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

Mohinder Singh, Ram Avtar, Vijya Laxmi and Yashpal Yadav

Abstract
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 crops 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 areas (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 biofertilizers 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-EI, 2011 and Cottenie, 1980) [2, 3]. Since information on pearl millet cultivars and integrated nutrient management is meager. Sandy soils, deeper water table, shallow 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) 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 in Dev 9999 followed by HHB 197 and HBH 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.

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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 pearl millet 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 in Dev 9999 followed 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.

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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 (9.4). Data in Table 1 reaveled that 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
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, Singh et al. (2012) [11] also reported significant differences in pearl millet genotypes with respect to biological yield. Biological yield recorded at 75% RD was aslo found significantly 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 pearl millet cultivars

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

Harvest Index
There is no any significant difference recorded in pearl millet cultivars under study. However, maximum harvest index (31.2%) was recorded in HHB 67 improved followed by Dev-9999 (30.2%) and HHB-197 (29.8). Minimum harvest index recorded 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 revealed 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 (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 aso 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 et al., (2008) [11], also reported significant differences in pearl millet genotypes with respect to 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 aso 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.
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