European Journal of Experimental Biology
ISSN: 2248-9215

Open Access Research Article

Effect of Different Sowing Dates on Growth and Yield of Spring Wheat (*Triticum aestivum* L.) Varieties in Baghlan Province, Afghanistan

Habibi A[1*], Omran AH[1], Jahish F[2], Alemyar SA[2]

[1]*Department of* Agro-biotechnology, *Russian State Agricultural University, Moscow, Russia*

[2]*Department of Agronomy, Baghlan University, Baghlan, Afghanistan*

ABSTRACT

In a field experiment at Baghlan university, Afghanistan conducted during winter 2021 the effect of three sowing dates February 22, March 8 and 23 March on three wheat cultivars Chont#1, Kabul-013 and Muqawim 09 was studied. Sowing dates and varieties both significantly affected the number of fertile tillers m^{-2}, plant height, and number of spikelets per spike, 1000 grains weight and grain yield. In case of sowing dates significantly maximum grain yield (4289.54 kg ha^{-1}) was obtained when crop was sown on 22nd February against the minimum grain yield (2109.50 kg ha^{-1}) in case of late sowing *i.e.* 23rd March. Among of varieties Chont#1 gave significantly maximum yield (3550.44 kg ha^{-1}) while minimum yield (2932.59 kg ha^{-1}) was obtained by Muqawim 09.

Keywords: Sowing dates; Spring; *Triticum aestivum* L; Wheat growth; Spikelets

INTRODUCTION

Wheat (*Triticum aestivum* L.) is one of the major food grain crops of the world including Afghanistan. Afghanistan produced about 4.26 million tons of wheat form an estimated area of 2.55 million hectares. Among various factors responsible for low yield of wheat crop in the country, sowing time and varietal selection are of primary importance. Wheat is sown in winter and it has its own definite requirements for temperature and light for emergence, growth and flowering. For winter wheat, too early sowing produces weak plants with poor root system as the temperature is above optimum. Temperature above optimum leads to irregular germination and the embryo frequently dies and the endosperm may undergo decomposition due to activities of bacteria or fungi. Late planting results in poor tillering and crop grow generally slow because of low temperature. In late planting the wheat variety should be short duration that may escape from high temperature at the grain filling stage reported that delay sowing suppressed the yield, caused by reduction in the yield contributing traits like number of tillers, number of grains per spike and grain yield. Rajput and Verma, observed that normal sowing gave higher grain yield than late sowing. Early sowing always produces higher yield than late sowing. Each day delay in sowing from 20th November decreases grain yield @ 39 kg ha^{-1} per day. According to Shafiq early sowing enhanced germination per unit area, plant height, spikelets per spike, grains per spike and 1000 grains weight over late sowing. Many high yielding varieties have been evolved and recommended for general cultivation in the past. These varieties are losing their yield potential due to changes in various edaphic and environmental conditions. Therefore, continuous selection of high yielding genotypes with mid-range of adaptability to edaphic

Received:	22-December-2022	**Manuscript No:**	EJEBAU-22-15312
Editor assigned:	26-December-2023	**PreQC No:**	EJEBAU-22-15312 (PQ)
Reviewed:	09-Janauary-2023	**QC No:**	EJEBAU-22-15312
Revised:	22-February-2023	**Manuscript No:**	EJEBAU-22-15312 (R)
Published:	01-March-2023	**DOI:**	10.36648/2248-9215.13.2.12

Corresponding author: Habibi A, Department of Agro-biotechnology, Russian State Agricultural University, Moscow, Russia; E-mail: ainullah.habibibi@gmail.com

Citation: Habibi A, Omran AH, Jahish F, Alemyar SA (2023) Effect of Different Sowing Dates on Growth and Yield of Spring Wheat (*Triticum aestivum* L.) Varieties in Baghlan Province, Afghanistan. Eur Exp Bio. 13:12.

and environmental conditions is very essential to increase yield per hectare. In Baghlan province, November 16 to October 30 is the recommended date of sowing for winter wheat. Keeping this in view, the present study was therefore, designed to determine the effect of different sowing dates on growth and yield of spring wheat (*Triticum aestivum* L.) varieties in Baghlan province [1-5].

Objective

To study the effect of different dates of sowing on growth and yield of three varieties of spring wheat.

MATERIALS AND METHODS

The field experiment was conducted during winter season of 2021 on sandy loam soil with pH of 7.8 and organic matter 0.8% at research farm of agricultural faculty of Baghlan university in Afghanistan, to study effect of sowing dates on growth, yield attributes and yield of three wheat varieties. The experiment was laid out in split plot design *viz.* three dates of sowing comprised of (22^{nd} Feb, 08^{th} March, 23^{rd} and March 2020) as main plot treatments and three varieties (Chont#1, Kabul-013 and Muqawim 09) as sub plot treatments with three replications. All operations were performed as per crop recommendation. The row spacing was maintained 20 cm. The data on growth, yield attributes and yield of all varieties were recorded from different treatments [6-10].

RESULTS

The yield of crop is always determined by its stand density that is function of its initial germination. The sowing dates significantly affected germination count per unit area. Germination was higher (190.77 m^{-2}) in February 22 sowing which differed significantly from March 8 and 23 sowing. The seedling in March 23 sowing was significantly lower (147.44 m^{-2}) than sowing date February 22 and March 8. The varieties did not show significant difference for germination count. The interaction between sowing dates and varieties was also non-significant. The sowing dates significantly affected the tillering. The crop sown on 22^{nd} February produced significantly more number of fertile tillers m^{-2} (327.66) while significantly minimum number of fertile tillers m^{-2} (189.55) was obtained when crop was sown on March 23. In case of varieties Chont 1 produced significantly maximum number of fertile tillers. The minimum number of fertile tillers was produced by Kabul-013 but it was statistically similar to Muqawim 09. Interaction between sowing dates and varieties was found to be non-significant. The data on plant height revealed that both the sowing dates and varieties affected the plant height significantly. Significantly maximum plant height (76.00 cm) was obtained when crop was shown on 22^{nd} February against the minimum plant height (63.33 cm) in case of 23^{rd} March sowing but it was statistically similar to 8^{th} March sowing. Chont#1 produced the tallest plants (76.00 cm), whereas the lowest plant height of (63.33 cm) was produced in Muqawim 09. However, the interaction between sowing dates and varieties was found to be non-significant. Number of grains per spike is an important yield contributing parameter and has a direct effect on the final grain yield of wheat. Data regarding number of grains per spike revealed that sowing dates did not affect number of grains per spike significantly. Among varieties, Chont#1 produced significantly more number of grains per spike (44.3) followed by Kabul-013 and Muqawim 09. The interaction between varieties and sowing dates showed non-significant results. The data regarding 1000 grains weight indicated that 1000 grains weight was significantly affected by sowing times. The crop sown on 22^{nd} February produced significantly heavier grains (35.13 g) than that of the crop sown on 8^{th} March (33.8 g) and 23^{rd} March (31.88 g). The grain weight decreased significantly with each day delay in sowing. Among the varieties, Chont#1 produced maximum 1000 grains weight (34.05 g) which is statistically at par with Kabul-013 (33.64 g). The minimum 1000 grains weight (33.12) was produced by Muqawim 09. The interaction between varieties and sowing dates was found to be significant. Chont#1 produced the heaviest 1000 grains weight (36.22 g) when it was sown on 22^{nd} February (S_1V_1). However, minimum 1000 grains weight (32.17 g) was produced by Muqawim 09 when it was sown on 23^{rd} March (S_3V_3) which was statistically at par with Chont#1 (32.51) when it was sown on 23^{rd} December (S_3V_1) [11-17].

Grain yield of wheat crop is the result of combined effect of various yield contributing components. It is evident from the data that sowing date affected significantly the grain yield. Significantly maximum grain yield (3330.54 kg ha^{-1}) was obtained when crop was sown on 22^{nd} February with minimum grain yield (1420.50 kg ha^{-1}) in case of late sowing *i.e.* 23^{rd} March. The grain yield was significantly affected by various varieties. The variety Chont#1 produced significantly maximum yield (3550.44 kg ha^{-1}) followed by Kabul-013 and Muqawim 09. However the interaction between sowing time and varieties was found to be non-significant (**Table 1**).

Table 1: Effect of sowing date on growth and yield of wheat varieties.

Treatment	Germination count (m^{-2})	No. of fertile tillers (m^{-2})	Plant height (cm)	No. of grains per spike	Grain yield ($kgha^{-1}$)	Stover yield (Kg ha^{-1})
Sowing dates						
S_1=22^{nd} Feb	190.77	327.66	76.76	38.35	4289.54	6515.53
S_2=8^{th} March	173.33	269.55	68.54	37.08	3316.97	5469.58

S_3= 23rd March	147.44	184.55	65.12	34.48	2109.50	4056.06
LSD	10.78	5.61	3.485	NS	169.34	310.36
Varieties						
V_1=Chont#1	174	266.33	73.12	36.51	3550.44	5807.21
V_2=Kabul-013	166.11	255.11	64.78	35.53	2932.59	4884.79
V_3=Muqawim 09	171.44	260.33	69.52	37.88	3232.98	5349.18
LSD	NS	5.394	2.6	1.352	122.56	196.11

The straw yield is reflected by growth parameters like total number of tillers, leaf area and plant height. The data indicated that planting time significantly affected the straw yield. Significantly higher straw yield (6515.53 kg ha^{-1}) was produced when crop was sown on 22nd February which was statistically at par with 8th March sowing against the minimum straw yield (4056.06 kg ha^{-1}) in case of 23rd March sowing. The straw yield was also significantly affected by various varieties. Chont#1 produced maximum straw yield (5807.21 kg ha^{-1}) against the variety Muqawim 09 which produced significantly minimum straw yield (4884.79 kg ha^{-1}). However the interaction between sowing time and varieties was found to be non-significant (**Table 2**).

Table 2: Effect of sowing date on 1000 grains weight of wheat varieties.

Treatments	S_1	S_2	S_3	Means
V_1	36.22	33.41	32.51	34.05
V_2	34.70	33.71	33.71	33.12
V_3	34.48	34.29	32.17	33.64
Means	35.13	33.80		

DISCUSSION

Decrease in germination count m^{-2} in case of late sowing is the result of temperature fluctuation. As the sowing delayed, the temperature falls this cannot fulfill the temperature requirement for seed germination. These results are in line with those of Razzaq, et al., they reported that late sowing results in less germination count m^{-2}. Differences in germination count m^{-2} among varieties might be attributed to their genetic diversity. These results are in accordance with those of Aslam, et al.

Less number of tillers in late sowing was the result of less germination count per unit area which occurs due to low temperature. In case of delayed sowing the temperature was not according to the tillering requirement which results in less number of tillers m^{-2}. Differences in number of tillers m^{-2} among varieties might be attributed to their genetic diversity. These results are in accordance with those of Aslam, Khaliq and shah, et al. Decrease in plant height in late sowing was due to shorter growing period. Early sown crop may have enjoyed the better environmental conditions especially the temperature and solar radiation which resulted to tallest plants. These results are in line with those reported by Shahzad, et al. Differences in plant height among varieties might be attributed to their genetic diversity. These results are similar to those of Ahmad. Less number of grains per spike in late sowing was due to less production of photosynthetic due to shorter growing period. These results are in line with those of Shahzad, et al. Differences in number of grains per spike among varieties might be attributed to their genetic variability. These results are in line with those reported by Haider.

The early sowing resulted in better development of the grains due to longer growing period. These findings are strongly supported by those of Spink and Shahzad, et al. who had also reported decreased 1000 grains weight with delay in sowing. Differences in 1000 grains weight among varieties might be attributed to their genetic diversity. These results are in line with those of Shahzad, et al.

Lower grain yield in late sowing was mainly due to lower germination count m^{-2}, less number of tillers m^{-2}, less number of grains per spike and lower 1000 grains weight. These results are in accordance with those of Spink and Aslam, et al. They also reported that late sowing results in less grain yield per hectare. Higher grain yield in Chont#1 was mainly due to higher number of tillers and higher 1000 grains weight. These results are similar to Shahzad, et al.

Higher straw yield in early sowing was mainly due to higher germination count m^{-2}, more number of tillers m^{-2} and more plant height. These results are in line with those of Donaldson, et al. They reported that early sowing resulted in higher straw yield due to more number of tillers. Higher straw

yield in Chont#1 can be attributed to more number of tillers m^{-2} and more plant height. These results are in line with those of Matuz and Aziz.

CONCLUSION

The optimum date of sowing for spring wheat varieties of Chont#1, Kabul-013 and Muqawim 09 found to be 22nd February 2021. Among the varieties Chont#1 had higher yield.

REFERENCES

1. Ansarym AH, Khushak AM, Sethar MA, Ariam NA, Emon MYM (1989) Effect of different sowing dates on growth and yield of wheat (*Triticum aestivum* L.) varieties in district Jhang, akistan. Pak J Sci Ind Res. 7(1):66-69.
2. Aslam M, Hussain M, Akhtar M, Cheema MS, Ali L (2013) Response of wheat varieties to sowing dates. Pak J Agron. 2(4):190-194.
3. Donaldson E, Schillinger WF, Dofing SM (2011) Straw production and grain yield relationship in winter wheat. Crop Sci. 41(1):100-106.
4. Habibi A, Fazily T (2020) Effect of sowing dates on growth, yield attributes and yield of four wheat varieties. EPRA Int J Res Dev. 5(1):1-5.
5. Matuz J, Aziz JS (1990) The effect of sowing season on Iraqi and Hungarian wheat varieties. Cereal Res Commun. 18(2):41-43.
6. Phadnawis BN, Saini AD (1992) Yield models in wheat based on sowing time and phenological developments. Ann Pl Physio. 6(1):52-59.
7. Rajput RL, Verma R (1994) Effect of sowing dates on the yield of different varieties of wheat in Chambal command area of Madhya Pradesh Bharyiya Krishi Anusandhan Patrika. Ind J Agron. 9(4): 165-169.
8. Razzaq A, Shah P, Sartaj KB, Saeed K, Mohammad D (1986) Effect of planting times on the growth and straw yield of wheat varieties. Sarhad J Agric. 2(2):327-334.
9. Shah WA, Bakht J, Ullah T, Khan AW, Zubair M, et al. (2016) Effect of sowing dates on yield and yield components of different wheat varieties. J Agron. 5(1): 106-110.
10. Shahzad K, Bakht J, Shah WA, Shafi M, Jabeen N (2012) Yield and yield components of various wheat cultivars as affected by different sowing dates. Asian J Pl Sci. 1(5): 522-525.
11. Singh VPN, Uttam SK (1999) Influence of sowing dates on yield of wheat cultivars under saline sodic conditions in Central Uttar Pradesh. Ind Agric. 38(1):64-68.
12. Spink JH, Semere T, Sparkes DL, Whaley JM, Foulkers MJ, et al. (2010) Effect of sowing date on plant density of winter wheat. Ann App Biol. 137(2):179-188.
13. Steel RGD, Torrie JH, Dicky DA (1997) Principles and procedures of statistics. A biometric approach, 3rd ed. McGraw Hill Book International Co. publishers, New York, USA:400-428.
14. Malik AU, Ahmad M, Hussain I (2009) Effect of seed rates sown on different dates on wheat under agro-ecological conditions of Dera Ghazi Khan. J Anim Plant Sci. 19(3): 126-129.
15. Uddin R, Islam MS, Ullah MJ, Hore PK, Paul SK (2015) Grain growth and yield of wheat as influenced by variety and sowing date. Bangladesh agron J. 18(2):97-104.
16. Tomar SPS, Tomar S, Srivastava SC (2014) Yield and yield component response of wheat (*Triticum aestivum* L.) genotypes to different sowing dates in gird region of Madhya Pradesh. Int J Agric Sci. 4(2):1-6.
17. Hossain A, Sarker MAZ, Hakim MA, Lozovskaya MV, Zvolinsky VP (2011) Effect of temperature on yield and some agronomic characters of spring wheat (*Triticum aestivum* L.) genotypes. Int J Agric Res Innov. 1(2):44-54.