EFFECT OF SOWING DATES ON GROWTH AND YIELD OF WHEAT (*TRITICUM AESTIVUM*)

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ABSTRACT
An experiment was conducted in department of agriculture Chilas, Diamer to explore the effect of sowing dates on growth and yield contributing parameters of wheat in 2009. The experimental design was RCBD with three replication and plot size 5x1.8m. The sowing dates were: SD1 (1-11-2009), SD2 (15-11-2009), SD3 (30-11-2009) and SD4 (01-12-2009). The results revealed that maximum grain yield kg/ha, plant height cm, spike length, number of grain/spike, straw yield kg hectare was recorded by SD1 and 2. It is observed that yield was gradually decreased in delayed sowing.

KEYWORDS: Wheat (*Triticum aestivum*), rainfed, Gilgit, sowing dates, Yield

INTRODUCTION
Wheat (*Triticum aestivum*) is most important staple food of the people of Pakistan. Wheat plays a dominant role in agriculture economy of both irrigated and rain fed areas of Pakistan. It is grown on the area of 9.042 million hectare with production 23.864 million tons and average yield of 2639 kg/ha (anonymous 2010). Wheat production in Pakistan is below as compared to some other wheat growing countries of the world. The total food requirements of population in Gilgit Baltistan is 25 matric tons. The requirement is being locally produced the wheat grain 6.244 matric tons and remaining quantity is being imported through food department Gilgit Baltistan from PASCO, only 25% of total food requirement is being met locally. In Gilgit Baltistan yield of wheat crop is very low as compared to national and international level due to many reasons, which are traditional cultivation, cultural practices, unavailability of improved high yielding varieties, in balance use of fertilizer and pesticides. Among these factors, the sowing time is most important. It has been observed that early sowing give high yield as compared to late sowing due to longer growing season (Munir et al 2002; Tanveer et al 2003). Delay sowing from 20th November onward decreased the wheat grain yield @ 39kg per hectare per day (Singa and Uttam 1994). From an agronomic point of view a key factor which is reflected in high wheat production is the well understanding of early crop establishment factors (Soomro et al 2009).

The aim of present study is to determine the proper sowing time of wheat crop in Diamer District for achievements of high yield of wheat and decrease the dependency of wheat supply from other provinces/areas of the country.

MATERIAL AND METHODS
The present study was carried out in the Department of Agriculture Chilas District Diamer Gilgit Baltistan during the year (2009-10). The experiment was conducted in four different sowing dates on a same wheat variety Chakwal 50 on following sowing dates SD1 1-11-2009, SD2 15-11-2009, SD3 30-11-2009 and SD4 01-12-2009. The experiment was laid out having RCB design with three replications and plot size 5x1.8m row to row distance 30 cm respectively. The data were recorded for number of days taken to maturity, plant height cm, number of tillers per plant, spike length cm, number of grains per spike, grain yield kg per hectare and straw yield kg per hectare. Expect enumerated data of maturity, grain and straw yield kg per hectare, ten plants were taken randomly from each treatment in each replication to record the data. The data were subject to analysis of variance following Steel and Torrie (1980).

RESULTS AND DISCUSSION
Plant Height (cm)
Effect of different sowing dates on plant height is highly significant in statistical analysis (Table-I). The maximum plant height is gained by SD1 (107 cm) and the minimum height was observed on SD4 (67.00). Plant height depends on both genetic and environmental factors (Shahzadat et al 2007), the similar results have been observed by Qamer et al (2004; Ali et al (2007) and Bloch et al (2010) who reported that variable environmental conditions and genetic make up of the genotype used in both studies.
Number of days taken to maturity
Highly significant differences were observed among the different sowing dates (Table-I), the maximum number of days to maturity was taken by SD4 (215.00 days) followed by SD3 (211 days) and minimum number of days have taken SD1 (199.70 days). In early sowing dates the wheat crop completed vegetative phase in suitable temperature for grain filling and mature physiologically but late sowing need more time for completion of vegetative and physiological maturity, thus the crop mature the stress of hot temperature. This result was contradictory to the results reported by Subhan et al (2004 a) and Khalifa et al (1998) who opined that decrease in days to maturity was due to delay of sowing.

Number of tillers per plant
Number of tillers per plant is most important yield contributing character of wheat. Grain and straw yield co related to number of tillers. The analysis data revealed that number of tillers per plant was highly significant among the different sowing dates (Table-I). Maximum number of tillers were recorded on SD1 with 14.77 and minimum tiller recorded on SD48.44. Present result is in accordance with the result of Baloch et al (2010) who reported that 25th October sowing of wheat gave maximum number of tillers than 25th December.

Spike length (cm)
The length of spike plays a vital role in wheat toward the grains per spike and finally the yield (Shazad et al (2007). The analysis data revealed that length of spike among different sowing dates was highly significant (Table-I). Maximum spike length gained on SD1 11.40 cm and minimum length was recorded on SD4, 93cm (Table-2), to Baloch et al (2010) reported similar results. Wareich et al also reported that earlier planting resulted in better spike development due to longer growing period.

Number of grain per spike
Analysis of variance (Table I) showed that the result of number of grain per spike was highly significant among different sowing dates. Maximum numbers of grains per spike observed on SD1 (57.07) and minimum grains were recorded on SD4 (32.63) (Table 2). The findings are in accordance with Inamullah et al (2007).

Grain yield (kg/ha)
Grain yield is a complex parameter it depends on genetic make up as well as cultural practices supplement of nutrients and favorable environments. The data analysis of grain yield kg/ha showed highly significant differences among sowing dates (Table-I). Maximum grain yield was observed on SD1 7617 kg and minimum grain yield was recorded on SD4 4050 kg/ha (Table-2). Baloch et al (2010) and Shahzad et al (2007) recorded similar results.

Straw yield (kg/ha)
The effect of different sowing dates on straw yield was statistically significant among the sowing dates (Table-I). The maximum straw yield was obtained on SD1 (19000kg/ha) and minimum straw yield was recorded on SD4 (11950 kg/ha). Qasim et al (2008) reported that straw yield was affected by different sowing dates.

Conclusion
The effect of 15 days interval of different sowing dates on yield and yield-contributing parameters was studied. Late sowing gradually decreases the yield. It is therefore recommended that cultivation of wheat crop in the experimental area may be completed before 30 November.
### Table-1: Mean square value of different wheat parameters studied

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>Def</th>
<th>Plant Height (cm)</th>
<th>Days taken to maturity</th>
<th>No. of tiller/plant</th>
<th>Spike length (cm)</th>
<th>No. of grain/spike</th>
<th>Grain yield (kg/ha)</th>
<th>Straw yield (kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rep</td>
<td>2</td>
<td>6.000</td>
<td>0.000</td>
<td>0.023</td>
<td>0.753</td>
<td>69.143</td>
<td>271458.3</td>
<td>1541458.3</td>
</tr>
<tr>
<td>Factor</td>
<td>3</td>
<td>2334.917</td>
<td>139.889</td>
<td>20.803</td>
<td>11.558</td>
<td>457.749</td>
<td>7270.763</td>
<td>5196944.4</td>
</tr>
<tr>
<td>Error</td>
<td>6</td>
<td>21.889</td>
<td>0.222</td>
<td>1.473</td>
<td>0.403</td>
<td>11.248</td>
<td>508680.6</td>
<td>1398402.7</td>
</tr>
</tbody>
</table>

### Table-2: Mean values for various parameters on different sowing dates

<table>
<thead>
<tr>
<th>Sowing Dates</th>
<th>Plant Height (cm)</th>
<th>Days taken to maturity</th>
<th>No. of tiller/plant</th>
<th>Spike length (cm)</th>
<th>No. of grain/spike</th>
<th>Grain yield (kg/ha)</th>
<th>Straw yield (kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD-1</td>
<td>107.00 A</td>
<td>199.70 D</td>
<td>14.77 A</td>
<td>11.40 A</td>
<td>57.07 A</td>
<td>7617 A</td>
<td>51000 A</td>
</tr>
<tr>
<td>SD-2</td>
<td>85.00 B</td>
<td>204.300</td>
<td>11.47 B</td>
<td>10.40 A</td>
<td>53.84 A</td>
<td>6283 AB</td>
<td>12580 B</td>
</tr>
<tr>
<td>SD-3</td>
<td>83.33 B</td>
<td>211.0B</td>
<td>11.73 B</td>
<td>8.50 B</td>
<td>35.99 B</td>
<td>4967 BC</td>
<td>13030 AB</td>
</tr>
<tr>
<td>SD-4</td>
<td>67.67 C</td>
<td>215.00A</td>
<td>8.40 C</td>
<td>6.93 C</td>
<td>32.63 B</td>
<td>4050 C</td>
<td>11950 B</td>
</tr>
<tr>
<td>LSD (0.05)</td>
<td>9.345</td>
<td>0.941</td>
<td>2.422</td>
<td>1.271</td>
<td>1.7</td>
<td>14.23</td>
<td>23.63</td>
</tr>
</tbody>
</table>
REFERENCES


