

Original Research Article

<https://doi.org/10.20546/ijcmas.2019.807.273>

Performance of Pearl Millet Advance Hybrids to Different Levels of Nitrogen under Dry Land Conditions

R. Sutaliya*

Agricultural Research Sub Station, (Agriculture University, Jodhpur),
Samdari, Barmer 344021 (Raj.), India

*Corresponding author

ABSTRACT

Keywords

Hybrids, Nitrogen levels, Pearl millet, Yield

Article Info

Accepted:

17 June 2019

Available Online:

10 July 2019

A field experiment was carried out at Agricultural Research Sub Station, Samdari, Rajasthan to evaluate the performance of pearl millet advance hybrids (MH 2192, MPMH 21, HHB 272 and RHB 177) under different levels of nitrogen (0, 20, 40 and 60 kg/ha). Results showed that application of nitrogen at the rate of 60 kg/ha recorded significantly ($p < 0.05$) higher plant height (119.7 cm) and grain yield (584 kg/ha) as compared to control and 20 kg N/ha but remained at par with 40 kg N/ha. While application of nitrogen at the rate of 60 kg/ha recorded significantly higher number of tillers and effective tillers/plant over lower nitrogen levels and control. Hybrids of pearl millet were found significant ($p < 0.05$) with respect to plant height at harvest and fodder yield and MH 3192 recorded higher plant height (120.7 cm) and fodder yield. Hybrid MPMH 21 significantly recorded highest grain yield (615 kg/ha) than other hybrids but at par with MH 578.

Introduction

Pearl millet [*Pennisetum glaucum* (L.) R. Br.] is the staple food as well as feed and fodder for livestock in the arid regions of the country. Pearl millet excels all other cereals due to its unique features- C_4 plant with high photosynthetic efficiency, high dry matter production capacity and is grown under the most adverse agro-climatic conditions where other *kharif* cereals fail to produce economic yields. In India, pearl millet is the fourth most widely cultivated food crop after rice, wheat and maize. It is grown on 7.4 million ha with and average production of 9.13 million tonnes

and productivity of 1237 kg/ha during 2017-18 (Project Coordinator Review, 2019). Out of 7.5 million ha area 55 per cent pearl millet grown in Rajasthan and contributing 43 per cent in production with 304 kg/ha lower productivity than national average. The research efforts have been made to enhance its productivity through high yielding, short duration and drought resistance hybrids and refinement in cultivation techniques. Due to development of high yielding hybrids varieties the productivity increased from 1184 kg/ha (2013-14) to 1237 kg/ha (2017-18) registered 4.4 per cent an increase in productivity, from decreased cultivated area

from 7.8 million ha in 2013-14 to 7.4 million ha in 2017-18 (Project Coordinator Review, 2019). Therefore, the present investigation was undertaken to evaluate the effect of different nitrogen levels on comparative performance of newly developed hybrids varieties in the hot dry arid conditions of Rajasthan.

Materials and Methods

The field experiment was conducted at Agricultural Research Sub Station (Agriculture University, Jodhpur), Samdari, Barmer during *Kharif* season of 2018-19. One advance hybrid variety MH 2192 was tested for their response to nitrogen four nitrogen levels (0, 20, 40 and 60 kg N/ha) in comparison with three checks MPMH 21, HHB 272 and RHB 177. Thus 16 treatment combinations were evaluated in split plot design, keeping N in main plots and hybrid varieties in sub-plot. All the treatments were replicated for three times. The soil of the experimental site was sandy in texture, low in organic carbon, medium in phosphorus and high in potash. The crop was sown on 2nd July, 2018 with 60 cm row spacing and 15 cm plant spacing. The total rainfall received during the crop growth period was 158.2 mm. The crop was supplied with 20 kg P₂O₅ /ha and half dose of nitrogen as basal and remaining nitrogen was applied at 19 days after sowing (DAS) of the crop. Five randomly selected plants from each plot were taken for recording growth and yield parameters. The observations recorded on growths, yield and its attributes are presented in Table 1.

Results and Discussion

Effect of nitrogen

Perusal of data presented in Table 1 revealed that the growth and yield attributing traits

were improved with the increasing levels of nitrogen except days to 50 per cent of flowering and non-significant effect on fodder yield. The ancillary character; plant height was significantly increased with the increasing levels of nitrogen up to 60 kg/ha but at par with 40 kg N/ha. Total and effective tillers per plant increased significantly up to 60 kg N/ ha application. The test weight was significantly increased up to 40 kg N/ha application. The grain yield increased significantly with increasing levels of nitrogen application up to 40 kg/ha but was found at par with 60 kg N/ha. Maximum grain yield was recorded with 60 kg N/ha which was 30.0, 13.4 and 2.3 per cents higher over control, 20 and 40 kg N application/ha, respectively. Similar results were also reported by Kumar and Bishnoi (2013) and Kumar *et al.*, (2016).

Performance of advance hybrid

Among all the tested hybrids, the plant height was significantly higher of hybrid MH 2192 as compared to all other hybrids. The highest test weight was recorded in the check RHB 177 (8.1 g) which was followed by new entry MH 2192 (7.7 g).The new entry MH 2192 (5.78 q/ha) could not surpass the grain yield of best check MPMH 21 (6.15 q/ha). The stover yield in MH 2192 was statistically superior among the tested hybrid entry and the checks. The maximum grain yield was recorded with best check MPMH 21 which was 50.7, 18.5 and 6.4 per cent higher over RHB 177, HHB 272 and MH 2192, respectively. The variety MPMH 21 and MH 2192 had significantly higher grain yield under dryland condition as these variety thrive well under moisture stress condition. Similarly significant differences in pearl millet varieties with respect to grain yield were also reported by Maqsood and Ali (2007), Yadav *et al.*, (2014) and Kumar *et al.*, (2016).

Table.1 Effect of graded levels of N on growth, yield attributes and yield of pearl millet advance hybrids

| Treatments | Plant height (cm) | Days to 50% flowering | Total tillers/plant | Effective tillers/plant | Test Weight (g) | Grain yield (kg/ha) | Fodder yield (q/ha) |
|-------------------------------|-------------------|-----------------------|---------------------|-------------------------|-----------------|---------------------|---------------------|
| Nitrogen Level (kg/ha) | | | | | | | |
| 0 | 113.8 | 53.1 | 1.2 | 0.9 | 7.2 | 449 | 10.11 |
| 20 | 114.0 | 50.9 | 1.6 | 1.3 | 7.3 | 515 | 9.36 |
| 40 | 116.0 | 51.5 | 1.7 | 1.6 | 7.8 | 571 | 9.77 |
| 60 | 119.7 | 50.3 | 2.0 | 1.9 | 7.7 | 584 | 10.75 |
| CD (P=0.05) | 4.0 | 1.9 | 0.1 | 0.1 | 0.4 | 50 | NS |
| Hybrid | | | | | | | |
| MH 2192 | 120.7 | 50.9 | 1.6 | 1.4 | 7.7 | 578 | 13.83 |
| MPMH 21 | 115.8 | 51.5 | 1.6 | 1.4 | 6.8 | 615 | 11.15 |
| HHB 272 | 109.8 | 50.4 | 1.7 | 1.4 | 7.5 | 519 | 9.03 |
| RHB 177 | 117.3 | 53.0 | 1.5 | 1.4 | 8.1 | 408 | 5.98 |
| CD (P=0.05) | 3.1 | NS | NS | NS | 0.4 | 43 | 0.89 |

Among tested varieties MH 2192 produced significantly higher fodder than other tested varieties under dryland condition. Better fodder yield in MH 2192 and MPMH 21 may be due to more active photosynthetic area (leaf area) that causes more expansion of shoot area. This indicates that these varieties thrive well under moisture stress condition. Such effect may be due to the genetic variability between the varieties. MPMH 21 and MH 2192 have favourable gene action under stress condition. The significance of genetic variability among pearl millet genotypes was also reported by Damame *et al.*, (2013) and Yadav *et al.*, (2014).

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How to cite this article:

Sutaliya, R. 2019. Performance of Pearl Millet Advance Hybrids to Different Levels of Nitrogen under Dry Land Conditions. *Int.J.Curr.Microbiol.App.Sci*. 8(07): 2245-2248.
doi: <https://doi.org/10.20546/ijemas.2019.807.273>