

EFFECT OF SOWING DATES ON THE GROWTH AND YIELD OF WHEAT CULTIVARS

A. Hameed Ansari, Ali M. Khushk*, Mumtaz A. Sethar, Niaz A. Arain and M. Yameen Memon

Sind Agriculture University, Tandojam

(Received May 29, 1988; revised January 4, 1989)

A field experiment was carried out to evaluate the effect of sowing dates on the growth and yield of wheat cultivars at the agronomy experimental field, (A.R.I.) Tandojam, during the winter of 1986-87. Six sowing dates viz. 1st. Nov, 10th Nov., 20th Nov., 1st., December, 10th December and 20th December with the wheat cultivars, M-141, M-154, M-5/84, and Pavon were studied. Crop sown from 1st. November to 1st. December, produced significantly higher yields, mainly due to increase in all yields components. However further delay in sowing suppressed the yield, caused by reduction in the yield contributing traits like, number of tillers, grains per spike, seed index, and grain yield/plant. The cultivars M-154, M-5/84 and Pavon produced higher yields than did M-141.

Key words: Sowing dates, Wheat cultivars, Yield components.

INTRODUCTION

There are many reports in the literature which illustrate that sowing time has great importance for achieving high wheat grain yield. Mazurek *et al.* [1] reported that grain yield decreased for each delay in sowing time, the decrease in grain yield being caused mainly by a decrease in tillering and number of grain/plant. Sandhu *et al.* [2] reported that crops sown on 10th November produced maximum grain yield; however, yield declined if sown on 5th or 30th December. Habib and Makkiy [3] estimated that the optimum sowing date was in November giving an average yield of 4.40-6.76 t/ha. Yield and yield components decreased greatly with later sowing. Khan and Salim [4] reported that early seeding crop displayed increased grain yield, due to increased in number of spikes/unit area other yield components however, were not greatly affected by seedling dates. Auti and Kenjales [5] estimated that each successive 15 days delay in sowing reduced grain yield by 626 and 558 kg/ha, respectively, Khalifa [6] observed that early sown wheat gave consistently greater grain yields than later sown, because grains were larger and more numerous per head. The present investigation was carried out to determine the sowing date for maximum wheat grain yield under the agroclimatic conditions of Tandojam.

MATERIALS AND METHODS

An experiment was carried out at Agronomy Experimental field, Agriculture Research Institute, Tandojam during the winter of 1986-87. The experiment was laidout in a split plot design having net plot size of 5x3 square metres

and replicated four times. The details of the experiment were as under:

Main plot: sowing dates. S_1 = 1st Nov; S_2 = 10th Nov.; S_3 = 20th Nov.; S_4 = 1st Dec.; S_5 = 10th Dec.; S_6 = 20th Dec.

Sub-plot: cultivars. C_1 = M-141; C_2 = M-154; C_3 = M-5/84; C_4 = Pavon.

At the time of maturity five normal plants from each treatment were tagged for recording the following observations. Plant height, number of tillers/plant, number of grain per plant, seed index (1000 grain weight), grain yield per plant (gm), and per hectare M.T. (calculated from plot yield). The data was subjected to statistical analysis of variance and on (L.S.D.) test following Steel and Torrie [7].

RESULTS AND DISCUSSION

The data regarding plant height (Table 1) revealed that sowing dates significantly influenced ($P=0.01$) plant height; cultivars were also significant difference ($P=0.01$) among themselves. Treatment interaction were non-significant. Crops sown on 30th Nov. showed maximum plant height (92.50 cm) followed by 1st December (86.60 cm) and 1st November (87.12 cm) respectively. These findings are in agreement with those of Habib and Makkiy [3]. The data also revealed that cultivar M-154 and M-5/84 displayed maximum plant height of 87.40 and 87.23 cm, as compared to M-141 and Pavon. This difference was attributed to the genetic make of the material.

The number of tillers/plant was significantly affected by sowing dates ($P=0.01$) whereas cultivar and treatment interaction had no significant interaction for this trait. Early sown crops showed a maximum of 6.64, 6.29 and 6.30 till-

*AERU, PARC Tandojam.

Table 1. Plant height (cm) and number of tillers/plant of wheat cultivars as affected by sowing dates and their interaction. Plant height. (cm)

Cultivars	Sowing dates						Mean
	Ist Nov.	10th Nov.	20th Nov.	Ist Dec.	10th Dec.	20th Dec.	
M-141	81.80	71.61	89.45	88.55	79.47	83.74	82.44b
M-154	92.46	81.36	94.80	90.30	80.04	85.47	87.40a
M-5/84	87.00	76.69	98.20	89.75	80.80	90.95	87.23a
Pavon	87.22	69.84	87.55	85.80	72.85	78.07	80.22b
Mean:	87.12ab	74.87c	92.50a	88.60ab	78.29c	84.56b	-
	S.E ±			L.S.D. at P=0.05			L.S.D. at P=0.01
Sowing dates	2.60	-	-	5.54			7.67
Cultivars	1.52	-	-	3.04			4.06
Interaction (SxC)	3.72	-	-	-			-
Number tillers per plant							
M-141	6.55	5.80	6.35	6.30	4.30	5.05	5.72
M-154	6.30	7.35	5.80	5.55	4.85	5.60	5.91
M-5/84	6.15	6.45	6.55	5.15	4.05	5.05	5.57
Pavon	6.20	6.95	6.45	6.35	3.90	5.10	5.82
Mean:	6.30a	6.64a	6.29a	5.84ab	4.37c	5.20bc	-
	S.E ±			L.S.D. at P=0.05			L.S.D at P=0.01
Sowing dates	-	0.44	-	0.94			1.30
Cultivars	-	0.28	-	-			-
Interaction (SxC)	-	0.68	-	-			-

Values followed by same letters do not differ significantly at 5% level of significance.

ers/plant as compared to later sown crops. This conforms with the findings of Muzurek, *et al.* [1] Habib and Makkiy [3].

The data demonstrate that early sown crops produced a maximum of 54.07, 52.84, 50.74 and 49.37 number of grain per spike as compared to later sown crop which produced a lesser number of grains/spike. Habib and Makkiy [3] also obtained similar results. The cultivar as well as treatment interaction had no significant response for this same characteristic (Table 2).

It is observed from the data on sowing dates and cultivars that a significant difference ($P=0.01$) accrued with regards to seed index (1000 seed weight) whereas the treatment interaction had significant differences at only ($P=0.05$). It is noted that early sown crop produced maximum seed index of 40.29, and 39.32 g as compared to later sown crop which produced a minimum of 30.57, 31.75 and 32.51 g, respectively. This conforms with the findings of Habib and Makkiy [3]. The cultivar M-154 also produced a maximum seed index of 38.38 g, followed by cultivar M-

5/84 at 36.06 g. However the cultivar Pavon and M-141 produced minimum seed index of 32.89 and 32.62 g respectively. This was attributed to genetical constitution of cultivars under test. The cultivar M-154 sown on 1st November produced a maximum seed index of 44.19 g as compared to later sowing dates and cultivar M-141, which produced minimum seed index of 25.06 g at the last seeding date, (Table 2).

It is evident from the data that sowing dates had significant effect ($P=0.01$) on grain yield/plant (Table 3). Whereas cultivars were not significant different ($P=0.05$). Treatment interaction showed no significant differences among each other. Crop sown on early dates of 1st and 10th November produced maximum grain weight of 6.84 and 6.71 gm/plant over later sowing dates of 20th and 10th December which produced a minimum of 4.72 and 4.51 gm/plant respectively. The results are in agreement to those of Habib and Makkiy [3], and Sandhu *et al.* [2].

The data reveals that sowing dates had significantly influenced on grain yield/ha (Table 3). Cultivars were also

Table 2. Number of grains per spike and seed index (gm) of wheat cultivars as affected by different sowing dates, and their interactions. Grain per spike.

Cultivars	Sowing dates						Mean
	Ist Nov.	10th Nov.	20th Nov.	Ist Dec.	10th Dec.	20th Dec.	
M-141	52.00	50.20	50.05	44.30	41.10	40.30	40.32
M-154	54.95	58.35	46.95	49.95	36.30	42.70	40.07
M-5/84	53.85	53.25	50.55	52.65	45.40	48.25	50.66
Pavon	50.55	54.50	55.40	51.35	42.00	40.55	49.06
Mean:	52.84a	54.07a	50.74a	49.37a	41.26b	42.95b	—
	S.E ±		L.S.D. at P=0.05		L.S.D at P=0.01		
Sowing dates	2.61		5.56		7.70		
Cultivars	2.96		—		—		
Interactions(SxC)	2.22		—		—		
Seed index (1000 grain weight gm.)							
M-141	42.36ab	38.63bcd	32.56fghij	29.86ijk	27.27jkl	25.06 - i	32.62c
M-154	44.19a	42.28ab	39.33bc	34.28efghi	34.31defghi	35.92cdefg	38.38a
M-5/84	37.19cde	42.09ab	36.30cdef	34.99cdefgh	31.49ghijk	34.30defghi	36.06b
Pavon	37.41cde	33.91efghi	34.15defghi	30.92hijk	29.22jkl	31.74fghijk	32.89c
Mean:	40.29a	39.22a	35.58b	32.51c	30.57c	31.75c	—
	S.E ±		L.S.D.at P=0.05		L.S.D. at P=0.01		
Sowing dates	1.40		2.97		4.12		
Cultivars	0.94		1.87		2.50		
Interaction (SxC)	2.30		4.59		—		

Values followed by same letters do not differ significantly at 5% level of significance.

Table 3. Grain yield (gm)/plant and/ha (M.t) of wheat cultivars as affected by different sowing dates and treatment interactions. Grain weight per plant (gm).

Varieties	Sowing dates						Mean
	Ist Nov.	10th Nov.	20th Nov.	Ist Dec.	10th Dec.	20th Dec.	
M-141	6.30	6.39	6.80	4.72	3.72	3.82	5.29
M-154	7.04	7.42	6.46	5.79	4.79	5.51	6.17
M-5/84	7.03	6.30	7.08	5.80	5.29	5.06	6.09
Pavon	6.99	6.74	6.02	5.61	4.24	4.49	5.68
Mean:	6.84a	6.71a	6.59ab	5.48bc	4.51c	4.72c	—
	S.E ±		L.S.D. at P=0.05		L.S.D. at P=0.01		
Sowing dates	0.59		1.25		1.73		
Cultivars	0.35		—		—		
Interaction(SxC)	0.86		—		—		
Grain yield/ha (M.t)							
M-141	3.49	3.94	3.13	3.00	1.34	1.33	2.70b

(Continued)

(Table 3, Continued)

M-154	3.71	3.73	3.74	3.57	2.19	2.31	3.21a
M-5/84	3.51	3.69	3.39	3.40	2.10	2.57	3.11a
Pavon	3.63	3.59	3.34	3.17	2.11	2.18	3.00ab
Mean:	3.58a	3.74a	3.40a	3.29a	1.94b	2.10b	—

	S.E ±	L.S.D. at P=0.05	L.S.D. at P=0.01
Sowing dates	0.32	0.68	0.94
Cultivars	0.17	0.34	—
Interactions(SxC)	0.62	—	—

Values followed by same letters do not differ significantly at 5% level of significance.

significant differences among each other ($P=0.05$), whereas the treatment interaction was non-significant. Crop sown on early dates of 10th. November and 1st November produced maximum grain yield of 3.74 and 3.58 M.t/ha. followed by 20th November and 1st December at 3.40 and 3.29 M.t/ha respectively. Whereas 20th and 10th Dec. sown crop produced significantly lower grain yields of 2.10 and 1.94 M.t/ha. These results are in agreement with Mazurek *et al* [1], Habib and Makkiy [3], Sandhu *et al.* [2], Khan and Salim [4] and Khalifa [6]. The cultivars M-154, M-5/84 and Pavon also produced higher grain yield of 3.21, 3.11 M.t/ha followed by Pavon recorded 3.00 M.t/ha as compared to M-141, respectively.

It is observed from the present studies that crop sown at 10 days interval from 1st November to 10th December, produced higher grain yield, further delay in sowing depressed the yield, this depression in yield mainly caused due to reduction in all yield contributing characters. The cultivars M-154, M-5/84 and Pavon gave significantly higher grain yield than did M-141. It is concluded that

wheat crop could be sown from 1st November to 10th December for obtaining maximum grain yield under agroecological condition of Tandojam.

REFERENCES

1. J. Mazurek, M. Wilczynska and W. Kostrzeina, *Field Crop Abst.*, **33**, 608 (1978).
2. H.S. Sandhu, S.S. Dhillon and G.S. Gill, *Field Crop Abst.*, **33**, 197 (1978).
3. M.M. Habib and M. Makkiy, *Field Crop Abst.*, **34**, 202 (1979).
4. A. Khan and M. Salim. *Pakistan J. Agri. Res.*, **7**, 14 (1981).
5. K.D. Auti and T. Kenjales, *Wheat, Barley and Triticale Abst.*, **3**, 477 (1985).
6. M.A. Khalifa, *Experimental Agri.*, **6**, 143, (1970).
7. R.G.D. Steel and J.H. Torrie, *Principles and Procedures of Statistics* (McGraw Hill Book Co. Inc. New York, 1960).