017) [14, 15]. No significant interaction was recorded in grain yield between cultivars and different fertilizer doses.

Harvest Index

There is no any significant difference recorded in pearlmillet cultivars under study. However, maximum harvest index (31.2%) was recoded in HHB 67 improved followed by Dev-9999 (30.2%) and HHB-197 (29.8). Minimum harvest index recoded in HHB-197. Similarly significant differences in pearl millet genotypes with respect to harvest index in different conditions were also reported by Maqsood & Ali (2007) [7] and Sarr *et al.* (2008) [11]. Data in Table 1 also reveled that increase in fertilizer dose from control to maximum also resulted in decrease in harvest index due to more increase in stover yield. Harvest index recorded control was significantly higher (32.4%) than rest of treatments. Harvest index recorded at 75% RD (31.0%) was significantly higher than 100% RD (29.7%) and 125% RD+5T VC+ Biomix (28.6). Harvest index with 100% RD was higher but statistically at par with 125% RD+5T VC+ Biomix. Stover yield yield recorded at 75% RD was aslo found significantly than the control. Similar results were also reported by Singh *et al*., (2017) [14, 15].

Conclusion
In this study, it was found that Dev-9999 cultivar performed better in sandy loam soil with irrigation facilities than HHB-197 and HHB -67 improved. Increase in nitrogen and phosphorous rate up to 125% RD with 5 ton vermicompost and seed treatment with biomix resulted in maximum test weight, straw yield, grain yield.

References

1. Ali EA. Grain yield and nitrogen use efficiency of pearlmillet as affected by plant density, nitrogen rate and splitting in sand soil. Am. Eur. J Agric. Environ. 2010; **7**:327-335.
2. Abd-El-Lattif EA. Growth and fodder yield of forage pearlmillet in newly cultivated land as affected by date of planting and integrated use of mineral and organic fertilizers. Asian J crop Sci. 2011; 3(1):35-42.
3. Cottenie A. Soil and Plant testing as a basis for fertilizer recommendations. FAO Soil Bulletin, Rome 1980; 38:61-100.
4. Campbell BM, Thornton P, Zougmoree R, van Asten P, Lipper L. Sustainable intensification: What is its role in climate smart agriculture? CurrOpin Environ Sustain 2014; 8:39-43
5. FAO. Food and Agriculture Organization of the United Nations. Bulletin of Statistics Journal. 2010; 1:16-36.
6. Lobell DB, Burke MB, Tebaldi C, Mastrandrea MD, Falcon WP, Naylor RL. Prioritizing climate change adaptation needs for food security in 2030. Science 2008; 319:607-10.
7. Maqsood, M. and Ali, S.N.A. Effects of environmental stress on growth, radiation use efficiency and yield of finger millet (*Eleucinecoracana*). Paki. J Bot., 2007; 39:463-474.
8. Mishra A, Prasad K, Rai G. Effect of Bio-fertilizer inoculations on growth and yield of dwarf field pea (*Pisumsativum* L.) in conjunction with different doses of chemical fertilizers. J Agronomy. 2010; 9(4):163-168**.**
9. Obeng E, Cebert E, Singh BP, Ward R, Nyochembeng LM, Mays DA. Growth and grain yield of pearl millet (*pennisetumglaucum*) genotypes at different levels of nitrogen fertilization in the southeastern United States. J of Agri. Sci. 2012; 4:12.
10. Saleh ASM, Zhang Q, Chen J, Shen Q. Millet grains: Nutritional quality, processing, and potential health benefits. Compr Rev Food Sci Food Saf. 2013; 12:281-95.
11. Sarr P, Badiane A, Yamakawa T, Guisse A, Khouma M, Sene M. Effect of pearl millet-cowpea cropping systems on nitrogen recovery, nitrogen use efficiency and biological fixation using the 15N tracer technique [electronic resource]. *Soil Sci. and Plant Nutr.,* 2008; 54(1):142-147. http://dx.doi.org/10.1111/j.1747-0765. 2007. 00216.x
12. Siddig AMA, Adam KI, Bahar AH, Hassan TA. Effect of sowing date and variety on growth and yield of pearlmillet (pennisetum Glaucum L.) grown on two soil types under rainfed condition at Zalingei Area in Sudan. ARPN J. Sci. Tec. 2013; 3:340-344.
13. Singh J. Effect of fertility levels on growth, yield and quality of pearl millet. M.Sc. Thesis submitted at Chaudhary Charan Singh Haryana Agricultural University, Hisar, 2006.
14. Singh M. Nitrogen scheduling in different cultivars of basmati rice under direct seeded conditions. Ph.D Thesis submitted at Chaudhary Charan Singh Haryana Agricultural University, Hisar, 2017.
15. Singh M, Yadav DB, Punia SS, Kakralia SK, Naveen. Effect of different cultivars of direct seeded basmati rice under different nitrogen scheduling in North-west India. *Eco. Env& Cons. Sp. Ed. PP.S,* 2017, 31-35.
16. Varshney RK, Ribaut JM, Buckler ES, Tuberosa R, Rafalski JA, Langridge P. Can genomics boost productivity of orphan crops? Nat Biotechnol, 2012; 30:1172–6