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PERFORMANCE OF NEWLY WHEAT (*TRITICUM AESTIVUM* L.) VARIETIES UNDER TIMELY SOWN, NORMAL FERTILITY AND IRRIGATED CONDITIONS

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Abstract

A field experiment was carried out during *Rabi* 2011 at Wheat Breeding Farm, Department of Genetic & Plant Breeding, Allahabad School of Agriculture, SHIATS, Allahabad (U.P.), India. The experiment consisted of 9 varieties of wheat which were laid out three replicated in randomized block design to study response of wheat under timely sown, normal fertility and irrigated condition having 9 varieties tired, 6 varieties *i.e.* [AAI-W1, (16)], [AAI-W3-(23)], [AAI-W4-(28)], [AAI-W5-(347)], [AAI-W6-(344)] and [AAI-W7(15)] have been recently put in state level trials, along with 3 standard check varieties *i.e.* K-9533, HD-2733 PBW-502. The study showed that AAI-W4-(28) variety gave higher grain yield (7.35 t ha^{-1}), harvest index (40.28 %), higher net income (90,172 ha^{-1}) and benefit: cost ratio (3.73) then the rest of varieties tried.

Key words : Wheat, varieties, fertility, irrigation.

Introduction

Wheat is the second most important food crop next to rice in India and it contributes nearly 35 per cent to the national food basket. Its contribution to the green revolution is significant. During the year 2011-12, wheat was grown over a production of 91 m.t. (Source: USDA).

Since the time of green revolution numerous wheat varieties have been developed with different response pattern to applied nutrients and irrigation frequency. It has been observed that recommended nutrient had been initially 100:60:40 kg's of NPK/ha respectively, which was later enhance to 120:60:40 kg's NPK/ha respectively. But the varieties failed in sustaining their yield. Therefore, the present recommendation has gone up to 150:80:60 kg of NPK/ha, respectively. Thus, the ever increasing doses of nutrients are posing a serious economic consequence to farmers and they are relevant to adopt such high doses. Therefore, the view to evolved varieties, which may response to lower doses of inputs, fertilizers doses and irrigation frequencies.

As a since of last eight years the university has evolved six varieties of wheat which have already perform better in multilocational trials conducted by U.P. state government and are expected to be released in near future. The response of these varieties with reference to standard checks under normal fertility and irrigation level is required to be tested under normal recommendation of 150:80:60 kg of NPK/hectare and five irrigation, respectively. Therefore, a field experiment entitled "wheat varietal response to timely sown, normal fertility and irrigated condition" was conducted during the 2011 at Crop Research Farm, SHIATS.

Materials and Methods

A field experiment was conducted at Central Research Farm, SHIATS, 2011. The experimental plot was sandy loam in texture, having a pH of 7.6, EC 0.22 dSm^{-1}, OC 0.34% and the available NPK were analyzed to be 239.0 kg/ha, 25.80 kg/ha and 257.40 kg/ha respectively. The treatments consisting of 6 newly evolved wheat varieties and 3 standard check, the recommended dose of NPK 150:60:40 kg ha^{-1} respectively Wheat varieties were sown in rows 20 cm apart on 29 November in 2011. Half of N and full dose of Phosphorous and Potassium were applied in the form of urea, DAP and muriate of potash at the time of sowing. Remaining half of Nitrogen was applied in 2 equal splits, i.e. one-fourth at CRI stage and rest one-fourth at tillering stage. The crop received 5 uniform irrigations.

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Table 1 : Performance of varieties on growth parameters of wheat at 90 DAS.

Treatment	Varieties	Plant height (cm)	No. of tillers/ running row meter	Dry weight (g)	Relative Growth Rate
T_1	AAI-W1(16)	101.86	100.33	20.67	0.0310
T_2	AAI-W3(23)	103.87	78.67	22.67	0.0330
T_3	AAI-W4(28)	100.77	97.00	15.87	0.0270
T_4	AAI-W5(347)	110.75	77.00	25.47	0.0420
T_5	AAI-W6(344)	105.86	85.00	22.87	0.0390
T_6	AAI-W7(15)	100.01	92.00	24.47	0.0370
T_7	K 9533(C)	115.11	87.33	23.73	0.0340
T_8	HD 2733	92.06	104.00	18.33	0.0280
T_9	PBW 502	94.17	92.00	23.80	0.0370
	S.Em (±)	3.67	7.93	2.33	0.0061
	C.D (P=0.05)	10.99	-	-	-

Table 2 : Performance of varieties on growth parameters of different varieties of wheat.

Treatments	Varieties	No. of effective tillers /running row meter^{-1}	Spike length (cm)	No. of grains spike^{-1}	Test weight (g)
T_1	AAI-W1(16)	78.47	10.29	43.60	38.00
T_2	AAI-W3(23)	62.73	11.17	50.40	42.00
T_3	AAI-W4(28)	77.20	8.93	48.80	35.33
T_4	AAI-W5(347)	63.87	11.83	42.53	43.33
T_5	AAI-W6(344)	63.13	11.93	40.87	42.67
T_6	AAI-W7(15)	72.47	11.04	53.20	36.67
T_7	K 9533(C)	63.60	11.75	44.40	38.67
T_8	HD 2733	92.67	9.58	40.67	39.33
T_9	PBW 502	79.73	9.79	39.93	42.00
	SEm (±)	4.59	0.21	2.54	1.02
	CD(P=0.05)	13.76	0.62	7.62	3.05

Results and Discussion

Growth parameters

Data on plant height, number of tillers/running row meter, dry matter production and relative growth rate are presented in table 1. The data clearly indicated that tallness of wheat varieties was different. The tallest plant height was influenced significantly by different varieties. The tallest plant height were counts in treatment T_7 (115.11 cm), both treatments T_4 and T_5 were statistically at par with T_7 (K 9533). The probable reasons for the findings could have been because of varietal characteristics, all varieties increased plant height by applying irrigation at all critical growth stage which might be due to the variation of genetic character among different varieties as well as with healthier plant growth with sufficient availability of nutrients having no moisture stress. The finding confirms the results of Naeem sarwar *et al*. (2010) and Thompson and Chase (1992).

The number of tillers per running row meter has been presented in table 1, which was non-significant difference at 90 DAS. The highest number of tillers per running row meter was recorded in treatment T_8 (104.00).

The maximum dry weight (25.47 g/plant) and the highest relative growth rate (0.0420 g/plant /day) was observed under the treatment T_4 [AAI-W5 (347)], which was not significantly higher than the other treatments. Probable reasons for such finding might be due to varietal character.

Yield components

Yield contributory characters such as no. of effective tillers/ running row meter, length of spike (cm), no. of grains/spike and test weight were found to differ

significantly under the various varieties shown in table 2. A critical observation of the table indicates that treatment T_8 (HD 2733) recorded the maximum no. of effective tillers /running row meter (92.67), which was statistically at par to the treatment T_9 (PBW 502) that of treatment T_8. The probable reasons for higher tiller count in treatment T_8 could have been because performance of varietal characteristics and variety (HD 2733) is a double dwarf variety, all varieties might be due to the sufficient availability of water at tillering stage with more uptakes of nutrients. This finding is in conformity with Naeem sarwar *et al*. (2010). Sharif (1999) reported greater than 400 tillers m^{-2} in wheat. McDonald (1984) found that maximum number of tiller was associated with higher number of irrigation. Might be due to the sufficient availability of water at tillering stage with more uptakes of nutrients.

The maximum length of spike (11.93 cm) was recorded in the treatment T_5 [AAI-W6(344)]. Treatments T_4 [AAI-W5(347)] and T_7 (K 9533)were statistically at par with T_5. The maximum number of grains $spike^{-1}$ (53.20) was recorded in the treatment T_6 [AAI-W7(15)]. Both treatments T_2 and T_3 were statistically at par with T_6. The probable reasons for such findings might be due to varietal character, timely sowing wheat crop took more days to complete its life-cycle with sufficient availability of moisture at seeding to physiological maturity. Shivani *et al.* (2001), Bhan *et al*. (1990), Tewari and singh (1993) and Verma *et al.* (1997) also reported similar findings.

The maximum test weight (43.33 g) was recorded in the treatment T_4 [AAI-W5(347)], whereas, treatments T_5, T_2 and T_9 were statistically at par with T_4 [AAI-W5(347)]. The probable reasons for such finding might be due to NPK fertilizers level and full irrigation because it might be due to the more translocation of photosynthats towards grain due to the sufficient amount of water in root zone. Similar results were recorded by Wajid *et al.* (2002), Malik *et al.* (1990), Khaliq *et al.* (1999), Maqsood *et al.* (1999) and Ali *et al.* (2000).

Grain yield

Grain yield of wheat was not significantly influenced by varieties response to timely sown, normal fertility and irrigated conduction as shown in table 3. The highest grain yield (7.35 t ha^{-1}) was obtained under the treatment T_3 [AAI-W4(28)]. Followed by treatments T_9 and T_1 respectively, whereas, the minimum grain yield (6.12 t ha^{-1}) was recorded in the treatment T_5 [AAI-W6(344)]. The probable reasons for such finding might be due to Because of different varieties showed significant value of different growth and yield parameters.

Table 3 : Comparative Performance of yield and economics of different varieties of wheat.

Treat-ments	Varieties	Grain yield (t ha^{-1})	Net return (‘ ha^{-1})	B:C ratio
T_1	AAI-W1(16)	6.54	78,649.00	3.38
T_2	AAI-W3(23)	6.22	75,253.00	3.28
T_3	AAI-W4(28)	7.35	90,172.00	3.73
T_4	AAI-W5(347)	6.27	76,318.00	3.31
T_5	AAI-W6(344)	6.12	73,504.00	3.23
T_6	AAI-W7(15)	6.49	81,354.00	3.47
T_7	K 9533(C)	6.38	79,741.00	3.42
T_8	HD 2733	6.26	76,225.00	3.31
T_9	PBW 502	6.62	82,663.00	3.50
	SEm (±)	0.30		

The highest net profit ‘90,172 ha^{-1} and Benefit Cost Ratio (3.73) was obtained under the treatment T_3 [AAI-W4 (28)] followed by the treatment T_9 (PBW 502) as depicted in table 3. The highest net profit and benefit cost ratio obtained under the treatment T_3 would have been due to better yield attributes and yield of wheat.

Conclusion

From the above finding, it may be concluded that among the varieties AAI-W4 (28) was the best for obtaining highest grain yield and benefit cost ratio in wheat. Since the findings are based on the research done in one season it may be repeated for confirmation.

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