Himachal Journal of Agricultural Research 38(1): 67-70 (2012)

Short Note

Performance of wheat genotypes in irrigated and rainfed ecosystems of mid hills of Himachal Pradesh

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Manuscript Received: 22.03.2010; Accepted: 18.05.2012

Abstract

A field experiment was conducted to compare the performance of promising genotype VL 907 against the check varieties of wheat 'HS 240, VL 738, VL 804' and triticale 'TL 2942' in irrigated ecosystem under timely sown(4-11 Nov.) and late sown (25-30 Nov.)conditions at Malan and Bajaura. Significantly higher grain yield was produced by promising genotype VL 907 both at Malan (41.3 q/ha; 12.8%) and Bajaura (46.6 q/ha; 15.0%) compared to VL 804. Delay in sowing resulted in significant reduction in yield both at Malan (10.9 q/ha; 26.9%) and Bajaura (9.5%). VL 907 produced grain yield of 46.5 q/ha (Malan) to 48.7 q/ha (Bajaura) under timely sown conditions (4-11 November). Another experiment on same set of varieties tested at graded levels of nitrogen (40, 60 & 80kg N/ha) was conducted under rainfed conditions. Promising genotype VL 907 produced significantly more yield at Bajaura (31.5 q/ha) compared to checks and also at Malan location (18.0 q/ha) compared to checks VL 738 and VL 804. Crop responded significantly upto 80 kg N/ha (recommended level) at Bajaura. Significantly higher test weight was recorded by the test variety at both the locations. Thus, VL 907 proved to be a promising genotype both under irrigated and rainfed timely sown conditions of mid hills of Himachal Pradesh.

Key words: VL 907, wheat varieties, rainfed, irrigated, sowing time, nitrogen.

Wheat in Himachal Pradesh occupies the largest crop acreage '362.2 thousand hectares' out of which 64 per cent is rainfed (Anonymous, 2006-07) and the productivity levels fluctuate around 15 q/ha. The farmers though have sufficient number of recommended varieties for growing but they need to be given further better genotypes which are suitable for rainfed and irrigated ecologies. The delay in sowing is usually faced by the farmers either due to no rainfall and/or waiting for their turn to hire tractor for tilling/sowing the crop. Therefore, the present investigation was undertaken to evaluate the performance of promising genotype VL 907 both under irrigated (timely and late sown)and rainfed (graded levels of nitrogen) conditions.

A field experiment was conducted to compare the performance of promising genotype VL 907 against the check varieties of wheat 'HS 240, VL 738, VL 804' and triticale 'TL 2942' in irrigated ecosystem under timely sown (4-11 Nov.) and late sown (25-30 Nov.) conditions at Malan and Bajaura.The experiment was conducted in split plot design with three replications. In another experiment, same set of varieties under rainfed conditions were tested at graded levels of nitrogen (40, 60 & 80 kg N/ha) at both the locations.The soil of the experimental sites was silty clay loam in texture at both the sites, acidic in reaction at Malan and neutral at Bajaura. The soils were medium in available nitrogen and potassium at both the locations; medium in available phosphorus at Malan and high at Bajaura. The crop received 153.1 mm and 204.7 mm rainfall at Malan and Bajaura, respectively. In irrigated trial, irrigations were provided at all the critical stages. The weekly maximum temperature at Malan (17.8 to 32.2^{o} C) was comparatively higher than at Bajaura (15.1 to 29.5^{o}C) during this period. The crop was sown by using 100 kg seed/ha in irrigated trial and by using 125 kg seed/ha in rainfed trial. In irrigated trial, 1/3rd of nitrogen (40 kg/ha) and full dose of phosphorus (60 kg P_2O_5/ha) and potash (40 kg k_2O/ha) was basally applied and the remaining 2/3rd of nitrogen (80 kg/ha) was applied at first node stage. In rainfed trial, the crop was sown under timely sown conditions only, half nitrogen (as per the treatment) and full dose of phosphorus (40 kg P_2O_5/ha) and potash (40 kg K_2O/ha) was basally applied and remaining half of nitrogen was applied after the receipt of rainfall. The number of ears/m row length was counted from randomly selected two spots to compute the ears per unit area.

The grains per spike were counted from the five randomly selected ears from each plot.

Irrigated ecosystem: On an average significantly higher grain yield was produced by promising genotypeVL 907 both at Malan (41.3 q/ha) and Bajaura (46.6 q/ha) locations compared to checks 'HS 240, VL 738 & VL 804' and 'TL 2942' (Table1).The VL 907 (Malan) produced 28.8, 26.1 and 12.8 per

Table 1. Performance of VL 907 under timely and late sown conditions at Malan and Bajaura

Genotype	Malan			Bajaura		
	Timely	Late	Mean	Timely	Late	Mean
			Grain yield (q/ha)			
VL 907	46.5	36.2	41.3	48.7	44.5	46.6
HS 240(c)	39.4	19.3	29.4	38.7	33.8	36.3
VL 738(c)	35.6	25.4	30.5	33.7	26.7	30.2
VL 804(c)	42.7	30.6	36.6	40.4	38.7	39.6
TL 2942(c)	37.6	36.2	36.9	37.9	36.8	37.3
	40.4	29.5		39.9	36.1	
CD (P=0.05)	Date of sowing	10.25			NS	
	Genotype	1.93			4.30	
Genotype × Date of sowing		2.73			NS	
			Ears/m²			
VL 907	364	294	329	333	313	323
HS 240(c)	382	281	332	355	283	319
VL 738(c)	281	257	269	285	321	303
VL 804(c)	289	307	298	303	340	322
TL 2942(c)	361	312	337	276	308	292
	336	290		310	313	
CD (P=0.05)	Date of sowing	NS			NS	
	Genotype	28.2			NS	
Genotype × Date of sowing		39.8			35.6	
			Grains/ear			
VL 907	25.2	22.2	23.7	29.2	26.5	27.8
HS 240(c)	25.2	15.9	20.6	24.6	29.1	26.8
VL 738(c)	28.8	22.8	25.8	28.8	19.9	24.4
VL 804(c)	31.4	20.6	26.0	29.7	26.4	28.0
TL 2942(c)	20.2	23.1	21.6	28.1	26.0	27.1
	26.2	20.9	23.5	28.1	25.6	
CD (P=0.05)	Date of sowing	NS			NS	
	Genotype	3.24			NS	
Genotype × Date of sowing		4.59			1.7	
			1000 grain weight (g)			
VL 907	50.9	55.4	53.2	50.3	53.7	52.0
HS 240(c)	40.9	43.4	42.1	44.6	41.1	42.9
VL 738(c)	44.7	44.4	44.5	41.1	42.0	41.5
VL 804(c)	47.3	48.6	48.0	45.1	43.3	44.2
TL 2942(c)	51.7	51.3	51.5	49.3	45.9	47.6
	47.1	48.6		46.1	45.2	45.6
CD (P=0.05)	Date of sowing	NS			NS	
	Genotype	3.64			3.31	
Genotype × Date of sowing		5.45			NS	

cent more grain yield over HS 240, VL 738 and VL 804, respectively. Likewise at Bajaura, it produced 35.2, 22.1 and 15.0 per cent higher yield compared to VL 738, HS 240 and VL 804, respectively. Delay in sowing resulted in significant reduction in yield both at Malan (10.9 q/ha; 26.9%) and Bajaura (9.5%). VL 907 produced grain yield of 46.5 q/ha (Malan) to 48.7 q/ha (Bajaura) under timely sown conditions (4-11 November). Even under late sown conditions (25-30 November) VL 907 recorded 15.4 and 17.3 % higher grain yield at Malan and Bajaura, respectively, compared to VL 804. The yield attributes were affected with treatments (Table 2). On an average VL 907 recorded 329 ears per meter square at par with other wheat varieties at both the locations except that it was significantly more than VL 804 and VL 738 at Malan. The number of grains per ear was 23.7 at Malan and 27.8 at Bajaura which was at par with check cultivars at both the locations except that it was significantly higher than HS 240 at Malan. Significantly higher test weight values (53.2, 52.0 g) were recorded at both the locations by VL 907 compared to other wheat cultivars. Similar results have been observed at Almora and Shalimar (DWR, 2008-09). Negi *et al.* (2003) recorded higher productivity of HS 240 among fourteen genotypes tested at two dates of sowing.

Rainfed ecosystem: In general under rainfed conditions, the yield levels realized at Bajaura were higher compared to Malan which may be ascribed to more rainfall (51.6 mm), neutral soil reaction and comparatively lower weekly maximum temperature at Bajaura making location more favouable. Test variety VL 907 produced grain yield (18.0 q/ha) at par with HS 240 and significantly more than VL 738 (33.3%), VL 804 (8.4%) & TL 2942 at Malan. The productivity of VL 907 (31.5 q/ha) at Bajaura being at par with VL 804, produced significantly higher yield than VL 738 (25.4%) and HS 240 (15.2%). DWR (2008-09) reported similar results. The yield attributes were varied significantly among genotypes. The number of ears/m^2 was significantly more at both the locations compared to other check cultivars except that it was at par with HS 240 at Malan. Significantly higher test weight was recorded by the test variety at both the locations. Averaged over the cultivars, crop responded significantly up to 80 kg N/ha (recommended level) at Bajaura where consistent and significant increase in number of ears/m^2 was

Table 2. Yield and yield attributes of wheat genotypes in rainfed conditions at Malan and Bajaura

Treatment	Grain yield (q/ha)	Ears/m^2	Grains/ear	1000-grain weight (g)	Grain yield (q/ha)	Ears/m^2	Grains/ ear	1000-grain weight (g)
	Malan						**Bajaura**	
N level (kg/ha)								
40	17.1	244	16.2	43.5	25.2	255	21.7	45.7
60	16.4	229	17.1	42.1	29.2	269	23.6	46.9
80	15.1	231	15.7	42.0	32.2	282	24.8	46.4
CD (P=0.05)	NS	NS	NS	NS	3.57	10.6	4.37	NS
Genotype								
VL 907	18.0	261	14.0	48.2	31.5	305	20.1	51.8
HS 240(c)	19.1	265	20.0	36.5	26.7	256	24.5	43.0
VL 738(c)	12.0	191	14.9	42.1	23.5	243	22.3	43.5
VL 804(c)	16.5	218	18.5	40.4	29.0	256	25.0	45.6
TL 2942(c)	15.5	239	14.3	45.4	33.6	282	24.9	47.7
CD (P=0.05)	3.76	18.42	2.15	2.67	3.76	20.4	3.51	3.27

observed with increase in nitrogen level. Test weight remained unaffected with increase in nitrogen level at both the locations. Results conform to the findings of Negi and Mankotia (1999).

Thus, VL 907 proved to be a promising genotype both under irrigated (timely and late) and rainfed (timely) sown conditions of mid hills of Himachal Pradesh.

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