



PERFORMANCE OF NEWLY WHEAT (*TRITICUM AESTIVUM* L.) VARIETIES UNDER LOW FERTILITY AND LIMITED IRRIGATED CONDITIONS

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Abstract

A field experiment was conducted under low fertility and limited irrigated conditions during *rabi* 2011 at Wheat Breeding Farm, Central Research Farm, 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 low fertility and limited irrigation condition having 9 varieties tried, 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 highest grain yield (5.06. tha⁻¹), harvest index (46.33), highest PBW-502 variety, highest net income (Rs. 56804.5) and highest Benefit: cost ratio (2.87) K-.9533(C) among the other varieties tried.

Key words : Wheat, varieties, fertility, irrigation, wheat (*Triticum aestivum* L.).

Introduction

Since the time of green revolution numerous 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 enhanced to 120:60:40 kg's NPK/ha, respectively. But the varieties failed to sustain their yield. Therefore, the present recommendation has gone up to 150:80:60 kg's NPK/ha, respectively. Thus, the increasing dose of nutrients is posing serious economic consequences to farmers and there are reluctant to adopt such high doses. Therefore, the view to evolve varieties which may respond to lower doses of inputs, fertilizers and irrigation frequencies. As since of last eight years the university has evolved six varieties of wheat, which have already performed better in multilocal trials conducted by U.P. State government and are expected to be released in near future. The dose of 80:40:20 kg of NPK ha⁻¹ respectively has been recommended and the variety will be checked with under three irrigations. Therefore, a field

experiment "wheat varietal response to timely shown, restricted fertility & irrigation conditions" has been planned to be conducted during *rabi* 2011 at crop research farm of SHIATS, Allahabad, U.P., India.

Materials and Methods

A field experiment was conducted at Central Research Farm, SHIATS, Allahabad (U.P.), India, during *rabi* 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 80:40:20 kg/ha. Wheat varieties were sown in rows 20 cm apart on 29 November in 2011. Half of N and full dose of phosphorus 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 3 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/row meter	Dry weight (g)	Relative growth rate
T ₁	AAI-W1(16)	101.83	86.66	86.00	0.06
T ₂	AAI-W3(23)	99.80	61.33	101.33	0.06
T ₃	AAI-W4(28)	96.60	70.00	124.33 ^a	0.07
T ₄	AAI-W5(347)	110.85	63.00	100.33	0.07
T ₅	AAI-W6(344)	106.74	64.33	127.66 ^a	0.06
T ₆	AAI-W7(15)	101.08	72.00	107.00	0.05
T ₇	K 9533(C)	120.49	75.66	134.33	0.06
T ₈	HD 2733	89.64	110.00	89.00	0.06
T ₉	PBW 502	90.02	71.66	123.00 ^a	0.07
	S.Em (±)	3.36	6.08	9.99	0.07
	C.D (P=0.05)	7.13	12.89	21.19	-

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

Treatments	Varieties	No. of effective tillers row meter	Spike length (cm)	No. of grains spike ⁻¹	Test weight (g)
T ₁	AAI-W1(16)	64.00	9.98	38.00	40.66
T ₂	AAI-W3(23)	52.33	9.81	38.46 ^a	45.33
T ₃	AAI-W4(28)	61.00	8.72	48.66	40.00
T ₄	AAI-W5(347)	54.33	11.07	26.16	49.33
T ₅	AAI-W6(344)	53.66	12.26	39.13 ^a	44.00
T ₆	AAI-W7(15)	51.33	10.36	48.00 ^a	42.00
T ₇	K 9533(C)	59.00	11.07	35.60	45.33
T ₈	HD 2733	83.33	9.44	33.26	43.33
T ₉	PBW 502	55.00	9.72	32.13	45.33
	SEm (±)	6.40	0.26	5.17	0.93
	CD (P=0.05)	13.57	0.55	10.97	1.98

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

Varieties	Grain yield (t ha ⁻¹)	Straw yield (t ha ⁻¹)	Net return (A ha ⁻¹)	B:C ratio
AAI-W1(16)	4.45	7.21	48591.55	2.6
AAI-W3(23)	3.35	7.64	35755.55	2.18
AAI-W4(28)	5.06	5.94	52572.50	2.73
AAI-W5(347)	4.72	7.92	54143.50	2.78
AAI-W6(344)	4.57	5.77	45822.55	2.51
AAI-W7(15)	4.38	5.62	42874.50	2.41
K 9533(C)	4.84	8.29	56804.5	2.87
HD 2733	5.01	6.32	53108.55	2.75
PBW 502	4.62	5.37	45294.5	2.49
SEm (±)	4.07	9.07		

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 heights were counts in T₇ (120.49cm) at 90 DAS due to varietal characteristics, this may be attributed to better proliferation of roots and increased uptake of nutrient. The finding confirms the results of Singh *et al.* (1996).

The number of tillers per running row meter has been presented in table 1, which was significantly difference at 90 DAS. The highest number of tillers per running row meter was recorded in treatment T₈ (110.00).

The maximum dry weight (134.33g/5 plant) was recorded under the treatment T_7 [K-9533] (C) at 90 DAS, which was significantly higher than the other treatments.

The maximum relative growth rate (0.07 g/g/day) was observed under the treatment T_3 [(AAI-W4-(28))] at 90 DAS, which was not significantly higher than the other treatment. Probable regions 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. Critical observations of the table indicates that treatment T_8 (HD 2773) recorded the maximum no. of effective tillers (83.33), which was significantly higher than other varieties. The probable reasons for higher tiller count in treatment T_8 could have been because performance of varietal characteristics. This may be attributed due to timely seeded wheat was owing to relatively more favorable temperature experienced by the crop. Tewari and Singh (1993) and Verma *et al.* (1997) also reported similar findings.

The maximum length of spike (12.6cm) was measured in the treatment T_5 [(AAI-W6(34)], which was significantly higher than the other varieties. The maximum number of grains spike⁻¹ (48.66) was counted in the variety [(AAI-W4-(28)], which was significantly higher than other varieties. Treatment T_2 , T_5 and T_6 were statistically at par with T_3 . The probable reasons for such findings might be due to varietal character, timely sowing what crop took more days to complete its lifecycle. Tewari and Singh (1993) and Verma *et al.* (1997) also reported similar findings.

The maximum test weight (49.33) was recorded in the variety [(AAI-W5 (347)], which was significantly higher than other varieties. The probable reasons for such finding might be due to NPK fertilizer level. Kattimani *et al.* (1989) and Thakur *et al.* (1997) also reported similar finding.

Grain yield

Grain yield of wheat was significantly influenced by varieties sown, low fertility and limited irrigated condition as shown in table 3. The higher grain yield (5.06 t ha⁻¹) was obtained under the varieties[(AAI-W4 (28)], which was significantly higher than other varieties followed by variety T_8 , T_7 , T_4 , T_9 , T_5 , T_1 and T_6 , respectively statistically at par with T_3 . The probable reasons for such

finding might be of difference the varieties showed significant value of different growth and yield parameters. This results inclose conformity with that of Singh and Uttam (1993).

Straw yield

The maximum straw yield (8.29 t ha⁻¹) was obtained under the variety [(K9533(c)], which was significantly higher than other followed by variety T_4 , T_2 and T_1 , respectively statistically at par with T_7 . This could be attributed to the fact that phosphorus (40 kg ha⁻¹) significantly influenced root development and metabolic processes in plant. These results are in conformity with those of Singh *et al.* (1996) and Vyas and Choudhary (2000).

Economic analysis

The highest net profit (Rs. 56804.5 ha⁻¹) and benefit cost ratio (2.87) was calculated under the variety [(K-9533 (c)], followed by variety T_4 [(AAI-W5- (347)], T_8 (HD2733) and T_3 [AAI-W4 (28)] as depicted in table 3. The highest net profit and benefit cost ration calculated under the variety T_7 would have been due to better yield attributed and yield of wheat.

Conclusion

From the above finding, it may be concluded that variety [AAI W4 (281)] recorded maximum grain yield but variety K-9533 recorded the maximum B:C ratio (2.87), it is suggested that may be repeated one more your for confirmation of the result.

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