

SOWING DATES EFFECT ON YIELD AND YIELD COMPONENTS OF DIFFERENT WHEAT VARIETIES

Muhammad Qasim, Maqsood Qamer, Faridullah
and Maraj Alam*

ABSTRACT

Growth and yield response of three wheat (*Triticum aestivum* L.) varieties (Suliman-96, Chakwal-97 and Inqalab-91) to various sowing times was studied at Karakoram Agricultural Research Institute, (Northern Areas) Gilgit, Pakistan during the year 2003-04. Three sowing dates viz. November 15, November 30 and December 15 were tested. Early planted wheat yielded maximum grains per spike (44.14), plant height (79.81 cm), 1000-grain weight (39.17 g) grain yield (4165.7 kg/ha) and straw yield (6814.2 kg/ha). Effect of varieties x sowing dates interaction was highly significant on number of tillers per square meter and grain yield. Maximum tillers were in Inqalab-91 (302.17) while Suliman-96 topped in grain yield (3387.33 kg/ha). Suliman-96 produced higher and statistically similar grain yield (4111.00 – 4243.75 kg/ha) at all sowing dates followed by Chakwal-97 (3750.00 to 3825.00 kg). Inqalab-91 produced the lowest (1955.00 - 2195.00 kg).

KEYWORDS: *Triticum aestivum*; high yielding varieties, sowing; timing; agronomic characters; Pakistan.

INTRODUCTION

Wheat (*Triticum aestivum* L.) is a staple food crop of Pakistan. Wheat flour is a major dietary and its straw is a major cattle fodder in winter months. The wheat occupies a central position in the farming system of Northern Areas of Pakistan. However, farmers grow low yielding local cultivars, which are susceptible to diseases like rusts, smuts and lodging. The yield in such places is about 30 percent lower than national average (2).

Low yield of wheat in Northern Areas may be attributed to poor soil fertility, lack of irrigation water, weeds infestation, use of old agronomic practices and low varietal potential. High yield potential varieties play a pivotal role in increasing per hectare yield under optimum growing season. Although many high yielding wheat varieties have been evolved and recommended for general cultivation in the past but their performance under farmer's field is not

*Karakoram Agricultural Research Institute for Northern Areas, Juglote, Gilgit. **National Agricultural Research Centre, Wheat Programme, Islamabad, Pakistan.

upto the mark as these have lost their adaptability to adaphic and environmental conditions.

Every crop variety has its own definite requirements for particular environmental conditions for optimum growth and grain yield. Delayed sowing of wheat not only affects germination and growth but also affects grain development (7). Razzaq *et al.* (11) suggested mid November planting to be superior to delayed planting in agro-ecological conditions like Northern Areas.

As planting time is a crucial factor for obtaining desirable wheat yield so a need was felt to study growth and yield behaviour of three wheat varieties under late sowing conditions in Northern Areas of Pakistan.

MATERIALS AND METHODS

A field experiment was conducted at Karakoram Agricultural Research Institute for Northern Areas, Gilgit, Pakistan during 2003-04. Three sowing dates (November 15, November 30 and December 15) were tried on three wheat varieties (Chakwal-97, Suliman-96 and Inqalab-91). Experiment was quadruplicated in split plot design with a net plot size of 2 x 5 meter. Sowing dates and varieties were randomized in main and sub plots, respectively.

The area falls in double cropping zone, which comes in irrigated land. Wheat is grown as major rabi crop followed by maize as major kharif crop. Crop was sown using 100 kg seed per hectare. It was fertilized @ 120-80 kg NP per hectare. All P_2O_5 and half of N was applied with first irrigation. Land was prepared by ploughing three times and planting was done in 30 cm apart rows. All agronomic practices were kept normal and uniform.

Data on germination count, number of tillers per unit area, final plant height, grains per spike, 1000-grain weight, grain yield and straw yield were recorded and analysed.

RESULTS AND DISCUSSION

Germination count

Sowing dates significantly affected germination count per unit area (Table 1). Germination was higher (184/m) in November 30 sowing but it did not differ significantly from November 15 sowing (180/m²) (Table 2). The seedling in December 15 sowing was significantly lower (160/m²) than November 15 and

Table 1. Mean square values of different parameters studied

SOV	df	Germination count/m ²	No. of tillers/m ²	Plant height (cm)	No. of grains/spike	1000-grain weight (g)	Grain yield (kg/ha)	Straw yield (kg/ha)
Replications	2	1000.30	141.583	0.62	0.777	1.93	15793.5	1802028.5
Varieties	2	988.87*	635.19NS	0.484	0.631	107.10**	11608.3	993696.5
Sowing dates	2	1998.38**	33202.86	2148.25**	1066.65**	272.55**	14765081.3**	11266275.7**
V x S	4	317.53NS	2653.94**	0.738	0.729	6.52	37742.7**	101088.2
Error	24	258.09	278.13	0.345	0.570	3.92	10374.8	424254.5

Table 2. Mean values of yield and yield components of wheat varieties for three sowing dates.

Sowing dates	Germination count/m ²	No. of tillers/m ²	Plant height (cm)	No of grains/spike	1000-grain weight (g)	Grain yield (kg/ha)	Straw yield (kg/ha)
Nov. 15	180.71a	316.5b	79.81a	44.14a	39.17a	4165.7a	6814.2a
Nov. 30	184.06a	331.25a	78.76b	38.98b	38.75a	3795.4b	6436.3a
Dec. 15	160.22b	235.67c	56.13c	25.93c	30.71b	2080.0c	4979.2c
(LSD)	13.53	14.05	0.49	0.64	1.669	85.8	548.8

November 30 sowings. This may be due to change in temperature in late sowings. Varieties differed significantly from each other. Maximum germination was recorded in Inqalab-91 (185/m²).

Number of tillers per unit area

The data (Table 1, 2 and 3) reveals that sowing dates significantly affected number of tillers per unit area. Interaction between varieties x sowing dates was also significant. Variety Chakwal-97 produced higher number of tillers per unit area (350) when sown on December 15 whereas the lowest number of tillers were observed in Inqalab-91 (225) when sown on December 30 (Table 4).

Table 3. Mean values of yield and yield components of three wheat varieties.

Varieties	Germination count/m ²	No. of tillers/m ²	Plant height (cm)	No. of grains/spike	1000-grain weight (g)	Grain yield (kg/ha)	Straw yield (kg/ha)
Suliman-96	169.88b	288.92a	71.5a	44.142a	33.804b	3387.33a	5789.7c
Chakwal-97	169.63b	290.33a	71.7a	39.975b	35.273b	3317.50a	6057.5b
Inqalab-91	185.48c	302.17a	71.4a	25.933c	39.554a	3338.67a	6373.3a

Table 4. Effect of V x S interaction on number of tillers and grain yield of wheat

Interaction	No of tillers/m ²	Grain yield (kg/ha)
15 November x Suliman-96	282.75c	4115.00a
15 November x Chakwal-97	335.25a	3825.00b
15 November x Inqalab-97	248.75d	2195.00c
30 November x Suliman-95	337.5a	4111.00a
30 November x Chakwal-97	308.5a	3750.00a
30 November x Inqalab-91	225.0c	2091.00cd
15 December x Suliman-96	329.25	4243.75a
15 December x Chakwal-97	350.0a	3811.25b
15 December x Inqalab-91	227.0d	1955.00d

Plant height

The data (Table 2) indicate that sowing date significantly affected plant height. The plant height decreased progressively with each delayed sowing. Crop sown on November 15 produced significantly taller plants (79.81 cm) against crop sown on December 15 (56.13 cm) (Table 2) Hussain (6) under particular agro-ecological conditions of Northern Areas of Pakistan reported similar observations. The earlier sown crop had longer vegetative growth period than late sown crop which resulted in more plant height. In case of varieties, plant height was statistically similar (Table 3).

Number of grains per spike

The data (Table 2) reveals that number of grains per spike also decreased significantly with each delayed sowing. These results were similar to those of Haq and Khan (7) and Shah and Akmal (12). They reported that earlier planted wheat had greater number of grains per spike. Wheat sown on November 15 gave maximum number of grains per spike (44.14) followed by crop sown on November 30 (38.98).

1000-grain weight

Effect of variety and planting date was highly significant (Table 1) on 1000-grain weight. There was non significant difference between Chakwal-97 and Suliman-96 for 1000-grain weight. However, Inqalab-91 excelled in 1000-grain weight (39.55 g) (Table 3). Delayed planting decreased 1000-grain weight. Late planted wheat (December 15) produced minimum 1000-grain weight (30.71) while there was no difference between wheat sown on mid and early dates (Table 3). Spink *et al.* (12) also observed that delayed sowing shortens the duration of each development phase which ultimately reduces grain filling period and lowers the grain weight.

Grain yield

It is evident from the data (Table 1 and 2) that sowing dates significantly affected grain yield. The interaction of varieties x sowing dates was also significant. However there was non-significant difference among varieties for grain yield (Table 3). Higher grain yield (4165.7 kg/ha) was obtained from November 15 sowing followed by crop sown on November 30 (3795.4 kg/ha). December 15 produced minimum (2080 kg/ha) (Table 2).

Straw yield

The data (Table 2 and 3) revealed that straw yield was significantly affected by sowing dates and varieties. Among varieties higher straw yield was produced by Inqalab-91 (6373.3 kg/ha) followed by Chakwal-97 (6057.5 kg/ha). Hussain (6) observed similar response in particular conditions of Northern Area.

CONCLUSION

It can be concluded that grain yield and its components were affected considerably by sowing date. Earlier sowing increased number of tillers per unit area, number of grains per spike and grain weight that resulted in higher grain and straw yields. Therefore, it is recommended that for good grain yield early planting should be adopted in Northern Areas.

REFERENCES

1. Ali, 1974. Comparative yield study of different wheat varieties under irrigated condition. M.Sc. (Hons.) Agriculture Thesis. Deptt. Agron. Univ. Agri., Faisalabad.
2. Anon. 2000. Areas conservation Strategy Background. Paper on Agric. And Food Security. NACS Support Proj. IUCN. Pakistan Program.
3. Anon. 1993. Pakistan Economic Survey, Government of Pakistan, Finance Division, Economics Wing, Islamabad.
4. Aziz, A. and M. A. Gill. 1973. Relationship between planting time and yield components of Mexican wheat. Pak. J. Agri. Sci. 10(1-4):61-63.
5. El-Rahman, K. A. A. E. M. Shalaby, M. A. Khalifa and R. A. Dawood., 1979. Grain filling of local and dwarf cultivars of wheat as affected by sowing dates and nitrogen fertilizer. Res. Bulletin. Faculty Agri. Ain Shams Univ. p.116. [Field Crop Absts; 34(1):14; 1981].
6. Hussain T. 1986. Wheat in High Mountain Valleys of Gilgit. Rural Sci. Res. Prog. Report No. 2. The Agha Khan Rural Support Prog. Gilgit, Pakistan.
7. Haq, N. U. and M. Khan. 2002. Effect of planting date, chlortoluran + MCPA and wheat varieties on weed control and wheat yield. Sarhad J. Agri. 18(2): 443-447.
8. Jshi, N. L. and H. G. Singh. 1983. Performance of wheat varieties under different sowing dates of semi arid land. Indian J. Agron. 28(1):54-58 [Field Crop Absts. 37(12):8436. 1984].

9. Maqsood, Q., Shafiullah and Shah Makeen. 2004. Genetic variability among wheat cultivars and effect of planting dates on grain and straw yield under double cropping zone of Northern Areas of Pakistan. *Sarhad J. Agric.* 20(1): 99-102.
10. Raj, S., D. Singh and U. V. Rao. 1992. Effect of date of sowing and row spacing on the yield of wheat. *Crop Research (Hisar)*. 5(2): 199-206 [Field Crop Absts. 47(6):4051, 1994].
11. Razzaq, A., P. Shah and K. Saeed. 1986. Performance of wheat varieties under different sowing dates of semi arid land. *Indian J. Agron.* 28(1):54-58 [Field Crop Absts., 37(12):8436, 1984].
12. Shah, M. S. S. and M. Akmal. 2002. Effect of different sowing dates on yield and yield components of wheat varieties. *Sarhad J. Agric.* 18:143-149.
13. Spink, J. H., E. J. M. Kirby, D. L. Forest, R. Sylvester-Bradley, R. K. Scott., M. J. Fouke's, R. W. Clare and E. J. Evans. 2000. Agronomic implications of variation in wheat development due to variety, sowing, site and season. *Plant, Variety and Seed*. 13:91-105.