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Influence of Inorganic Fertilizers and Biomix Inoculation on Yield and Yield Attributes in Pearlmillet Hybrids

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ABSTRACT

The experiment was conducted at Research Area of Agronomy, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana (India) situated at 29°10' N latitude and 75° 46' E longitude at an elevation of 215.2 m above mean sea level during Kharif 2016 to notice the effect of biomix inoculation and chemical fertilizers on yield and yield attributes. Inoculation of bacteria has synergistic and additive effect on plant growth besides reducing the cost of cultivation. Higher number of ear head plant^{-1} was recorded with treatment F_6 (2.76) and lowest in F_1 (1.77). Significantly longer ear length (25.39 cm) as compared to rest of the treatments and it was at par with treatment F_4 (25.14 cm). Perusal of data revealed that 1000 grain weight of pearlmillet was found to be statistically higher in treatment F_6 as compared to rest of the treatments. Maximum grain yield was recorded in treatment F_6 (30.79 q ha^{-1}) which was at par with treatment F_4 (29.65 q ha^{-1}) and F_5 (28.81 q ha^{-1}). Pearlmillet hybrid H_3 (28.64q ha^{-1}) produced significantly higher grain yield than other two hybrids. This might be due to their better vegetative growth in terms of plant height, number of ear head and bolder seeds.

Key words: *Pearlmillet, Growth parameters, Biomix inoculation, Chemical fertilizers*

INTRODUCTION

Pearlmillet (*Pennisetum glaucum* [L.] R. Br. emend. Stuntz) is cereal crop cultivated in dryland area of India due to its capacity to grow well under drought, high temperature, low soil fertility and medium salinity. Pearlmillet was accounts first in ranks under the category of millets in India, in terms of area, production and productivity. The states of Rajasthan, Maharashtra, Uttar Pradesh, Haryana and Gujarat account for more than 90% of total area and production under Pearlmillet. Now area under coarse cereals goes decreasing and got shifted to pulses and oilseeds in *Kharif* season. Pearlimillet, being an important *Kharif* crop and has dual-purpose crop. So, play important role in the integrated agricultural and animal husbandry economy of the drier area of the country.

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At farmer's field the averages yield of pearlmillet is low due to poor plant stand. Pearlmillet also suffers badly due to low soil fertility and scarce water availability, thereby reducing the yield potential. It is clear to generate fair information on performance of pearlmillet under differential water and fertilizer regimes, which are meager in Indian conditions. Keeping these points under consideration, the present investigation was taken on Influence of inorganic fertilizers and biomix inoculation on yield and yield attributes in pearlmillet hybrids

MATERIALS AND METHODS

The experiment was conducted during *Kharif* 2016 replicated thrice with split plot design at Research Area of Agronomy, Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana (India) situated at 29°10' N latitude and 75° 46' E longitude at an elevation of 215.2 m above mean sea level. The following treatments were taken as in main plot F_1: Control, F_2 : *Biomix* (*Azotobacter* + *Azospirillum* + *PSB*), F_3: 75 % RDF, F_4: RDF (150 kg N /ha and 62.5 kg P_2O_5 /ha), F_5: 75% RDF + *Biomix*, F_6: RDF + *Biomix* and in sub plot H_1: HHB 234, H_2: HHB197, H_3: HHB223 in a split plot design and 5 kg/ha seed rate was taken for pealmillrt sowing by keeping 45 cm row to row spacing. The tagged plants were used for recording the number of ear heads plant^{-1}. Length of the ear head in centimeter was recorded on the tagged plants. Mean length of ear was computed. A random sample of grain was drawn from the produce of each plot. Out of this sample, 1000-grains were counted and their weight was recorded. Every plot was harvested and sun dried separately. Total weight of these plants (stover + ear head) from net plot was recorded and computed as biological yield (kg ha^{-1}). Each of the plots was harvested and threshed separately. Grain yield from each net plot was recorded and reported as grain yield kg ha^{-1}. By subtracting grain weight from total produce of individual plot, stover yield for each plot was recorded. It was recorded as q ha^{-1}. Harvest index for each plot was computed using following formula.

$$\text{Harvest Index} = \frac{\text{Grain yield}}{\text{Biological yield}} \times 100$$

Attraction index was calculated by dividing the grain yield with straw yield and multiplied by 100. Tiller conservation index was calculated by dividing the number of effective tillers per plant with total numbers of tillers per plant and multiplied by 100.

RESULTS AND DISCUSSION

The result revealed that number of ear head plant^{-1}of pearlmillet hybrids recorded under different treatments is presented in Table 1 under various combinations of RDF and *biomix* inoculation did not have significant effect on number of ear head plant^{-1}. Higher number of ear head plant^{-1} was recorded with treatment F_6 (2.76) and lowest in F_1 (1.77). The differences between no. of ear head per plant in all the three pearlmillet hybrids were not significant.

A close perusal of the data in Table 1 on ear head length shows that various combinations of RDF and *biomix* inoculation influenced the ear head length of pearlmillet hybrids significantly. The seed inoculation of pearlmillet hybrids with *biomix* in association with RDF (F_6) resulted in significantly longer ear length (25.39 cm) as compared to rest of the treatments and it was at par with treatment F_4 (25.14 cm). There was also no significant difference in ear length of treatment F_3 and F_5.

Table 1: Effect of different fertility management and hybrids on yield attributes of pearlmillet

Treatments	No. of ear head/plant	Ear head length (cm)	1000 grain weight (g)	Tiller conservation index (%)
Fertility management				
F_1 : Control	1.77	21.46	9.20	93.55
F_2 :*Biomix*	2.00	22.26	9.46	95.24
F_3: 75 % RDF	2.33	24.33	9.83	94.32
F_4: RDF	2.68	25.14	10.14	93.72
F_5: 75% RDF + *Biomix*	2.40	24.76	9.98	95.74
F_6: RDF + *Biomix*	2.76	25.39	10.37	96.02
SEm ±	0.23	0.44	0.07	2.06
CD at 5%	NS	1.4	0.22	NS
Hybrids				
H_1: HHB 234	2.19	23.80	8.57	94.40
H_2:HHB197	2.38	22.95	10.31	95.11
H_3: HHB223	2.44	24.94	10.64	94.79
SEm ±	0.13	0.29	0.09	1.80
CD at 5%	NS	0.87	0.29	NS

Pearlmillet hybrid H_1 produced significantly longer ear head than rest two hybrids. The difference of ear head length between hybrid H_1 and H_2 was statistically at par. Lowest ear head length was obtained in hybrid H_2 (22.95 cm). Test weight (1000 grain weight**)** of pearlmillet hybrid was significantly influenced by various combinations of RDF and *biomix* inoculation (Table 1). Perusal of data concluded that 1000 grain weight of pearlmillet was found to be statistically higher in treatment F_6 as compared to rest of the treatments. 1000 grain weight was significantly affected by various pearlmillet hybrids. Among different pearlmillet hybrid, H_3 (HHB 223) produced significantly higher 1000 grain weight than H_1 and H_2 (HHB 234 and HHB 197). Lowest 1000 grain weight of pearlmillet was obtained in hybrid H_1 (8.57 g). A close perusal of the data in Table 1 on tiller conservation index reveals that various combinations of RDF and *biomix* inoculation and different pearlmillet hybrids did not influence the tiller conservation index significantly.

Table 2: Effect of different fertility management and hybrids on yield, harvest and attraction index of pearlmillet

Treatments	Yield (q ha^{-1})			Harvest index (%)	Attraction index (%)
	Grain	Stover	Biological		
Fertility management					
F_1 : Control	20.24	48.44	68.68	29.46	41.80
F_2 :*Biomix*	21.16	50.84	71.99	29.47	41.93
F_3: 75 % RDF	25.24	63.36	88.60	28.52	40.00
F_4: RDF	29.65	69.49	99.14	29.90	42.66
F_5: 75% RDF + *Biomix*	28.81	64.66	93.48	30.79	44.57
F_6: RDF + *Biomix*	30.79	69.67	100.46	30.64	44.19
SEm ±	0.75	0.71	1.22	0.57	1.16
CD at 5%	2.41	2.28	3.91	NS	NS
Hybrids					
H_1: HHB 234	23.81	56.07	79.88	29.79	42.47
H_2:HHB197	25.50	63.12	88.62	28.69	40.31
H_3: HHB223	28.64	64.03	92.67	30.91	44.85
SEm ±	0.48	1.47	1.83	0.37	0.76
CD at 5%	1.43	4.32	5.39	1.11	2.24

The data pertaining to grain yield of pearlmillet hybrids as influenced by various combinations of RDF and *biomix* inoculation is presented in Table 2. The grain yield of pearlmillet hybrids were significantly influenced due to various combinations of RDF and *biomix* inoculation. Maximum grain yield was recorded in treatment F_6 (30.79 q ha^{-1}) which was at par with treatment F_4 (29.65 q ha^{-1}) and F_5 (28.81 q ha^{-1}). Pearlmillet hybrid H_3 (28.64q ha^{-1}) produced significantly higher grain yield than other two hybrids. Lowest grain yield was obtained in hybrid H_1 (23.81q ha^{-1}). Higher grain yield in pearlmillet hybrid H_3 (HHB 223) than rest two cultivars might be due to their better vegetative growth in terms of plant height, number of ear head and bolder seeds. The differences in grain yield of pearlmillet cultivars have also been reported by Kumar[3], Sewhag[4] and Yadav[5].

The data on stover yield of pearlmillet under different treatments (Table 2) revealed that stover yield was significantly influenced by various combinations of RDF and *biomix* inoculation. Significantly higher stover yield was recorded in treatment F_6.The difference between the treatments F_6 and F_4 for stover yield were however non-significant. Among different Pearlmillet hybrids, H_3 recorded significantly higher stover yield as compared to other hybrids (64.03 q ha^{-1}). The difference between the hybrid H_2 and H_3 for stover yield was however, not significant. This increase in the stover yield may be attributed to the increased height, leaf area and dry matter production. In the inorganic + biofertilizers treatment (T_9) the positive benefits of seed bacterization are attributed mainly to N_2 fixation and other factors like release of hormones, promotion of PGPS and nutrient uptake. Results of almost similar nature were also reported by Kumar *et al*.[3] and Jadhav *et al*[1].

Biological yield as influenced by various combinations of RDF and *biomix* inoculation and pearlmillet hybrids are presented in Table 2. Perusal of data revealed that the biological yield of pearlmillet obtained in treatment F_6 (100.46 q ha^{-1}) was significantly higher as compared to other treatments. However, the difference in biological yield between treatment F_6 and F_4 was statistically at par. Lowest biological yield was obtained in treatment F_1 (68.68 q ha^{-1}). Pearlmillet hybrid H_3 (92.67 q ha^{-1}) produced significantly higher biological yield than other hybrids. However, the difference in biological yield of hybrids H_2 and H_3 were statistically at par. Lowest biological yield was obtained in hybrid H_1 (79.88 q ha^{-1}).

Data presented in Table 2 revealed that various combinations of RDF and *biomix* inoculation did not influence the harvest index of various pearlmillet hybrids significantly. Among different pearlmillet hybrid, H_3 recorded significantly higher value of harvest index as compared to H_1 and H_2. The lowest harvest index was recorded in pearlmillet hybrid, H_2. The difference between the pearlmillet hybrid H_1 and H_2 for harvest index was, however, not significant. Various combinations of RDF and *biomix* inoculation did not have significant effect on attraction index; however, it differed significantly with varying pearlmillet hybrids (Table 2). Significantly highest attraction index was recorded with hybrid H_3 as compared to rest two hybrids (H_1 and H_2). The difference between the hybrid H_1 and H_2 for attraction index was however, not significant.

CONCLUSION

Higher number of ear head $plant^{-1}$ was recorded with treatment F_6 (2.76) and lowest in F_1 (1.77). Significantly longer ear length (25.39 cm) as compared to rest of the treatments and it was at par with treatment F_4 (25.14 cm). Perusal of data revealed that 1000 grain weight of pearlmillet was found to be statistically higher in treatment F_6 as compared to rest of the treatments. Maximum grain yield was observed in treatment F_6 (30.79 q ha^{-1}) which was at par with treatment F_4 (29.65 q ha^{-1}) and F_5 (28.81 q ha^{-1}). Pearlmillet hybrid H_3 (28.64q ha^{-1}) produced significantly higher grain yield than other two hybrids.

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