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Response of pearlmillet hybrids to nitrogen levels under rice fallows

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ABSTRACT

A field trial was carried out during *rabi*, 2024-25 on sandy clay loam soil of Agricultural College Farm, Bapatla to study the effect of pearlmillet hybrids and nitrogen levels on growth, yield attributes and yield of pearlmillet. The experiment was laid out in split plot design and replicated thrice. The treatments consists of pearlmillet hybrids viz., MPMH-21, AHB-1200, HHB-67, MLBH-308 and nitrogen levels *Viz.,* Control (0% RDN), 100% RDN, 125% RDN, 150% RDN. The hybrid MLBH-308 recorded higher growth parameters, yield attributes and yield followed by AHB-1200. Application of 150% RDN significantly improved the growth parameters, yield attributes and yield which shows parity with 125% RDN. The results concluded that cultivation of MLBH-308 hybrid of pearlmillet with application of 150% RDN during *rabi* was found to be the best package in rice fallows of north coastal Andhra Pradesh.

Keywords: *Growth parameters, Hybrids, Nitrogen levels, Pearlmillet, Yield attributes and Yield.*

Pearlmillet (*Pennisetum glaucum* L.), popularly known as bajra, is the sixth most important crop in India occupying an area 7.08 m ha with an average production of 9.531 mt and productivity of 1360 kg ha^{-1}. In Andhra Pradesh it occupies an area of 0.024 m ha with an average production of 0.054 mt and productivity 2252 kg ha^{-1} (DAFW 2023-24). It has potential to produce more amount of yield even under harsh environmental conditions such as drought. Compared to many cereals, it is more nutritious and a rich source of protein (12-16%), lipids (4-6%), carbohydrates (67.5%), dietary fiber (11.5%), minerals (2.3g) making it suitable for its usage as food and fodder crop (Gahalawat *et al.,* 2024).It has some additional advantages over sorghum and maize because it has high crude protein (9.9 -14%) and also its green fodder can be safely fed to cattle at all stages of growth because of absence of hydrocyanic acid. The introduction of pearlmillet into new cropping systems is being attempted given the changing climate, this could be a very good alternative. It is a short day warm weather crop and is even more resistant to drought than sorghum.

In northern coastal regions of A. P, pearl millet covers an area of 11.07 lakh hectares. Due to the recent outbreak of several diseases, farmers are searching for alternatives to the customary practice of growing pulses in rice fallow systems. Due to the low resource requirements, higher nutritional value and its drought tolerance ability, pearl millet is becoming an important crop among the farmers next to sorghum under rice - fallow scenario. So, there is a need to identify suitable pearlmillet hybrids under rice fallow conditions which can resist lodging.

Nitrogen is an essential nutrient for plant growth and development. Farmers of the North Coastal areas of AP are using the fertilizers and pesticides indiscriminately Chapke *et al*., 2011. Nitrogen (N) fertilization is becoming increasingly important in gauging the economic and environmental viability of agro ecosystems and exploiting genotypic differences in N demand and efficiency have been proposed as possible alternatives for reducing the cost and reliance upon fertilizer N Gardner *et al*., 1994.

MATERIAL AND METHODS

A field experiment was conducted during *rabi*, 2024-25 at the Agricultural College Farm, Bapatla, Andhra Pradesh. The soil was sandy loam in texture with a pH of 7.4 and EC of 0.42 dSm^{-1} , low in organic carbon (0.40 %) and available nitrogen (192.8 kg ha^{-1}), medium in available phosphorus

(26.2 kg ha^{-1}) and potassium (254.6 kg ha^{-1}). The experiment was laid out in split plot design comprising of four pearlmillet hybrids MPMH-21, AHB-1200, HHB-67, MLBH-308 and four nitrogen levels *viz*., Control (0% RDN), 100% RDN, 125% RDN, 150% RDN and replicated thrice.

RESULTS AND DISCUSSION

Growth parameters

The hybrids and nitrogen levels had shown significant effect on growth parameters *viz.,* plant height and dry matter production but their effect was not significant on 50% flowering. The maximum plant height and drymatter production were observed in MLBH-308 (204.9 cm, 10638 kg ha^{-1}) which was on par with the AHB-1200 (195.7 cm, 9488 kg ha^{-1}) where minimum plant height and drymatter production were recorded in HHB-67 (180.7 cm, 7684 kg ha^{-1}).

The data on plant height and drymatter production among nitrogen levels revealed that the application of 150% RDN recorded highest plant height and drymatter production (202.5cm, 11035 kg ha^{-1}) which was on par with the 125% RDN (195.6 cm, 10056kg ha^{-1}) and lowest (181.7 cm, 54805 kg ha^{-1}) was noticed in controled condition.

Nitrogen is the main component of the protoplasm involves in various metabolic processes *viz.,* photosynthesis for longer time which improves the leaf area (Corsi, 1995), stimulation of cell division and elongation by Ali (2010) which leads to increase in plant height and drymatter production, and the result was in conformity with the findings of shahin *et al*.,2013.

Yield attributes

Among elite four pearlmillet hybrids taken for the field experiment, maximum earhead length was observed in MLBH-308 hybrid (25.8 cm) and was significantly superior to the remaining hybrids tested which was comparable with AHB-1200 (21.7 cm) where the lowest earhead length was noticed in HHB-67 (18.8 cm).

Among nitrogen levels application of 150% RDN recorded significantly higher length of earhead (24.6cm) compared to other nitrogen levels tested and showed parity with the 125% RDN (22.5 cm) but the lowest earhead length (18.3 cm) was observed in control.

The reason behind increase in earhead length mightbe due to propitious effect of nitrogen on cell

Table 1. Effect of hybrids and nitrogen levels on growth, yield attributes and yield of pearlmillet

Treatments	Plant height (cm)	Drymatter production (kg ha^{-1})	Earhead length (cm)	Grain yield (kg ha^{-1})	Stover yield (kg ha^{-1})
M_1-MPMH-21	184.4	8407	19.5	2224	5171
M_2-AHB-1200	195.7	9448	21.7	2737	6208
M_3- HHB-67	180.7	7684	18.8	1901	4747
M_4-MLBH-308	204.9	10638	25.8	3036	6734
SEm (±)	4.14	207.1	0.8	57.4	176.7
CD (p=0.05)	10.5	716	2.7	198	611
CV (%)	7.4	7.9	12.8	8	10.7
S_1 – 0 % RDN	181.7	5805	18.3	1210	3666
S_2– 100 % RDN	186	9288	20.3	2496	5834
S_3– 125 % RDN	195.6	10050	22.5	2988	6463
S_4 –150 % RDN	202.5	11035	24.6	3203	6896
SEm (±)	3.6	195.7	0.59	60	162.3
CD (p=0.05)	10.5	571	1.7	175	473
CV (%)	6.51	7.5	9.4	8.4	9.8
SEm (±)	7.2	391.53	1.18	120	324.6
CD (p=0.05)	NS	NS	NS	NS	NS

enlargement and production of more photosynthates that might had transcolated during the reproductive stages from source to sink. These results were in close proximity with the experiment as findings presented by Mishra *et al*., 2013.

Yield

The data presented in table 1 showed that maximum grain yield and straw yield was observed in hybrid MLBH-308 (3036, 6734 kg ha^{-1}) which showed parity with the hybrid AHB-1200 (2737, 6208 kg ha^{-1}) where as, minimum grain yield and straw yield were noticed in hybrid HHB-67 (1901 kg ha^{-1}).

Among nitrogen levels with the application of 150% RDN there was increase in grain yield and straw yield (3203, 6896 kg ha^{-1}) which was on par with the 125% RDN (2988, 6463kg ha^{-1}) but the lowest (1210, 3666 kg ha^{-1}) were observed in control, i.e. 0% RDN.

Seed yield varied significantly with the nitrogen application in comparison to plot receiving no nitrogen. Similar results were obtained by other researchers under similar conditions, Ibrahim *et al.,* 2014.Earlier workers have also reported such positive response on straw yield due to nitrogen application to pearlmillet, these results are also in agreement with the findings of Chaudhary *et al*., 2018.

CONCLUSION

Based on the findings, it could be concluded that the hybrid MLBH-308 and application of 150% RDN recorded highest crop growth parameters, yield attributes and yield over other hybrids in Krishna zone of Andhra Pradesh under rice fallow conditions.

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