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EVALUATION OF PROMISING LINES OF PEARL MILLET IN TWO SEASONS

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ABSTACT

Ten pearl millet genotypes were tested in a randomized complete block design replicated thrice in two seasons to select the most stable high yielding genotypes. Analysis of variance for kharif 2013 revealed significant differences for all the attributes except plant height trait. While during kharif 2014, all the genotypes differed significantly ($p \leq 0.05$) for plant height, days to 50% anthesis, grain yield and stalk yield characters. During kharif 2013, genotypes YBS-98 and YBS-94 produced maximum grain yield (2868 Kg/ha) followed by genotype YBS-95 of 2836 kg/ha. While minimum grain yield was recorded for genotype YBR-5 (2173 kg/ha). Genotype YBS-95 obtained highest grain yield (3186 kg/ha) during kharif 2014 and GenotypeYBS-98 ranked 2nd (2860kg/ha) among all the genotypes. Minimum and maximum numbers of days to complete 50% anthesis were taken by genotypes YBR-05 and 18-BY respectively, during two years 2013 and 2014. Maximum plant height (302 and 403 cm) was obtained by check variety 18-BY in both season and also topped for stalk yield by producing 58222kg/ha and 52444Kg/ha in kharif 2013 and kharif 2014, respectively.

Key words: Pearl millet, bajra, performance ,variety and anthesis.

INTRODUCTION

Pearl millet (*Pennisetum glaucum* (L.) R.Br.) is the staple food grain and a source of feed, fodder, fuel and construction material for hundreds of millions of people (Kannan *et al*., 2014; Kholova and Vadez, 2013; Sumathi *et al*.,2010). Moreover, it has a many applications used in dietary fibre, nutraceuticals, micronutrients, phytochemicals (Bashir *et al*., 2011; Sehgal and Kawatra, 2006). It high nutritional values, grain fat and protein than other cereals (Bashir *et al*., 2014; Govindaraj *et al*.,2011). In Pakistan millet is the most popular bird seed commodity fed to pet birds (Chughtai *et al*., 2004).

In Pakistan, it is grown on an area of 474.6 million hectares with annual production of 301.00 million tones Anon. (2014). Punjab is the largest pearl millet growing province with an area of 423.2 thousand hectares with production of 273.6 thousand tones. The average yield in Pakistan and Punjab is 634 and 647 kg/ha, respectively which is very low as compared to other pearl millet growing countries of the world. Non availability of high yielding varieties, improper planting methods, use of marginal land and birds attacks are the major causes of low production of pearl millet in the country.

Drought stress is one of the major serious environmental constraints limiting crop production in marginal areas and affecting yield stability under the rain fed agriculture (Shao *et al*., 2009). However, pearl millet possesses unique genetic predisposition to withstand environmental stress and give appreciable yield on marginal land (Wilson *et al*., 2008). Pearl millet crop respond well to water and fertile soil in the form of high yield because of C_4 plant which enable to capture more energy and efficient use of carbon. Although available statistics demonstrate the reduction of pearl millet harvest area in several countries of the world. Several factors are responsible for the general decline of pearl millet production. One of the major reasons for the decline in pearl millet production is the lack of improved cultivars adapted to a wide range of environments. Climate change and food security issues will definitely stimulate expansion of land devoted to pearl millet cultivation in the world and high yield of pearl millet under stress conditions will act as potential buffer against famine.

The relative performance of cultivars for quantitative traits like yield varies from one environment to another. The importance of evaluating many potential genotypes in different environments (Location and years) before cultivation has been recognized by breeders (Gupta and Ndoye, 1991). Therefore, extensive testing is needed to find out genotypes that show minimum interaction with the environment (Shakoor *et al*.,1999).

In view of the above, the present study was conducted to evaluate the yield potential and adaptation of ten promising pearl millet varieties (Including one check) at Maize and Millet Research Institute, Yusafwala for two consecutive seasons during Kharif 2013 and 2014.

MATERIALS AND METHODS

The experimental material comprising of ten promising pearl millet genotypes i.e. YBR-5, YBS-70, YBS-83, YBS-89, YBS-90 YBS-92, YBS-94, YBS-95 YBS-98and 18-BY was tested at Maize and Millet Research Institute, Yusafwala during Kharif 2013 and 2014 for their yield potential and adaptation. Randomized complete block design with three replications was used to lay out the experiment. The plot size was kept (5mx2.4m) by keeping row to row and plant to plant distance 75 cm and 25cm respectively. Recommended agronomic practices were followed for raising the crop. Data regarding plant height (cm), days to 50% anthesis and grain yield / stalk yield (kg/ ha) were noted. Recorded data were subjected to analysis of variance following Steel and Torrie (1980) and least significance difference test was applied to determine the level of significance among the treatment means by using MStat C Programme.

RESULTS AND DISCUSSION

The One way analysis of variance of growth data for kharif 2013 (Table 1), kharif 2014 (Table 2) and two way analysis of variance for the collective data is presented in Table 3. ANOVA showed that pearl millet varieties differed significantly ($p \leq 0.05$) for all the characters under study except plant height during kharif 2013. However, perusal of table- 2 revealed the significant differences for plant height, days to 50% anthesis, grain yield and stalk yield (kg/ha) among genotypes during kharif 2014.

Growth data for Kharif 2013 and 2014 is presented in Table 4 and 5. The grand mean, LSD and CV% for the two years are presented in Table 6 showing validity and preciseness of the data for the plant parameters of pearl millet genotype included in the experiments.

Growth in kharif 2013 (Table 4) showed that the promising pearl millet variety YBS-98 and genotype YBS-94 produced the maximum grain yield of 2868 kg/ha followed by genotype YBS-95 (2836 kg/ha). Minimum grain yield was obtained from genotype YBR-5(2173 kg/ha). Regarding days to 50% anthesis character genotype YBR- 5 took minimum days (53 days) while promising variety YBS-98 completed 50% anthesis in 57 days behaving as medium maturing variety. Plants height is very important attribute especially in the barani areas where peoples prefer dual purpose variety (grain and stalk) because the bajra dry stalk is the main source to feed the livestock especially in the winter season. Increased emphasis on development of dual purpose pearl millet variety is therefore necessary to ensure high grain yield as well as dry fodder under rain fed cultivation (Dangaria and Atara, 2004). A commercial variety 18- BY (check) produced the maximum plant height 302 cm along with maximum stalk yield i.e. 58222 kg/ha as plant height and stalk yield are positively correlated characters. In this regard, promising variety YBS-98 not only given maximum grain yield but at the same line ranked third for stalk yield among the genotype included in the experiment. So, genotype YBS-98 is good for irrigated as well as barani condition being a dual purpose variety.

Table 1. Mean square values obtained from analysis of variance for Plant height, days to 50% anthesis, grain yield and stalk yield during kharif 2013.

SOV	df	Plant height	Days to 50% anthesis	grain yield (kg/ha)	stalk yield (kg/ha)
Replications	2	14.233	3.43	20355	1.654E+07
Varieties	9	664.152	13.79	214210	1.086E+08
Error	18	350.752	4.14	24660	7753990
Total	29				

Table 2. Mean square values obtained from analysis of variance for Plant height, days to 50% anthesis, grain yield and stalk yield during kharif 2014.

SOV	df	Plant height	Days to 50% anthesis	grain yield (kg/ha)	stalk yield (kg/ha)
Replications	2	947.50	19.63	1515	2.003E+07
Varieties	9	4442.96	88.50	847172	4.611E+08
Error	18	238.24	7.00	35081	4.041E+07
Total	29				

Table 3. Mean square values obtained from two way analysis of variance for Plant height, days to 50% anthesis, grain yield and stalk yield for 2013 - 2014.

SOV	df	Plant height	Days to 50% Anthesis	grain yield (kg/ha)	stalk yield (kg/ha)
Year	1	23720.8	633.75	1189197	4.683E+07
Replications	2	393.1	10.717	4168	2.480E+07
Year * rep	2	568.6	12.350	19752	1757341
Varieties	9	3562.5**	81.943**	739742**	1.455E+08**
Error	45	544.5	8.525	68929	6874233
Total	59				

** Highly significant

Table 4. Plant height, days to 50% anthesis, grain yield and stalk yield for 10 pearl millet genotypes grown during kharif 2013.

Sr. No.	Varieties	Plant height	Days to 50% anthesis	grain yield (kg/ha)	stalk yield (kg/ha)
1	YBS-98	247	57	2868 a	43111
2	YBS-94	279	56	2868 a	42222
3	YBS-95	268	56	2836 ab	39111
4	YBS-93	266	58	2738 ab	39111
5	YBS-92	282	56	2577 bc	41333
6	YBS-89	260	56	2442 cd	44556
7	YBS-70	284	59	2326 cde	47555
8	18BY	302	61	2324 cde	58222
9	YBS-83	274	56	2289 de	39111
10	YBR-5	279	53	2173 e	38222

Table 5. Plant height, days to 50% anthesis, grain yield and stalk yield for 10 pearl millet genotypes grown during kharif 2014.

Sr. No.	Varieties	Plant height	Days to 50% anthesis	grain yield (kg/ha)	stalk yield (kg/ha)
1	YBS-95	288	65	3186 a	39536
2	YBS-98	305	61	2880 b	47111
3	YBS-89	298	63	2556 bc	45778
4	YBS-83	300	59	2295 cd	40889
5	YBS-92	285	60	2258 cd	42667
6	YBS-70	360	72	2162 d	49778
7	YBS-94	293	60	2095 d	46222
8	YBS-93	320	63	2044 d	44889
9	18BY	403	73	1522 e	52446
10	YBR-5	287	56	1480 e	40889

A view of Table 5 indicated that during Kharif 2014 genotype YBS-95 gave the highest grain yield (3186kg/ha) followed by YBS-98 (2860 ha) showing consistence performance in two seasons. Minimum and maximum number of days to 50 % anthesis were taken by genotype YBR -5 (56 Days) and 18-BY (75days) behaved as early and late maturing varieties respectively. However, promising line YBS-98 took almost equal no of day for 50% anthesis in two years showing consistent performance for this trait. A check variety 18- BY ranked 1st for plant height and

stalk yield by producing 403cm and 52444 kg/ha respectively. While promising line YBS-98 behaved as dual purpose variety and Produced plant height (305cm) and stalk yield 47111 kg/ha.

A desirable cultivar is one that not only yield well in its area of initial selection but also maintain the high yielding ability over a wide range of environments' within its intended area of production (Yahaya *et al*., 2006). The finding of present studies indicated that promising line YBS-98 behaved as high yielding (grain / stalk) variety with consistent performance over two years.

Table 6. Grand mean, range, LSD value and C.V percentage for different plant attributes during kharif 2013 and kharif 2014.

Plant trait	Grand mean		Range		C.V percentage		LSD value	
	2013	2014	2013	2014	2013	2014	2013	2014
Plant height	274.23	340	302 - 247	403-285	6.83	4.9	32.13	26.48
Days to 50% anthesis	56.77	63.27	61 - 53	73-56	3.58	4.18	3.49	4.54
grain yield (kg/ha)	2544	2244	2838 -2178	3186 -1480	6.17	8.34	269.38	321.31
stalk yield (kg/ha)	43255	45022	58222 - 38222	52444 - 39556	6.44	3.33	4776.7	2570.3

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