

## Effect of Sowing Dates on Grain Yield of Wheat Crop (*Triticum aestivum* L.) in Dar-ul-Aman Research Farm in Kabul Afghanistan

Sediq Omar, RafiqAtif, Yar Mohammad Hedayat, Fahimullah

Received 4 July 2018; Accepted 8 August 2018; Published on 30 August 2018

**Abstract** A factorial experiment was conducted in Dar-ul-Aman Research Station Farm, Kabul during 2017, to study the effects of planting dates on yield of different wheat varieties. The experiment was laid out in RCBD with three replications. Four sowing dates i.e. October 24<sup>th</sup>, November 2<sup>nd</sup>, 12<sup>th</sup>, and 22<sup>nd</sup> were in main plots, whereas five wheat varieties (Chounth # 1-2010, Moqawim-09, Shisham Bagh-08, Dar-ul-Aman-07, Solh 2002) were in sub plots. November 2<sup>nd</sup> planted wheat had maximum grain yield (3722.9 kg ha<sup>-1</sup>), followed by October 24<sup>th</sup> and November 12<sup>th</sup> which gave (3557.2) and (2802.9 kg ha<sup>-1</sup>) respectively. Wheat planted on November 22<sup>nd</sup> resulted in minimum grain yield (2358.6 kg ha<sup>-1</sup>). Wheat variety, Solh 2002, had significantly higher grain yield (3546.8 kg ha<sup>-1</sup>) in comparison with other varieties. Whereas variety Shisham Bagh-08, had grain yield (3543.2 kg ha<sup>-1</sup>), that was also significantly higher

than other varieties. However, Moqawim-09, had minimum grain yield (2665.2 kg ha<sup>-1</sup>) in comparison with other varieties. While, evaluating performance of different varieties on different sowing dates, Shisham Bagh-08, resulted in maximum yield on November 2<sup>nd</sup>. On the other hand, Chounth # 1-2010 and Solh 2002, had maximum yield on November 2<sup>nd</sup> and lower yield in late planting dates. Results from the study revealed that maximum grain yield could be achieved with sowing wheat varieties on November 2<sup>nd</sup> as compare to other sowing dates and among the selection of other varieties, Solh 2002, and Shisham Bagh-08, produced significantly higher grain yield and any delay in wheat planting or selection of other varieties might reduce wheat yield.

**Keywords** Wheat, crop, Sowing dates, Variety, Grain yield.

### Introduction

Wheat (*Triticum aestivum* L.) is one of the major cereal crops with a unique protein and it is grown around the world in diverse environments. Variation in weather conditions among and within seasons is one of the most important constraints affecting yield potential (Murungu and Madanzi 2010). Proper time of sowing helps cultivars to express its growth patterns to its full extents in various climatic conditions. The demand for Wheat in Afghanistan is growing at

---

Sediq Omar<sup>1\*</sup>, RafiqAtif<sup>2</sup>, Yar Mohammad Hedayat<sup>3</sup> Fahimullah<sup>4</sup>  
 1\*, 2, 3, & 4 MBA (Agribusiness Management) Students,  
 Department of Agricultural Marketing, Cooperation and  
 Business Management, University of Agricultural Sciences,  
 Bengaluru 560065, India  
 e-mail : sediqomar2014@gmail.com  
 \*Corresponding author

an exorbitant rate due to its rapid expansion in population. It occupies premier position among the crops due to its food value. Wheat is grown throughout the Afghanistan in a wide variety of environment, range from the arid desert low lands of Helmand to the temperate high altitude mountains valleys in provinces like Bamyán and Ghor. The crop is typically planted in the autumn and harvested in early summer. Over half of the national wheat crop is totally reliant on rainfall, while approximately 45% of total area has access to irrigation. Afghanistan is an exceptionally arid country, which experiences wide fluctuation in seasonal rainfall and is prone to periodic drought. To meet the food requirement of ever increasing human population, there is need to intensify efforts on judicious use of the available land through integrated application of proper fertilizers, selection of specific variety for sowing with favorable sowing dates to increase the production and productivity.

As Afghanistan is exceptionally arid country, which experiences wide range of seasonal rainfall, and exposure to drought, people are usually growing those wheat varieties, which are less sensitive to water scarcity, and they prefer late planting practices which causes yield reduction. Hence this study was undertaken to determine appropriate combination of sowing dates selection of different varieties of wheat for profitable and maximum production.

## Materials and Methods

A field experiment was conducted at Dar-ul-Aman Research Farm Kabul during the year 2014 to study the comparative performance of planting dates, and different varieties of wheat crop in relation to profitable and maximum yield in Dar-ul-Aman Kabul, Afghanistan. The soil of the experimental site was silt loam in texture, neutral in reaction with pH of 7.3, non-saline in nature, non-calcareous and the soil was poor in organic matter contents.

The field experiment was laid out in RCBD design composed of four treatments replicated thrice viz four main plots and five subplots. Chemical fertilizers were applied i.e. urea at the rate of 250 kg ha<sup>-1</sup> in which pure nitrogen was 115 kg, and DAP at the rate of 200 kg ha<sup>-1</sup>, in which pure (P<sub>2</sub>O<sub>5</sub>) was 92 kg.

Total 10500 g urea and 8400 g DAP fertilizer were consumed in whole experiment, where 875 g urea and 700 g DAP fertilizers were used in each individual plots. Out of 10500 g urea, 3500 g urea at the time of sowing, 3500 g urea at knee height stage, and 3500 g urea at flowering stage was applied and same as the case DAP was applied at the time of sowing. From sowing till harvesting 5 time irrigations and 3 time weeding have been taken place during whole life of this experiment.

The observations on growth, yield and yield attributes were recorded up to harvest. Statistical analysis was made by computer using statistic 8.1, package. The recorded data were statistically analyzed using ANOVA technique and means were compared by LSD test of significance (Assaad et al. 2014).

Sowing dates are as follows : (D<sub>1</sub>) = October 24<sup>th</sup>, 2017, (D<sub>2</sub>)= November 2<sup>nd</sup>, 2017, (D<sub>3</sub>) = November 12<sup>th</sup>, 2017, (D<sub>4</sub>) = November 22<sup>nd</sup>, 2017.

Varieties of wheat used in the study : (V<sub>1</sub>)=Chounth # 1- 2010, (V<sub>2</sub>) = Moqawim - 09, (V<sub>3</sub>) = Shisham Bagh-08, (V<sub>4</sub>) = Dar-ul-Aman -07, (V<sub>5</sub>) = Solh 2002.

## Results and Discussion

Effect of sowing dates and varieties on plant height of wheat

The result obtained on plant height as affected by different sowing dates and selections of different varieties for sowing are presented in Table 1. Both sowing dates and selection of varieties significantly increased the plant height of wheat. Tahir et al. (2009) reported that both the sowing dates and varieties affected the plant height significantly. Maximum plant height (73.76 cm) was obtained when crop was sown on 1<sup>st</sup> December against the minimum plant height (65.12 cm) in case of 30<sup>th</sup> December sowing but it was statistically similar to 15<sup>th</sup> December sowing. Inqlab-91 produced the tallest plants (73.12 cm), whereas the lowest plant height of (64.78 cm) was produced in AS - 2002. However, the interaction between sowing dates and varieties was found to be non-significant. Similarly on average, the maximum plant height of 75.7 cm produced with sowing date of 2<sup>nd</sup> November.

**Table 1.** Effect of sowing dates varieties on plant height of wheat (cm). LSD for sowing date (D) (0.050) = 2.0185, LSD for variety (V) (0.050) = 2.2567, LSD for V\*D (0.050) = 4.5134.

Varieties (V)	Dates (D)				Mean
	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	
V <sub>1</sub>	73.3 bcd	75.0 abc	70.0 def	73.3 bcd	72.9 ab
V <sub>2</sub>	68.3 ef	75.0 abc	70.0 def	66.7 f	70.0 c
V <sub>3</sub>	76.7 ab	75.0 abc	75.0 abc	66.7 f	73.3 ab
V <sub>4</sub>	75.0 abc	75.0 abc	75.0 abc	60.0 g	71.3 bc
V <sub>5</sub>	75.0 abc	78.3a	75.0 abc	71.7 cde	75.0 a
Mean	73.7 ab	75.7 a	73.0 b	67.7 c	

The plant height 73.7 cm produced with sowing wheat in October 24<sup>th</sup> was significantly greater than that produced (73 cm and 67.7 cm) with sowing in November 12<sup>th</sup> and November 22<sup>nd</sup> respectively but was significantly lower than that produced with sowing date of 2<sup>nd</sup> November. Similarly the average maximum plant height of 75 cm was obtained with the selection of variety 5<sup>th</sup> (Solh 2002) for sowing and this was statistically greater than those obtained with selection of other four varieties for sowing i.e. Chounth # 1-2010, Moqawim-09, Shisham Bagh-08, Dar-ul-Aman-07, which produced 72.9 cm, 70 cm, 73.3 cm, and 71.3 cm, respectively.

The interactive effect of different sowing dates and selection of varieties on plant height of wheat was also significant. The higher plant height of 78.3 cm was obtained with both sowing date of 2<sup>nd</sup> November and selection of (Solh 2002) variety for sowing. The lowest plant height of 60 cm, was obtained with sowing date of 24<sup>th</sup> November and selection of (Dar-ul-Aman-07) variety for sowing (Table 1).

Effect of sowing dates and varieties on 1000 grain weight of wheat

The result obtained on 1000-grain weight as affected by different sowing dates and selection of different varieties for sowing are presented in Table 2. Both sowing dates and selection of varieties significantly increased the 1000-grain weight of wheat. On average, the maximum 1000-grain weight of 41.3g produced with sowing date of 2<sup>nd</sup> November. The 1000-grain weight (39.7 g) produced with sowing wheat in October 24<sup>th</sup> was significantly greater than

**Table 2.** Effect of sowing dates and varieties on 1000 grain weight of wheat (g). LSD for sowing date (D) (0.050) = 1.6709, LSD for variety (V) (0.050) = 1.8682, LSD for V\*D (0.050) = 3.7363.

Varieties (V)	Dates (D)				Mean
	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	
V <sub>1</sub>	41.7 ab	43.3 a	30.0 d	30.0 d	36.3 ab
V <sub>2</sub>	40.0 abc	36.7 c	30.0 d	30.0d	34.2 c
V <sub>3</sub>	40.0 abc	40.0 abc	38.3 bc	30.0d	37.1 ab
V <sub>4</sub>	36.7 c	43.3 a	31.7 d	30.0 d	35.4 bc
V <sub>5</sub>	40.0 abc	43.3 a	30.0 d	36.7 c	37.5 a
Mean	39.7 a	41.3 a	32.0 b	31.3 b	

that produced (32 g and 31.3 g) with sowing on November 12<sup>th</sup> and November 22<sup>nd</sup> respectively, but was significantly lower than that produced with sowing date of 2<sup>nd</sup> November. Similarly Said et al. (2012) described the response of wheat to different planting dates and seeding rates for yield and yield components at the end of their description differences were found among the planting dates for number of grains / spike, 1000 grain weight, biological yield and grain yield. Maximum number of grains (53.99) / spike, 1000 grain weight (40.2g). Similarly the average maximum 1000-grain weight of 37.5 g was obtained with the selection of variety 5<sup>th</sup> (Solh 2002) for sowing and this was statistically greater than those obtained with selection of other four varieties for sowing i.e. Chounth # 1-2010, Moqawim-09, Shisham Bagh-08, Dar-ul-Aman -07, which produced 36.3g, 34.2 g, 37.1g, 35.4g respectively.

The interactive effect of different sowing dates and selection of varieties on 1000-grain weight of wheat was also significant. The greatest 1000-grain weight of 43.3 g was obtained with both sowing date of 2<sup>nd</sup> November and selection of (Chounth-#1-2010), (Dar-ul Aman-07) and (Solh 2002) variety for sowing. The lowest 1000-grain weight of 30 g was obtained with sowing date of 24<sup>th</sup> November and selection of all varieties except (Solh 2002) for sowing (Table 2).

Effect of sowing dates and varieties on grain yield of wheat

The results obtained for grain yield as affected by different sowing dates and varieties are presented in Table 3, both sowing dates and selection of varieties

**Table 3.** Effect of sowing dates and varieties on grain yield of wheat (kg ha<sup>-1</sup>). LSD for sowing date (D) (0.050) = 320.83, LSD for variety (V) (0.050) = 358.70, LSD for V\*D (0.050) = 717.41.

Varieties (V)	Dates (D)				Mean
	D <sub>1</sub>	Grain yield (kg/ha)			
		D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	
V <sub>1</sub>	2978.6 def	4136.9 ab	2790.5 def	1697.6 h	2900.9 b
V <sub>2</sub>	3217.9 cd	3502.4 abcd	2047.6 fgh	1892.9 gh	2665.2 b
V <sub>3</sub>	4142.9 ab	4178.6 a	3386.9 cd	2464.3 efg	3543.2 a
V <sub>4</sub>	3738.1 abc	3083.3 cde	2452.4 efg	2309.5 fgh	2895.8 b
V <sub>5</sub>	3708.3 abc	3713.3 abc	3336.9 cd	3428.6 bcd	3546.8 a
Mean	3557.2 a	3722.9 a	2802.9 b	2358.6 c	

significantly increased the grain yield of wheat. On average, the maximum grain yield of 3722.9 kg ha<sup>-1</sup> was obtained with sowing date of 2<sup>nd</sup> November. The yield (3557.2 kg ha<sup>-1</sup>) produced with sowing wheat in October 24<sup>th</sup> was significantly greater than that produced (2802.9 kg ha<sup>-1</sup> and 2358.6 kg ha<sup>-1</sup>) with sowing in November 12<sup>th</sup> and November 22<sup>nd</sup> respectively but was significantly lower than that produced with sowing date of 2<sup>nd</sup> November. Similarly carried out an experiment on the effect of two sowing dates of wheat. They concluded that the crop sown in October produce more productive tillers as compare to the crop sown in December. Similarly the average maximum grain yield of 3546.8 kg ha<sup>-1</sup> was obtained with the selection of variety 5<sup>th</sup> (Solh 2002) for sowing and this was statistically at par with that obtained with the sowing of variety 3<sup>rd</sup> (Shisham Bagh-08) but was statistically greater than those obtained with selection of other varieties for sowing i.e. Chounth# 1-2010, Moqawim-09, Dar-ul-Aman-07 which produced 2900.9 kg ha<sup>-1</sup>, 2665.2 kg ha<sup>-1</sup>, 3543 kg ha<sup>-1</sup> respectively.

The interactive effect of different sowing dates and selection of varieties on grain yield of wheat was also significant. The greatest grain yield of 4142.9 kg ha<sup>-1</sup> was obtained with both sowing date of 2<sup>nd</sup> November and selection of (Solh 2002) variety for sowing. The lowest grain yield of 1697.6 kg ha<sup>-1</sup> was obtained with sowing date of 24 November and selection of (Chounth # 1-2010) variety for sowing.

Similarly Qasim et al. (2008) described the effects of sowing dates on yield and yield components of different wheat varieties in which three varieties were involved (Suliman-96, Chakwal-97 and Inqalab-91). The varieties and 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<sup>-1</sup>) Suliman-96, produced higher and statistically similar grain yield (4111-4243.75 kg ha<sup>-1</sup>) at all sowing dates followed by Chakwal-97 (3750-3525 kg ha<sup>-1</sup>). Inqalab-91 produced the lowest (1955-2195 kg ha<sup>-1</sup>) ( Table 3).

## Conclusion

In light of the results obtained from the present investigation, it was concluded that maximum growth, yield and yield components among all the varieties were obtained with planting date of 2<sup>nd</sup> November for Solh 2002 variety. Because of better tillering, plant growth, number of grain unit / area and grain weight, this planting dates and variety may be recommended to be used by the farmers carrying out their farm activities in the same climatic conditions of Dar-ul-Aman Research Station.

## References

- Assaad IH, Zhou L, Carroll JR, Wu G (2014) Rapid publication ready MS-Word tables for one-way ANOVA. Springer Plus 3 : 474.
- Murungu FS, Madanzi T (2010) Seed priming genotype and sowing date effect on emergency, growth and yield of wheat in a tropical low altitude area of Zimbabwe. Afr. J Agric Res 5 (17) : 2341—2349.
- Qasim M, Qamer M, Faridullah, Alam M (2008) The effect of sowing dates on yield and yield components of different wheat varieties. J Agric Res 46 (2) : 135—140.
- Said A, Gul H, Saeed B, Haleema B, Lal Badshah N, Parveen L, (2012) response of wheat to different planting dates and seeding rates for yield and yield components. ARPN J Agric Biol Sci 7 (2) : 138—140.
- Tahir M, Ali A, Nadeem AM, Hussain A, Khalid F (2009) Effect of different sowing dates on growth and yield of wheat (*Triticum aestivum* L.) varieties in district Jhang, Pakistan. J Life and Social Sci 7 (1) : 66—69.