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Comparative growth and yield evaluation of different high yielding wheat varieties under rainfed conditions of Attock, Pakistan

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ABSTRACT

The experiment was conducted at the farmer's field Attock during the year 2015-16. Six wheat Varieties i.e Aas 2011, Bars 2009, Narc 2009, Chakwal 50 and Pakistan 13 were evaluated for yield performance. Results revealed that all the varieties differ significantly in yield parameters. The varieties Narc 2009 and Pakistan 13 were best performer with 36.34 mds/ acre and 36.14 mds/acre yield respectively and are recommended for cultivation in rainfed conditions of Attock District.

KEYWORDS: Growth, yield, wheat varieties, rainfed conditions

INTRODUCTION

In Pakistan, wheat (*Triticum aestivum* L.) is an important crop and is grown widely. About 20% wheat is cultivated in rainfed area of Pakistan of which mainly concentrated in photohar tract. The agriculture in rainfed areas is mainly depended on the occurrence of rainfall. The average wheat yield is about 1.5 tons per hectare which is much lower than the national average yield. The main reason of low yield especially in rainfed area is that the wheat crop suffers drought condition [1] and thus cause significant reduction in yield [2]. The second main reason for low yield is sowing time. Optimum temperature required for wheat growth range between 15 to 25°C. The recommended time for wheat cultivation is late October to mid November. It is reported that a loss of 10 million tones per annum has occurred due to late sowing of crop. Other physiological factors for low yield are improper seed bed preparation, low seed rate, low recommended fertilizer, non eradication of weeds diseases and insect attack etc.

Despite the high yielding varieties in rainfed areas their average yield is low under farmer field condition. The reason of low potential may be due to their susceptibility to environmental stresses. So there is need for selection of varieties. It can be done by analyzing the morphological and yield characteristics [3, 4]. Yield per unit area will be increased with related traits [5, 6]. The objective of present study is to find high yielding wheat variety under the agro ecological conditions of Attock.

MATERIAL AND METHODS

The experiment was conducted at the farmer's field Attock during the year 2015-16. Six wheat Varieties i.e AAS 2011, BARS 2009, Narc 2009, Chakwal 50 and Pakistan 13 were evaluated for yield. The experiment was laid out in randomized complete block design (RCBD, n=3). The plot was sown on 30 October at 25cm inter row spacing with a hand drill on well prepared land. Normal cultivation practices were followed. Data regarding emergence m⁻², Number of tillers m⁻², plant height (cm), grains/ spike, 1000 grain weight and grain yield (mds/ acre) were noted. Analysis was done using analysis of variance techniques at P=5%. [7]

RESULTS AND DISCUSSION

Emergence

Data pertaining to emergence/m² is show in Table 1. Statistical analysis of the average germination count m⁻² revealed that the experimental varieties showed non-significant results on emergence for the growing season. Average value of emergence m² of different wheat varieties ranged from 144.6 to 164 m⁻². The maximum number of plants/m² (164m⁻²) was recorded in Pakistan 13 while minimum germination count of 144.6m⁻² was recorded in wheat variety Chakwal 50. The results are in accordance with that of [8] which indicate that germination count did not differ significantly among various wheat cultivars.

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Table: 1 Comparative growth and yield performance of various wheat varieties

Treatments	Emergence m ⁻²	Plant height (cm)	Number of Tillers m ⁻²	No. of grains/spike	1000 grain weight (gm)	Grain yield(mds/acre)
AAS 2011	150a	102.1a	310d	39.33c	36.2d	26.89c
BARS 2009	148a	95.2b	304d	31.53d	40.4c	23.56d
NARC 2009	169.33a	94.83b	321.3b	43.43a	48.43a	36.34a
CHAKWAL 50	144.66a	95.5b	313.66c	41.06b	46.33b	33.36b
PAKISTAN 13	164a	101.43a	346a	44.53a	48.133a	36.14a
	NS					

Plant Height

The data concerning plant height was shown in Table 1. The maximum plant height was observed in variety AAS 2011 which did not differ significantly from that of Pakistan 13 i.e 101.43cm. The minimum height (94.8cm) was recorded in NARC 2009 which was statistically at par with BARS 2009 and Chakwal 50. The average plant height recorded in BARS 2009 and Chakwal 50 were 95.2cm and 95.5cm respectively. The plant height of wheat crop is depend on genetic makeup of crop and it is also affected by the prevailing environmental conditions during the growing season [9, 10 & 11].

Number of Tillers

The yield of any wheat variety is mainly depended on the number of fertile tillers produced by the particular crop. The statistical analysis of number of tillers m² showed that varieties had a significant effect on their production of tillers. The average tillers count of different varieties falls between 304 to 346. Maximum tillers m² was recorded as 346 in variety Pakistan 13 which was statistically different from rest of the varieties. The wheat varieties AAS 2011 and Bars 2009 showed similar behavior and remained statistically at par with 310 and 304 tillers respectively. The average number of fertile tillers m² in wheat variety NARC 2009 was recorded as 321.3 which was statistical different from Chakwal 50 that produced 313.66 number of fertile tillers m². These results coincide with the result of [8 & 12] which showed that different varieties behave different in number of tillers m² under field conditions.

Grains Per Spike

The data recorded on number of grains per spike was shown in Table 1. Statistical analysis showed significant results in grains/spike. The variety NARC 2009 and Pak 13 had highest grains/spike and showed non significant behavior in number of grains per spike. The number of grains/spike in NARC 2009 is 43.43 and PAK 13 gave 44.53 grains/spike. The variety Chakwal 50 produced 41.06 grains/spike and statistically significant from all other varieties. The minimum grains (31.5) were produced in BARS 2009 while variety AAS 2011 produced 39.3grain/spike. It was reported that the number of grains per spike depend upon the genotype of the crop and growing conditions of the crop [9].

1000 Grain Weight

Analysis of variance for 1000 grain weight revealed that the grain weight had significant effect on all tested varieties. Maximum

grain weight was observed in NARC 2009 and Pakistan 13 as 48.43gm and 48.13gm respectively and remained at par with one another. The minimum grain weight (36.2gm) was observed in variety Aas 2011. While varieties Chakwal 50 and BARS 2009 stand significant in 1000 grain weight with one another. The grain weight of 40.4gm was recorded in BARS 2009 while 46.33gm weight was observed in Chakwal 50 variety. The results are in close relation with the findings of [13].

Grain Yield

The yield of any crop depends upon the number of fertile tillers, number of grains per spike and 1000 grain weight produced by the particular crop. There were highly significant difference was recorded regarding grain yield mds/acre among the different wheat varieties. The two varieties i.e NARC 2009 and Pakistan 13 produced high grain yield and showed significant behavior over all the other varieties while these two varieties remain at par with one another. The grain yield of 36.34mds/acre was observed in NARC 2009 while Pakistan 13 produced 36.14mds/acre grain yield. Chakwal 50 produced grain yield of 33.6mds/acre and statistically holds a significant position. The lowest grain yield of 23.56 mds/acre was recorded in BARS 2009. The grain yield of AAS 2011 was 26.89 mds/acre and remained different from all other varieties. These results are in accordance with those of [14] who reported that NARC 2009 is high yielding wheat variety for rainfed areas.

CONCLUSION

In the light of above findings it is concluded that the wheat varieties Narc 2009 and Pakistan 13 are high yielding varieties and recommended for cultivation under rainfed conditions of Attock.

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