

# Effect of different sowing dates on morpho-physiological feature, yield and yield contributing characters of three modern wheat varieties

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**Abstract:** An experiment was conducted to examine the effect of variety and sowing date on the morpho-physiological, yield and yield contributing characters of wheat. Results showed that occurrence and duration of different phenophases were significantly affected by differences in varieties and planting dates. The duration for anthesis, maturity and grain filling were curtailed due to delay in planting. The varieties in respect to grain yield may be graded as Shatabdi > Sourav > Kanchan with 3.22 t/ha > 2.9 t/ha > 2.8 t/ha; while the sowing time may be graded in respect of grain yield as 15 Nov > 30 Nov > 1<sup>st</sup> Nov > 15 Dec. In respect of grain yield variety Shatabdi with 15 November sowing gave the maximum grain yield (3.96t/ha) and the lowest grain yield (2.36 t/ha) was observed from Kanchan with 15 December sowing.

**Key words:** Wheat variety, sowing date, yield.

## Introduction

The cultivated wheat plant (*Triticum aestivum*) belongs to the sub-tribe Triticinae under the tribe Triticeae (= Hordeae), which is economically the most important group of the grass family Graminae. *Triticum aestivum* is of two types, winter and spring wheat. In our country, only spring wheat is commonly grown. Wheat is an important crop and ranks first globally among the cereals both in terms of production and acreage (FAO, 1988). The average wheat yield (2.16 t/ha) in Bangladesh is lower compared to that of many other wheat growing countries. Yield is the cumulative effect of variety with its inherent characteristics, environmental condition in which it is grown and management practices. Recent efforts to improve the present yield level of wheat in Bangladesh could not bring any noticeable changes because of several production constraints. One of the major reasons for this failure in yield improvement is late planting of wheat (Islam et al., 1993). With the above background, the present piece of research work was undertaken to find out the effect of seeding times on the morpho-physiological characters, yield and yield attributes of wheat and to evaluate the adaptive performance of wheat varieties under late sowing condition.

## Materials and Methods

The experimental field was medium high level and belonging to the Sonatala soil series of gray flood plain soil type under the agro-ecological zone (AEZ-9) named old Brahmaputra Flood plain (FAO, 1988).

**Experimental treatments:** The experiment comprised of two sets of factors such as (A) varieties of wheat and (B) date of sowing. The first set of factors consisted of three different modern varieties of wheat released by BARI viz. V<sub>1</sub> (Kanchan), V<sub>2</sub> (Shatabdi), V<sub>3</sub> (Sourav). The second set of factors consisted of four dates of sowing as S<sub>1</sub> (November 1), S<sub>2</sub> (November 15), S<sub>3</sub> (November 30), S<sub>4</sub> (December 15).

**Experimental design:** The experiment was laid out in a split-plot design with three replications, assigning the date of planting into the main plot and variety into the sub-plot. The area of unit plot was (4.0m × 2.5m) 10m<sup>2</sup>. Land preparation, fertilizer application, irrigation and intercultural operation were done as and when necessary.

**Collection of data:** The following data were collected at various stages of development. Days to anthesis (When 50% plants flowered), days to maturity (When 80% spike ripened) and Total number of tillers plant<sup>-1</sup>.

**Statistical analysis:** The collected data were analyzed statistically using the analysis of variance (ANOVA) technique and significant of mean differences were adjudged by Duncan's Multiple Range Test (Gomez and Gomez, 1984).

## Results and Discussion

### Morpho-physiological characters

**Days to anthesis:** Days to anthesis varied significantly among the varieties (Table 1). Shatabdi (69.41) required more days to anthesis. Kanchan (67.33) needed comparatively less time to anthesis. Days to anthesis varied significantly due to difference of sowing time (Table 1). The longer time 71.55 days required for anthesis in November 1 sowing crop and duration for attaining anthesis was reduced in December sowing crop. In late planted crops the days to flowering was accelerated, leading to shortening of the duration in comparison to 1<sup>st</sup> November sowing. The rise in temperature accelerated the development of phenophase, which progressed linearly with the increases in temperature (Bishrol et al., 1991). The findings of present work confirm the result of Pal et al., (1996).

**Days to Maturity:** Days to maturity differed significantly in different varieties. Shatabdi needed 109.50 days to reach maturity, where as Kanchan needed 105.75 days. Sourav needed 107.66 days to reach maturity. Days to maturity differed remarkably with variation in planting time. The earlier planted crop reached at maturity stage by 113.55 days while the last planted crop reached at maturity stage by 100.44 days. The late planted crops experienced increased temperature which forced the plants to mature earlier. Similar results were reported by Saini and Dadhwal (1986), Saini (1977) and Blue et al., (1990).

**Days to grain filling period:** Variety showed significant difference in days to grain filling period (Table 1). Shatabdi (40.17 days) required highest time to grain filling. Lowest time was required by Kanchan (38.41 days) to grain filling and Sourav required 39.24 days.

Grain filling period decreased significantly with delay in time of planting irrespective of variety. The result of the

present study is in agreement with that of Chit-Thein (1988) who reported that planting date influenced to reduce the crop duration and also the grain filling period due to higher temperature. Joarder *et al.* (1981) also observed a remarkable decrease in grain filling period with

in planting from 15 November to 15 January. The present study suggested that any delay in planting after 1<sup>st</sup> November reduced the Anthesis time, crop duration and grain filling period to a considerable extent.

**Table 1.** Morphological parameters of wheat affected by varieties and sowing dates

Treatment	Days to anthesis	Days to maturity	Days to Grain filling	Final height
<b>Variety</b>				
Kanchan (V1)	67.33c	105.75c	38.41c	86.30b
Shatabdi (V2)	69.41a	109.50a	40.17a	88.60a
Sourav (V3)	68.33b	107.66b	39.24b	85.78b
LSD (0.05)	0.28	1.88	1.23	0.97
CV (%)	3.86	4.25	4.97	6.95
<b>Sowing time</b>				
1 <sup>st</sup> November (S <sub>1</sub> )	71.33 a	113.33 a	42.22 a	91.24 a
15 November (S <sub>2</sub> )	69.33 b	110.00 b	40.66 b	90.08 b
30 November (S <sub>3</sub> )	77.77 c	106.66 c	38.88 c	85.29 c
15 December (S <sub>4</sub> )	65.00 d	100.33d	35.33 d	80.07d
LSD (0.5)	0.57	2.36	1.74	0.81
CV (%)	3.86	4.25	4.97	6.95
<b>Interaction</b>				
V <sub>1</sub> S <sub>1</sub>	71.00 a	114.00 a	43 a	90.29
V <sub>1</sub> S <sub>2</sub>	68.66 cd	109.00 d	40.33 bc	89.34
V <sub>1</sub> S <sub>3</sub>	66.66 e	104.00 be	37.33 e	85.24
V <sub>1</sub> S <sub>4</sub>	63.00 g	96.00 f	33.00 g	80.33
V <sub>2</sub> S <sub>1</sub>	71.66 a	113.00 a	41.66 b	93.32
V <sub>2</sub> S <sub>2</sub>	70.00 b	111.00 ab	41 b	92.67
V <sub>2</sub> S <sub>3</sub>	69.00 bc	109.00b	40 c	87.19
V <sub>2</sub> S <sub>4</sub>	67.00e	105.00 d	38 dc	81.22
V <sub>3</sub> S <sub>1</sub>	71.33 a	113.66 a	42 ab	90.12
V <sub>3</sub> S <sub>2</sub>	69.33 bc	110.00 b	40.66 c	88.23
V <sub>3</sub> S <sub>3</sub>	67.66 de	107.00 c	39.33 c d	83.44
V <sub>3</sub> S <sub>4</sub>	65.00f	100.00 e f	35 f	78.67
LSD (0.05)	1.00	4.10	2.03	NS
CV (%)	3.86	4.25	4.97	6.95

In a column, figures having similar letter(s) are not significantly different at 5% level of significance at DMRT.

**Plant height:** The plant height is a varietal character and varied significantly among the varieties under investigation. Shatabdi produce the tallest plant (88.60 cm). Sourav was inferior in this respect (85.11 cm). It was evident that plant height increased gradually with the advancement of maturity and delay in planting decreased the plant height. At final harvest higher plant height was observed in 1<sup>st</sup> November sown crop. But at 60 DAS highest plant height was recorded in 15 December sown crop. This is in agreement with that of Chit-Thein (1988). Where he reported that low yield in late planting was subjected to hastening of crop growth development and grain filling duration by the high temperature.

**Number of tillers/plant:** Total number of tillers/plant varies significantly in different varieties. Shatabdi produced the highest tiller/plant (5.74). Sourav and Kanchan produced 5.24 and 5.05 tillers/plant respectively, which were statistically similar. Tillers/plant differed significantly due to planting time (Table 2). The highest number of average tillers/plant (6.77) were produced by 15 November sowing wheat. Second highest number (5.33) of tillers/plant were produced by 30 November which was at par with 1 November (5.29) sown crop. The higher tillers/plant observed in shatabdi (7.33) in 15 November sowing.

**Number of effective tillers/plant:** Varieties showed significant difference for effective tillers/plant (Table 2). Highest effective tiller was observed in Shatabdi (5.16) and lowest in Kanchan (4.09). Sourav produced medium number of effective tillers/plant. Effective tillers/plant showed significant response to planting date. The highest value (5.16) was noticed in 15 November sown crop which was significantly superior to crops of all other sowing dates. This result is in agreement with that of Sarkar *et al.*, (1996). They reported that highest number of effective tiller/plant were produced by crops planted of 15 November. Reduction of effective tillers/plant were observed in 30 November (4.42) and 15 December (2.79) sown crop. Similar result was reported by Randhawa *et al.* (1981), where they reported that the number of effective tillers/plant and 1000 grain weight were reduced by late sowing. The sowing date and variety interaction was also significant in this chapter. Higher effective tillers were produced by Shatabdi (7.00) in 15 November sowing and lowest was observed in Kanchan (2.16) sowing December 15.

**Number of non-effective tillers/plant:** Non-effective tillers/plant differed significantly among the varieties and the excessive non-effective tillers were observed in Kanchan (0.95). Fathei and Mazheri (1990) reported that

non-effective tiller varied remarkable in different varieties. Date of planting had a remarkable effect on number of non-effective tillers/plant. Results showed that with delay in planting after 15 November this character increased and the highest value (1.20) was noticed on 15 December planting. Geleto *et al* (1990) who reported that the late

sowing resulted higher number of non-effective tiller. Non-effective tillers responded significantly due to interaction of planting time and variety. In last planting the highest number of non-effective tillers was observed in Kanchan. Other varieties also produced more non-effective tillers/ plant due to late sowing condition.

**Table 2.** Yield contributing parameters of wheat affected by varieties and sowing dates

Treatment	No. of tiller/plant	No. of effective tiller/plant	No. of non-effective tiller/plant
<b>Variety</b>			
Kanchan (V1)	5.05 b	4.09 c	0.95 a
Shatabdi ( V2)	5.74 a	5.16 c	0.58 a
Sourav ( V3)	5.24 b	4.42 b	0.82 b
LSD (0.05)	0.44	0.22	0.09
CV (%)	4.42	4.36	5.80
<b>Sowing time</b>			
1 <sup>st</sup> November (S <sub>1</sub> )	5.29 b	4.66 b	0.63 c
15 November (S <sub>2</sub> )	6.77 a	6.37 a	0.40 d
30 November (S <sub>3</sub> )	5.33 b	4.42 b	0.90 b
15 December (S <sub>4</sub> )	3.99 c	2.79 c	1.20 a
LSD (0.5)	0.23	0.62	0.09
CV (%)	4.42	4.36	5.80
<b>Interaction</b>			
V <sub>1</sub> S <sub>1</sub>	5.53 c	4.88 cd	0.67 f
V <sub>1</sub> S <sub>2</sub>	6.33 b	5.78 bc	0.55 g
V <sub>1</sub> S <sub>3</sub>	4.66 ef	3.55 efg	1.11 b
V <sub>1</sub> S <sub>4</sub>	3.66 h	2.16 h	1.50 a
V <sub>2</sub> S <sub>1</sub>	5.00 de	4.67 cd	0.33 h
V <sub>2</sub> S <sub>2</sub>	7.33 a	7.00 a	0.33 h
V <sub>2</sub> S <sub>3</sub>	6.33 b	5.66 bc	0.67 f
V <sub>2</sub> S <sub>4</sub>	4.33 fg	3.33 fg	1.00 c
V <sub>3</sub> S <sub>1</sub>	5.33 cd	4.44 def	0.89 e
V <sub>3</sub> S <sub>2</sub>	6.66 b	6.33 ab	0.33 h
V <sub>3</sub> S <sub>3</sub>	5.00 de	4.06 def	0.94 d
V <sub>3</sub> S <sub>4</sub>	4.00 gh	2.88 gh	1.12 b
LSD (0.05)	0.45	1.08	0.01
CV (%)	4.42	4.36	5.80

In a column, figures having similar letter(s) are not significantly different at 5% level of significance at DMRT.

From the above discussion, it could be concluded that Shatabdi performed better on yield and yield components and 15 November sowing seemed to be suitable for better yield. On the other hand, Shatabdi also gave better performance on yield characters under late sowing condition.

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