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Performance of Thirty Wheat Genotypes under Late Sown Conditions in Southern Region of Bangladesh

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Abstract: An investigation was made to evaluate the performance of different wheat genotypes under late sown conditions (sowing date: December 15 and December 30) during 1999-2000. Grain yield (1.62 t ha^{-1}) obtained from December 15 sowing were significantly higher than that of December 30 sowing (0.98 t ha^{-1}). Different genotypes showed no significant variation in respect of grain yield. The interaction effect showed that plant height, ear length, no. of grains/ear and straw yield were significantly better in December 15 sowing than December 30 sowing while no. of effective tillers/plant and grain yield were not significantly influenced by date of sowing.

Key words: Sowing date, genotype, wheat

INTRODUCTION

Wheat (*Triticum aestivum* L.) is the leading cereal crop of the world and the second important cereal crop of Bangladesh. The topography, climatic condition and cropping pattern are such that seeding of wheat starts from the first week of November and continuous up to late December. Among the agronomic practices, time of sowing has a major bearing on the yield of wheat. On the average, yield of wheat was reduced by about 50% when sown in the third week of December^[1]. In southern region of Bangladesh, one of the main constraints of sowing wheat in optimum time is that almost all the land is occupied by aman rice till its harvest during November and mid December. So it is necessary to find out such varieties which can be sown under late sown conditions in southern region of Bangladesh. In view of the above facts, an experiment was undertaken to evaluate the performance of different wheat genotypes under late sown conditions in southern region of Bangladesh.

MATERIALS AND METHODS

An experiment was conducted at Patuakhali Agricultural College (now Patuakhali Science and Technology University) Farm during the period from 15th December 1999 to 30th March 2000. The soil was clay loam belonging to the agro-ecological zone of Ganges Tidal Floodplain. Thirty genotypes of wheat were collected from Bangladesh Agricultural Research Institute. They were CB11, CB15, CB19, CB26, CB29,

CB31, CB32, CB37, CB41, CB43, CB46, CB47, CB56, Cb66, CB67, CB71, CB76, CB79, CB80, CB82, CB85, CB86, CB87, CB95, CB97, CB101, CB102, Kanchan, Shawghat and Protiva. The experiment was laid out in a split plot design with three replications keeping the sowing dates namely 15th December and 30th December in the main plots and genotypes in sub plots. The size of each sub plot was 3x1 m. The land was uniformly fertilized with 65 g urea, 40 g TSP, 20 g MP, 33 g gypsum and 5 g ZnSO_4 per plot. Half of urea and full dose of other fertilizers were applied basally and remaining urea was applied at crown root initiation stage followed by irrigation. Seeds were sown at 20 cm row spacing at the seed rate of 120 kg ha^{-1} . One hand weeding was done at fourth week of seeding. Irrigation was given at crown root initiation, heading and grain filling stages. Observations on yield attributes were taken from 10 randomly selected plants per plot. Days to flowering, days to maturity and grain yield were taken on whole plot basis. Days to flowering represents days required for flowering of 50% plants in a plot from the date of sowing. Days to maturity represents days required for maturity of 95% panicles in a plot from the date of sowing. Grain yield was measured after proper drying. The relevant data were analyzed statistically and the means were compared by using LSD test^[2].

RESULTS AND DISCUSSION

Effect of sowing date: Date of sowing significantly affected the yield and yield contributing characters except ear length (Table 2). Plant height, no. of effective

Table 1: Sowing date and genotype effects on the days to anthesis and maturity and grain filling duration of wheat

Genotype	Days to anthesis			Days to maturity			Grain filling duration	
	Dec. 15	Dec. 30	Mean days	Dec. 15	Dec. 30	Mean days	Dec. 15	Dec. 30
CB102	56	55	55.5	90	81	85.5	34	26
CB101	56	55	55.5	93	85	89.0	37	30
CB97	59	53	56.0	91	82	86.5	32	29
CB95	52	51	51.5	95	86	90.5	43	35
CB87	53	51	52.0	87	80	83.5	34	29
CB86	52	49	50.5	88	79	83.5	36	30
CB85	53	55	54.0	88	85	86.5	35	30
CB82	52	59	55.5	88	80	84.0	36	21
CB80	61	59	60.0	93	86	89.5	32	27
CB79	54	60	57.0	92	81	86.5	38	21
CB76	54	51	52.5	88	81	84.5	34	30
CB71	54	54	54.0	87	80	83.5	33	26
CB67	51	55	53.0	87	79	83.0	36	24
CB66	55	53	54.0	90	80	85.0	35	27
CB56	61	57	59.0	90	85	87.5	29	28
CB47	56	58	57.0	91	85	88.0	35	27
CB46	48	55	51.5	84	78	81.0	36	23
CB43	51	54	52.5	84	80	82.0	33	26
CB41	51	55	53.0	90	80	85.0	39	25
CB37	47	57	52.0	88	83	85.5	41	26
CB32	64	55	59.5	91	85	88.0	27	30
CB31	62	58	60.0	93	85	89.0	31	27
CB29	58	54	56.0	96	88	92.0	38	34
CB26	56	55	55.5	91	83	87.0	35	28
CB19	53	55	54.0	90	82	86.0	37	27
CB15	46	55	50.5	95	77	86.0	49	22
CB11	47	56	51.5	87	80	83.5	40	24
Kanchan	55	58	56.5	88	82	85.0	33	24
Showgat	55	58	56.5	88	84	86.0	33	26
Protiva	55	58	56.5	88	82	85.0	33	24
Mean	52.73	55.27		89.70	82.13		35.47	26.87

tillers/plant, no. of grains/ear and 1000 grain weight were significantly lower in December 30 seeding in comparison to December 15 seeding. Reduction in 1000-grain weight was due to shorter grain filling period (Table 1) caused by higher temperature at grain filling stage. Similar result was reported by BARI^[3]. The highest grain yield of 1.62 t ha⁻¹ was recorded from seeding wheat in December 15 and the lowest (0.98 t ha⁻¹) from December 30 seeding. The lower yield under December 15 seeding may be attributed to the reduction in the no. of effective tillers/plant, no. of grains/ear and 1000-grain weight. The percentage of relative yield reduction was 39.5% in December 30 sowing over December 15 sowing. Reduction in yield under late sown condition was also reported by Guffer *et al.*^[4], Hossain and Farid^[5], BARI^[3]. December 15 sowing crop also produced higher straw yield (4.34 t ha⁻¹) than December 30 sowing crop (2.74 t ha⁻¹). The crop sown on December 15 anthesized earlier than the crop sown in December 30 (Table 1). On the contrary, December 30 sowing crop matured earlier than December 15 sowing crop mainly due to reduction in grain filling period (Table 1) resulted from higher temperature at grain filling stage.

Performance of genotypes: Significant variation was observed among different wheat genotypes in respect of all yields attributes except no. of effective tillers/plant

(Table 2). The tallest plant height (75.76 cm) was produced by the genotype CB80 and the shortest plant height by CB56 (53.82 cm). CB31 produced the highest no. of effective tillers/plant (3.31) and CB71 (2.16) the lowest. The tallest ear length was 7.56 cm with CB97 and the shortest was 5.13 cm with CB41. The highest no. of grains/ear was produced by CB71 (22.99) and the lowest no. of grains/ear by CB41 (14.97). CB87 possessed the highest grain size (50.07 g/1000 seed) and CB32 the smallest (30.98 g/1000 seed). However, 1000 seed weight was found higher (46.25-50.07) in some genotypes like CB95, CB87, CB86, CB76 and CB66 compared to the high yielding variety shawgat (44.58 g/1000 seed).

The grain yield was not significantly affected by genotypes. However the highest grain yield of 1.67 t ha⁻¹ was produced by the genotype CB95 which was higher than those of the high yielding varieties (kanchan, Shawgat and protiva) and the lowest by CB15 (1.07 t ha⁻¹). Among the high yielding varieties, kanchan produced the highest grain yield (1.58 t ha⁻¹). Similar result was reported by Ali *et al.*^[6]. CB95 also produced the highest straw yield (4.78 t ha⁻¹) and CB43 the lowest (2.65 t ha⁻¹).

Among different wheat genotypes, CB29 required the highest number of days (92 days) to mature and CB46 the lowest (81 days).

Table 2: Yield and yield attributes of wheat as influenced by different sowing dates and genotypes

Treatments	Plant height (cm)	No. of effective tiller/plant	Ear length (cm)	No. of grains/ear	1000 grain weight (g)	Grain yield (t ha ⁻¹)	Straw yield (t ha ⁻¹)
Sowing dates							
December 15	67.04a	2.85a	6.51	20.74a	43.34a	1.62a	4.34
December 30	62.62b	2.39b	6.53	18.28b	38.65b	0.98b	2.74
LSD(1%)	1.76	0.32	NS	1.25	1.83	0.12	0.30
Genotypes							
CB102	60.11	2.25	6.46	22.06	39.5	1.08	2.75
CB101	69.61	2.53	6.90	21.59	38.38	1.29	3.65
CB97	69.59	2.28	7.56	22.51	41.67	1.22	3.57
CB95	74.17	2.96	6.85	18.61	46.25	1.67	4.78
CB87	65.36	2.41	6.85	20.17	50.07	1.47	3.64
CB86	67.06	2.30	6.71	22.08	49.13	1.37	3.65
CB85	63.13	2.90	5.67	19.26	43.55	1.60	4.11
CB82	66.14	3.05	6.92	18.43	37.45	1.43	3.67
CB80	75.76	2.81	6.77	18.07	41.55	1.37	4.49
CB79	65.63	2.23	6.97	21.48	39.48	1.29	3.29
CB76	72.65	2.31	6.97	22.24	48.23	1.45	3.81
CB71	68.44	2.16	7.26	22.99	41.00	1.11	3.26
CB67	66.85	2.83	6.79	20.76	35.95	1.40	3.16
CB66	64.44	2.18	7.03	19.86	49.45	1.18	3.29
CB56	53.82	2.50	6.10	18.02	38.45	1.09	3.51
CB47	61.53	2.76	6.15	17.36	42.38	1.37	3.84
CB46	66.20	2.66	6.75	21.11	36.82	1.29	3.05
CB43	56.00	2.38	6.55	20.79	38.30	1.10	2.65
CB41	54.67	2.91	5.13	14.97	40.45	1.17	2.97
CB37	70.15	2.68	6.04	16.82	42.03	1.21	3.20
CB32	58.32	3.00	6.40	18.19	30.98	1.27	3.95
CB31	63.21	3.31	5.82	15.02	34.00	1.31	3.94
CB29	62.20	2.58	6.61	20.77	33.68	1.14	3.84
CB26	69.52	2.85	6.51	19.53	39.47	1.31	3.81
CB19	63.88	2.63	5.99	19.35	40.62	1.30	3.20
CB15	67.61	2.56	6.24	17.71	38.87	1.07	2.74
CB11	58.15	2.70	6.06	17.41	41.65	1.22	3.34
Kanchan	63.06	2.76	6.44	20.65	42.65	1.58	3.91
Showgat	62.32	2.63	6.63	18.47	44.58	1.38	3.86
Protiva	65.34	2.58	6.65	18.99	43.20	1.30	3.30
LSD(1%)	6.83	NS	1.17	4.83	7.09	NS	1.16

Table 3: Interaction effect of genotype and sowing date on plant height, ear length, no. of grains/ear and straw yield

Genotype	Sowing date							
	Plant height		Ear length		No. of grains/ear		Straw yield	
	Dec.15	Dec. 30	Dec. 15	Dec. 30	Dec. 15	Dec. 30	Dec. 15	Dec. 30
CB102	62.72	57.50	6.57	6.35	22.84	21.28	3.27	2.21
CB101	77.49	61.73	7.42	6.37	24.66	18.51	4.85	2.44
CB97	70.28	68.90	6.90	8.22	21.25	23.77	4.59	2.55
CB95	76.00	72.33	7.03	6.13	22.46	14.76	5.83	3.72
CB87	67.36	63.35	6.96	6.75	21.63	18.71	4.59	2.68
CB86	65.47	68.65	6.14	7.28	19.02	25.15	4.35	2.94
CB85	65.60	60.67	5.78	5.57	19.60	18.92	4.61	3.61
CB82	67.15	65.13	7.41	6.44	18.34	18.53	4.47	2.86
CB80	79.72	71.80	6.94	6.61	20.54	15.60	4.92	4.05
CB79	69.46	61.80	7.12	6.82	23.22	19.73	4.04	2.53
CB76	75.58	69.71	7.13	6.81	25.74	18.74	5.00	2.62
CB71	69.94	66.93	7.19	7.33	25.46	20.53	4.39	2.12
CB67	70.43	63.27	7.08	6.49	24.86	16.66	4.42	1.88
CB66	69.68	59.20	6.61	7.44	21.86	17.87	4.50	2.07
CB56	57.34	50.30	5.81	6.39	17.62	18.43	5.22	1.79
CB47	64.95	56.10	6.11	6.18	18.54	16.18	5.00	2.68
CB46	66.71	65.70	6.73	6.78	21.18	21.04	3.59	2.51
CB43	55.83	56.17	6.16	6.95	21.95	19.63	2.96	2.33
CB41	59.33	50.00	5.48	4.79	17.41	12.53	3.51	2.42
CB37	71.60	68.70	5.26	6.82	16.53	17.11	4.02	2.38
CB32	57.07	59.57	5.99	6.81	20.40	15.98	5.33	2.55
CB31	63.54	62.87	5.47	6.17	14.61	15.44	4.31	3.55
CB29	66.17	58.23	6.75	6.47	21.85	19.70	4.61	3.07

Table 3: Countinue

Genotype	Sowing date							
	Plant height		Ear length		No. of grains/ear		Straw yield	
	Dec.15	Dec. 30	Dec. 15	Dec. 30	Dec. 15	Dec. 30	Dec. 15	Dec. 30
CB26	70.37	68.67	6.33	6.70	20.50	18.56	3.94	3.66
CB19	62.07	65.70	5.64	6.34	20.55	18.15	3.46	2.94
CB15	67.04	68.17	7.16	6.32	17.26	18.17	2.90	2.57
CB11	55.70	60.60	5.64	6.47	15.87	18.96	3.74	2.94
Kanchan	68.56	57.57	6.89	6.00	21.58	19.71	4.90	2.90
Showgat	64.62	60.02	6.98	6.28	22.09	14.84	4.83	2.89
Protiva	73.44	57.24	7.55	5.75	22.76	15.22	4.03	2.56
LSD(1%)	9.65		1.25		5.17		1.24	

Interaction effect: The interaction between sowing dates and genotypes was found significant for plant height, ear length, no. of grains/ear and straw yield (Table 3). The performances of all genotypes were better in December 15 seeding in comparison to December 30 seeding. Although grain yield was not significantly affected by interaction of genotypes and sowing dates, the highest grain yield was recorded from genotype CB95 (1.97 t ha^{-1}) in December 15 seeding. Significantly the highest straw yield was recorded from the genotype CB95 (5.83 t ha^{-1}) in December 15 seeding.

Different wheat genotypes required more days to mature under December 15 sowing compared to those of December 30 sowing mainly due to longer grain filling duration caused by lower temperature. CB29 appeared as the longest (96 days) and CB46 and CB43 the shortest (84 days) durated wheat genotypes under December 15 sowing. On the other hand, CB29 appeared as the longest (88 days) and CB15 the shortest (77 days) durated wheat genotypes under December 30 sowing.

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