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Original Research Article

Productivity of Wheat Varieties under Different Sowing Dates

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A B S T R A C T

Field experiments were conducted during winter seasons of 2010-11 and 2011-12 to study the effect of seeding time on the growth, development and productivity of wheat cultivars under alfisol of Ranchi. Results revealed that among sowing dates, crop sown at 15 November produced higher grain yield 4.47 t/ha, straw yield 6.71 t/ha, harvest index 39.79, gross return Rs. 72668/ha, net return Rs. 48551/ha and benefit cost ratio 2.01. Higher productivity of wheat with timely sowing was due to better yield attributes such as spikes/m^2, grains/spike and 1000 grain weight of wheat crop.

Keywords

Climate change, Cultivars, Productivity, Suitability, Wheat

Introduction

Wheat crop requires cool weather during vegetative phase and warm weather during reproductive phase. A mean daily temperature of 20 ^{O}C has been observed optimum for seeding, around 15 ^{O}C for satisfactory tillering and 25 ^{O}C for physiological maturity. Hence, mean air temperature between 20 ^{O}C and 25 ^{O}C at any location decides growing period and productivity of wheat crop. Nowadays climate changes, especially increasing temperature will be the major challenge in the coming years as far as increasing crop yield is concerned. High temperature reduces tillering during vegetative phase and grain filling duration during reproductive phase in normal sown conditions, thus shortens wheat growing period vis-à-vis yield. However, selection of suitable cultivars can maintain the higher productivity of wheat in any region. In the light of above facts, an experiment was conducted to study the effect of seeding time on the growth, development and productivity of wheat cultivars.

Materials and Methods

Field experiments were conducted during winter seasons of 2010-11 and 2011-12 at University farm of Birsa Agricultural University, Ranchi (23^{o} 17' N latitude, 85^{o} 10' E longitude and 625 m above mean sea level). The soil was sandy loam (Alfisol), low in available N (217.8 Kg/ha) and medium in available P (12.43 Kg/ha) and exchangeable K (153.04 Kg/ha). The main-plot treatments consisted of four cultivars,

viz. two timely sown, K9107 and K0307, and two late sown, HUW234 and NW2036 and subplots included 5 sowing dates, viz. 30 October, 15 November, 30 November, 15 December and 30 December laid out in split-plot design with four replications. Wheat variety K9107 was sown at a spacing of 20 cm row to row with a seed rate of 125 Kg seed/ha and 100:60:40 kg/ha $N:P_2O_5:K_2O$. Half N with full P and K were applied basal in furrows. Remaining half of N was applied in two equal splits at crown root initiation and maximum tillering stage.

Results and Discussion

Yield and yield attributes

Wheat varieties K9107, K0307, HUW234 and NW2036 could not differ in respect of grain yield. Further, different cultivars performed differently when sown on different dates but the effect was nullified and consequently gave similar grain yield. But mean straw yield of K9107 (6.71 t/ha) was 7, 8 and 5 per cent higher than K0307, HUW234 and NW2036 (Table 2).

Interaction of variety and seeding time showed that grain yield of all varieties increased from October 30 seeding to 15 November and declined gradually thereafter. Delay in sowing from 15 November to 30 December caused maximum reduction in K9107 (30-49 per cent) and K0307 (23-47 per cent) while lowest reduction was recorded in NW2036 (8-25 per cent) and HUW234 (13-27 per cent), indicating the suitability of K9107 and K0307 under timely sown and NW2036 and HUW234 under late sown condition (Table 3). Similar results were obtained in case of straw yield and harvest index.

Among seeding time, timely planted (15 November) wheat gave mean grain yield 4.71 t/ha which was 13 per cent higher than October 30 sowing and reduced by 19 per cent when sowing was delayed to 30 November, 27 per cent when delayed to 15 December, 38 per cent when planting was delayed to 30 December. This might be due to timely planted crop experienced relatively favorable temperature regime during pre and post anthesis which resulted in better growth and development and ultimately led to better yield components than delayed planted crops which was reflected in grain yield. Mean straw yield (6.06 t/ha when planted on 15 November) as well as harvest index (43.61 per cent when planted on 15 November) followed the trend of grain yield. A number of experiments conducted earlier gave similar reduction in grain yield, straw yield and harvest index when sowing of wheat was deviated from timely sown condition (Jhanji and Gill, 2011, Pandey *et al.,* 2010, Mishra *et al.,* 2003, Shivani *et al.,* 2003).

Economics

Economics of crop production plays an important role when it comes to adoption among farmers. Gross return, net return as well as benfit: cost ratio decreased when sowing was delayed from 15 November, but the extent of decrease was more in timely sown varieties and less in late sown varieties. Reduction in net return was Rs 20,103-33,201 in K9107, Rs 15,703-33,466 in K0307, Rs 7,713-16,056 in HUW234 and Rs 5,929-15,693 in NW2036 on delay of sowing from 15 November to 30 November, 15 December and 30 December (Table 8). Similarly, reduction in benefit: cost ratio was more in K9107 (0.81-1.34) and K0307 (0.63-1.35) and was less in HUW234 (0.31-0.65) and NW2036 (0.24-0.63) indicating the suitability of former two varieties for timely sown condition and later two for late sown condition (Table 9).

Table.1 Yield attributes of wheat influenced by variety and seeding date (Mean of 2 years)

Treatments	Spikes/m^2	Grains/spike	1000 grain weight (g)
Variety			
K9107	363.10	44.63	39.70
K0307	385.92	41.68	38.25
HUW234	336.33	42.43	37.83
NW2036	372.67	42.10	39.80
SEm	8.43	0.36	0.21
CD(P=0.05)	NS	1.24	0.72
Seeding time			
30 Oct	380.69	43.23	40.83
15 Nov	444.33	44.35	41.73
30 Nov	386.63	43.28	39.84
15 Dec	331.06	41.88	36.89
30 Dec	279.81	40.79	35.18
SEm	10.51	0.24	0.29
CD(P=0.05)	30.29	0.68	0.85
Irrig. X seeding time			
SEm 1	21.01	0.47	0.59
CD 1	NS	NS	NS
SEm 2	20.60	0.55	0.57
CD 2	NS	NS	NS
CV%	9.98	1.92	2.63

Table.2 Yield and harvest index of wheat influenced by variety and seeding date (Mean of 2 years)

Treatment	Yield (t/ha)		Harvest index (%)
	Grain	Straw	
Variety			
K9107	3.71	5.86	38.25
K0307	3.86	5.50	40.75
HUW234	3.69	5.42	40.29
NW2036	4.01	5.57	41.75
SEm	0.08	0.07	0.49
CD(P=0.05)	NS	0.23	1.70
Seeding time			
30 Oct	4.16	5.90	41.35
15 Nov	4.71	6.06	43.61
30 Nov	3.83	5.56	40.64
15 Dec	3.45	5.29	39.39
30 Dec	2.93	5.13	36.31
SEm	0.07	0.07	0.48
CD(P=0.05)	0.20	0.19	1.38
Var. X seeding time			
SEm 1	0.14	0.13	0.96
CD 1	0.39	0.38	2.77
SEm 2	0.14	0.13	0.99
CD 2	0.45	0.41	2.99
CV%	6.13	5.60	4.13

Table.3 Grain yield of wheat influenced by Variety X Seeding time (pooled)

	30 October	15 November	30 November	15 December	30 December
K9107	4.38	4.99	3.51	3.14	2.53
K0307	4.30	5.06	3.92	3.36	2.66
HUW234	3.86	4.27	3.70	3.48	3.12
NW2036	4.11	4.53	4.17	3.83	3.41

Table.4 Straw yield of wheat influenced by Variety X Seeding time (pooled)

	30 October	15 November	30 November	15 December	30 December
K9107	6.32	6.42	5.75	5.39	5.41
K0307	6.02	6.15	5.57	5.04	4.73
HUW234	5.64	5.69	5.46	5.30	5.02
NW2036	5.62	6.00	5.45	5.43	5.35

Table.5 Harvest index of wheat influenced by Variety X Seeding time (pooled)

	30 October	15 November	30 November	15 December	30 December
K9107	40.99	43.72	37.82	36.84	31.88
K0307	41.64	45.08	41.22	39.74	36.05
HUW234	40.54	42.62	40.27	39.61	38.40
NW2036	42.23	43.01	43.23	41.36	38.91

Table.6 Economics of wheat influenced by variety and seeding date (Mean of 2 years)

Treatments	Gross return (Rs./ha)	Net return (Rs./ha)	Benefit :cost ratio
Variety			
K9107	61023	36329	1.47
K0307	62001	37307	1.51
HUW234	59644	34950	1.42
NW2036	64037	39343	1.59
SEm	1090	1090	0.04
CD(P=0.05)	NS	NS	NS
Seeding time			
30 Oct	66764	42070	1.70
15 Nov	74073	49379	2.00
30 Nov	61710	37016	1.50
15 Dec	56367	31673	1.28
30 Dec	49468	24774	1.00
SEm	882	882	0.04
CD(P=0.05)	2544	2544	0.10
Irrig.Xseeding time			
SEm 1	1765	1765	0.07
CD 1	5088	5088	0.21
SEm 2	1918	1918	0.08
CD 2	5887	5887	0.24
CV%	5.01	8.27	8.27

Table.7 Gross return (Rs. /ha) of wheat influenced by Variety X Seeding time (pooled)

	30 October	15 November	30 November	15 December	30 December
K9107	70492	78388	58285	52766	45187
K0307	68819	78601	62898	54554	45135
HUW234	62307	67657	59944	56709	51601
NW2036	65439	71644	65715	61437	55950

Table.8 Net return (Rs. /ha) of wheat influenced by Variety X Seeding time (pooled)

	30 October	15 November	30 November	15 December	30 December
K9107	45798	53694	33591	28072	20493
K0307	44125	53907	38204	29860	20441
HUW234	37613	42963	35250	32015	26907
NW2036	40745	46950	41021	36744	31257

Table.9 Benefit: cost ratio of wheat influenced by Variety X Seeding time (pooled)

	30 October	15 November	30 November	15 December	30 December
K9107	1.86	2.17	1.36	1.14	0.83
K0307	1.79	2.18	1.55	1.21	0.83
HUW234	1.52	1.74	1.43	1.30	1.09
NW2036	1.65	1.90	1.66	1.49	1.27

Among sowing dates, mean gross return (Rs 72668 and 74073/ha in first and second experiment), net return (Rs 48551 and 49379/ha in first and second experiment) as well as benefit: cost ratio (2.01 and 2.00), were higher in timely sown crop than early, moderately late, late and very late sowing due to higher grain yield and straw yield with the same input cost in timely sown condition which decreased with delay in sowing (Table 6).

Selection of suitable wheat cultivar is another important factor for higher yield. Present investigation shows that for Ranchi conditions, wheat varieties K9107 and K0307 are suitable for timely sown condition. While NW2036 as well as HUW234 shows wider adaptability in respect of yield and economics.

References

Jhanji, S. and Gill, D.S. 2011. Phenological development and heat unit requirement of wheat under different dates of sowing. Indian Journal of Agricultural Research. 45 (2): 161-166.

Mishra, V., Mishra, R.D., Singh, M. and Verma, R.S. 2003. Dry-matter accumulation at pre and post-anthesis and yield of wheat (*Triticum aestivum*) as affected by temperature stress and genotypes. Indian Journal of Agronomy. 48 (4): 277-281.

Pandey, I.B., Pandey, R.K., Dwivedi, D.K. and Singh, R.S. 2010. Phenology, heat unit requirement and yield of wheat (*Triticum aestivum*) varieties under different crop growing environment.

Indian Journal of Agricultural Sciences. 80 (2): 136-140.

Shivani, Verma, U.N., Sanjeev Kumar, Pal, S.K. and Thakur, R. 2003. Growth analysis of wheat (*Triticum aestivum*) cultivars under different seeding dates and irrigation levels in Jharkhand. Indian Journal of Agronomy. 48 (4): 282-286.