# Performance of wheat varieties under different dates of sowing under irrigated condition of Baghlan province, Afghanistan

TAMIM FAZILY[#1]AND AINULLAH HABIBI[*2]

Department of Agronomy, Agriculture Faculty of Baghlan University,
Poz-E-Ishan, Pulikumri-3601Afghanistan.

Abstract: A field experiment was conducted during winter season of 2015-16 on sandy loam soils of Poz-e-Ishan Research Farm of Agricultural Faculty of Baghlan University, to find out the performance of wheat varieties under different dates of sowing under irrigated condition of Baghlan province. The experiment was comprised of four sowing times (25th November, 11th December, 26th December and 11th January 2016) as main plot treatments and four varieties (Milad 013, Bakhtar 013, Chonta 01, Kabul 013) as sub plot treatments. Experiment was laid out in split plot design with four replications. Based on research investigation, it was found that all varieties sown in 25th November-15 had higher but identical plant height, number of effective tillers, number of days taken to heading and physiological maturity, higher test weight and grain yield of wheat all varieties sown on 11 December-15, but was significantly higher over rest of dates of sowing. Among the varieties Chonta 01, produced higher but identical test weight with Kabul 013 but significantly higher test weight over rest of the varieties.

Keywords — *Date of sowing, wheat varieties, growth and yield.*

## I. INTRODUCTION

Wheat is the staple crop, accounting for about 83% of total cereal consumption in Afghanistan (Mail, 2010). A large part of the Afghan wheat crop is grown in the Northern provinces with the majority of the crop being dependent on seasonal precipitation. The 5-year average wheat grain yield production is 4.81 million tons. Harvested area is estimated at 2.55 million hectares (Geerts and Raes 2009, FAO 2019). Timely sowing of wheat provides optimum growing period for the crop growth which can accumulate more biomass and finally results in higher grain and biological yield. In case of late sowing, the wheat crop is exposed to low temperature at the time of germination and seedling emergence while exposure to high temperature at the reproductive stage leads to force maturity and resulted in reduction of the grain yield and biological yield (Gupta et al., 2017). The crops which are sown too early produce weak plants with poor root system. Increase in temperature reduces the phonological stages of wheat crop and result in short life cycle of wheat crop (Nahar et al., 2010). Under late sown condition high temperature and hot winds during grain filling period resulted in shrivelled grains which ultimately reduced grain yield of the crop (Shirpurkar et al., 2008). Selecting of best sowing time, congenial environmental conditions and suitable cultivars, resulted in increase in wheat grain yield up to 80% (Coventry et al., 2011). Therefore by keeping the above facts in consideration, this investigation was taken during winter season of 2015-16 to find out the performance of wheat varieties under different dates of sowing under irrigated condition of Baghlan province, Afghanistan.

## I. MATERIAL AND METHOD

The field experiment was conducted during winter season of 2015-16 on sandy loam soil with pH of 6.5 and organic matter 0.8% at Poz-e-Ishan Research Farm of Agricultural Faculty of Baghlan University, to study the performance of wheat varieties under different dates of sowing under irrigated condition of Baghlan province, Afghanistan. The experiment was comprised of four sowing times (25th November, 11th December, 26th December and 11th January 2016) as main plot treatments and four varieties (Milad 013, Bakhtar 013, Chonta 01, Kabul 013) as sub plot treatments. Experiment was laid out in split plot design with four replications. All operations were performed as per recommendation for the crop. The row spacing was 20 cm ×10 cm. The data on various growths, growth phenology and yield attributes of the all varieties were recorded from different treatments.

## II. RESULT AND DISCUSSION

### A. Effect on growth

Wheat crop needs optimum conditions during its growth and development to attain good yield. The plant height of wheat of increased irrespective to wheat varieties; the plant height of wheat (Table-1) increased on 25-Nov-15 which was identical with all varieties sown on 11-Dec-15, but significantly higher over rest of date of sowing. Tallest plants with 25th Nov-15 sowing time might be attributed to the suitable temperatures beside other environmental conditions, which positively influenced nutrient absorption capacity and conversion of radiant energy to chemical energy in presence of chlorophyll and resulted to better growth and early development of the crop. Similar findings were reported by Nainwal and Singh (2000). Sharma reported that earlier sowing is more favorable for producing tallest plants in comparison with other later sowing dates.

**Table 1:** Effect of wheat date of sowing and varieties on plant height (cm) at harvest

| Date of sowing | Varieties | | | | |
|---|---|---|---|---|---|
| | Milad 013 | Bakhtar 013 | Chonta 01 | Kabul 013 | Mean |
| 25-Nov-15 | 92.84 | 90.69 | 95.10 | 95.06 | 93.42 |
| 11-Dec-15 | 90.56 | 89.55 | 93.59 | 92.04 | 91.43 |
| 26-Dec-15 | 88.55 | 86.06 | 90.06 | 90.22 | 88.72 |
| 11-Jan-16 | 86.28 | 85.87 | 88.81 | 87.72 | 87.17 |
| **Mean B** | 89.56 | 88.04 | 91.89 | 91.26 | |

| Factors | CD at 5% | SEm ± |
|---|---|---|
| Date of sowing | 3.85 | 1.19 |
| Varieties | N/A | 1.27 |
| Varieties at same level of date if sowing | N/A | 2.38 |
| Date of sowing at same level of varieties | N/A | 2.49 |

**Table 2:** Effect of wheat date of sowing and varieties number of days taken to heading

| Date of sowing | Varieties | | | | |
|---|---|---|---|---|---|
| | Milad 013 | Bakhtar 013 | Chonta 01 | Kabul 013 | Mean |
| 25-Nov-15 | 102.25 | 101.25 | 104.00 | 103.50 | 102.75 |
| 11-Dec-15 | 100.75 | 100.25 | 102.25 | 101.50 | 101.19 |
| 26-Dec-15 | 98.25 | 97.50 | 100.00 | 99.50 | 98.81 |
| 11-Jan-16 | 95.50 | 94.75 | 98.25 | 97.25 | 96.44 |
| **Mean B** | 99.19 | 98.44 | 101.13 | 100.44 | |

| Factors | CD at 5% | SEm ± |
|---|---|---|
| Date of sowing | 3.61 | 1.11 |
| Varieties | N/A | 1.05 |
| Varieties at same level of date if sowing | N/A | 2.23 |
| Date of sowing at same level of varieties | N/A | 2.14 |

**Table 3:** Effect of wheat date of sowing and varieties number of days taken to physiological maturity

| Date of sowing | Varieties | | | | |
|---|---|---|---|---|---|
| | Milad 013 | Bakhtar 013 | Chonta 01 | Kabul 013 | Mean |
| 25-Nov-15 | 144.50 | 145.25 | 146.25 | 146.00 | 145.50 |
| 11-Dec-15 | 138.25 | 138.75 | 141.00 | 140.75 | 139.69 |
| 26-Dec-15 | 136.00 | 135.00 | 138.00 | 137.50 | 136.63 |
| 11-Jan-16 | 132.50 | 131.25 | 135.00 | 134.25 | 133.25 |
| **Mean B** | 137.81 | 137.56 | 140.06 | 139.63 | |

| Factors | CD at 5% | SEm ± |
|---|---|---|
| Date of sowing | 7.69 | 2.37 |
| Varieties | N/A | 1.30 |
| Varieties at same level of date if sowing | N/A | 4.74 |
| Date of sowing at same level of varieties | N/A | 3.27 |

B. ***Effect on yield***

The environment under which crop is grown creates a tremendous impact on the growth, development and yielding ability of wheat crop. Among the varieties Chonta 01 produced highest number of effective tiller per plant which was identical with Kabul 013 and Bakhter 013, but significantly higher over Milad 013 varieties. All the varieties which were sown on 25-Nov-15 produced more number of effective tillers per plant which was statistically at par with same varieties sown on 11-Dec-15, but significantly higher over rest of dates of sowing (Table-4). Higher number of tillers with 25$^{th}$ November sowing might be due to existence of better environmental condition *i.e.* optimum temperature and solar radiation which influenced directly nutrient absorption of the crop which ultimately resulted in more green photosynthetic area (source) responsible for carbohydrate formation and finally increased tillering capacity of the crop. Similar findings was reported by Sufyan *et al*. (2013) and Bachhao *et al.* (2018).

The highest test weight of wheat recorded from Chonta 01, where it was identical with Kabul 013 but significantly higher over rest of the varieties at all dates of sowing. The date of sowing had significant effect on test weight of wheat. All the varieties which were sown on 25-Nov-15 had higher but identical test weight with same varieties sown on 11-Dec-15, but significantly higher test weight over same varieties sown in rest of dates. This result corroborate the findings of Sufyan *et al.* (2013), who found that the early sowing significantly enhanced the test weight of wheat over late sowing. Similar findings were reported by Naeem (2001), Sardana *et al.* (2002) and Singh *et al.* (2002) who observed that cultivars differed significantly for mean grain weight. They found that, November sowing significantly enhanced the grain yield over December sowing crop.

Among the varieties Chonta 01 produced higher grain yield over rest of the varieties in all dates of sowing. Similarly the grain yield of Chonta 01 was identical with Kabul 013 at all dates of sowing but statistically at par with Milad 013 only on 25-Nov-15 but significantly higher over rest of varieties sown in different dates. The grain yield of wheat decreased with delay in date of sowing. This finding is in line with Donaldson *et al.* (2001) who reported that, early sowing resulted higher grain yield compared with mid to late sowing date. Jain *et al.* (1992) concluded that late sowing of wheat significantly reduced grain yield in all the varieties compared to the optimum date of sowing. Lathwal *et al.* (1999) reported that the grain

yield of wheat decreased with the delay in time of sowing. An increase of 48 and 39% in grain yield was observed from 5 and 15 November sowing compared with fifth December (Late sowing).

**Table 4:** Effect of wheat date of sowing and varieties on number of effective tillers per plant at harvest

| Date of sowing | Varieties | | | | |
|---|---|---|---|---|---|
| | Milad 013 | Bakhtar 013 | Chonta 01 | Kabul 013 | Mean |
| 25-Nov-15 | 4.25 | 4.00 | 4.75 | 4.50 | 4.37 |
| 11-Dec-15 | 4.00 | 3.75 | 4.50 | 4.25 | 4.12 |
| 26-Dec-15 | 3.25 | 3.00 | 3.75 | 3.50 | 3.37 |
| 11-Jan-16 | 2.75 | 2.50 | 3.00 | 2.75 | 2.75 |
| **Mean B** | 3.56 | 3.31 | 4.00 | 3.75 | |

| Factors | CD at 5% | | SEm ± |
|---|---|---|---|
| Date of sowing | 0.54 | | 0.17 |
| Varieties | 0.43 | | 0.15 |
| Varieties at same level of date if sowing | N/A | | 0.34 |
| Date of sowing at same level of varieties | N/A | | 0.31 |

**Table 5:** Effect of wheat date of sowing and varieties test weight (g)

| Date of sowing | Varieties | | | | |
|---|---|---|---|---|---|
| | Milad 013 | Bakhtar 013 | Chonta 01 | Kabul 013 | Mean |
| 25-Nov-15 | 33.48 | 33.13 | 36.11 | 35.86 | 34.65 |
| 11-Dec-15 | 32.17 | 31.83 | 35.05 | 34.90 | 33.49 |
| 26-Dec-15 | 31.14 | 30.73 | 33.73 | 33.28 | 32.22 |
| 11-Jan-16 | 29.82 | 29.17 | 32.35 | 31.89 | 30.81 |
| **Mean B** | 31.65 | 31.21 | 34.31 | 33.98 | |

| Factors | CD at 5% | | SEm ± |
|---|---|---|---|
| Date of sowing | 2.08 | | 0.64 |
| Varieties | 2.34 | | 0.81 |
| Varieties at same level of date if sowing | N/A | | 1.28 |
| Date of sowing at same level of varieties | N/A | | 1.55 |

**Table 6:** Effect of wheat date of sowing and varieties on grain yield (kg/ha)

| Date of sowing | Varieties | | | | |
|---|---|---|---|---|---|
| | Milad 013 | Bakhtar 013 | Chonta 01 | Kabul 013 | Mean |
| 25-Nov-15 | 5533 | 5026 | 5734 | 5621 | 5441 |
| 11-Dec-15 | 5107 | 4795 | 5605 | 5492 | 5250 |
| 26-Dec-15 | 4777 | 4262 | 5271 | 5109 | 4855 |
| 11-Jan-16 | 4223 | 3843 | 4665 | 4480 | 4302 |
| **Mean B** | 4873 | 4481 | 5318 | 5175 | |

| Factors | CD at 5% | | SEm ± |
|---|---|---|---|
| Date of sowing | 329 | | 101 |
| Varieties | 306 | | 106 |
| Varieties at same level of date if sowing | N/A | | 202 |
| Date of sowing at same level of varieties | N/A | | 210 |

## III. CONCLUSION

25th November-15 is found to be the optimum sowing time for wheat varieties (Milad 013, Bakhtar 013, Chonta 01 and Kabul 013) under situation of Baghlan province, Afghanistan. The growth, phonological character, number of effective tillers per plant, test weigh and grain yield of wheat decreased by delay in each 15 days dates of sowing starting from the optimum sowing date. However all the growth, growth phenology and yield character and yield of wheat with optimum date of sowing (25th Nov-15) was statistical identical with all varieties sown on 11-Dec-15, but all these characters was significantly higher over all same varieties sown on 26-Dec-15 and 11-Jan-15. Among the varieties the number of effective tillers, test weight and grain yield of Chontal 01 was found to be identical with Kabul 013 but significantly higher over rest of the varieties.

## IV. REFERENCES


[1] Bachhao KS, Kolekar PT, Nawale SS and Kadlag AD. 2018. Response of different wheat varieties to different sowing dates. *Journal of Pharmacognosy and Phytochemistry* **7**(1): 2178-2180.

[2] Coventry D R, Gupta R K, Yadav A, Poswal R S, Chhokar R S, Sharma R K and Kleemann S G L. 2011. Wheat quality and productivity as affected by varieties and sowing time in Haryana, India. *Field Crops Research* **123**: 214-225.

[3] Donaldson E, Schillinger WF and Dofing SM. 2001. Straw production and grain yield relationships in winter wheat. *Crop Sci.*, 41:100-106.

[4] FAO. 2019. Deficit water irrigation practice. Water Reports 22. Rome, Italy: Food and Agriculture Organization of the United Nations.

[5] Geerts S, Raes D. 2009. Deficit irrigation as on-farm strategy to maximize crop water productivity in dry areas. *Agricultural water management* **96** (9):1275-1284.

[6] Ghosh, M. and B.C. Patra. 2004. Effect of sowing date on heat unit and yield of wheat varieties at Raghunathpur. *Indian J.*, **48**(1): 137-139.

[7] Gupta S, Singh R K, Sinha N K, Singh A and Shahi U P. 2017. Effect of different sowing dates on growth and yield attributes of wheat in Udham Singh Nagar District of Uttarakhand, India.*Plant Archives* **17**: 232-236.
[8] Haider, S.A., M.Z. Alam and N.K. Paul. 2003. Influence of different sowing dates on phenology and accumulated heat units in wheat .*J. of Biol. Sci*., **3**(10): 932-939.
[9] Jain M, Pillai PVA and Khan RA. 1992. Effect of sowing date on wheat (*Triticum aestivum* L.) varietieis under late sown conditions. *Ind. J. Agric. Sci.,* **62**: 669-671.
[10] Lathwal OP and Thakral SK. 1999. Performance of wheat varieties sown on different dates under rainfed conditions. *Crop Res. Hisar*. **18**: 470-471.
[11] Muhammad Abu Sufyan, Azhar Mahmood, Anser Ali, Muhammad Mudassar Maqbool and Muhammad Ahmad. 2013. Comparative assessment of wheat cultivars and sowing dates under agro-climate of Sheikhupura, Pakistan. *Asian J Agri Biol*.**,** **1**(3):100-104.
[12] Nahar K, Ahmad K and Fujita M 2010. Phenological variation and its relation with yield in several wheat (*Triticum aestivum*L.) cultivars under normal and late sowing mediated heat stress condition. *Notulae Scientia Biologicae* **2**: 51-56.
[13] Nainwal K and Singh M. 2000. Varietal behaviour of wheat (*Triticum aestivum* L.) to dates of sowing under Tarai region of Uttar Pradesh. *Indian Journal of Agronomy (India)*.
[14] Naeem M. 2001. Growth, radiation use efficiency and yield of new wheat cultivars under variable nitrogen rates. M. Sc. Thesis, Dept. *Agron, Univ. Agric.,Faisalabad*.
[15] Rakesh Kumar Sharma, S.N. 2003. Effect of nitrogen on wheat as influenced by dates of sowing. Annals of Agricultural Research, 24(4): 104-110.
[16] Razzaq AP, Zada K and Saeed K. 1986. Effect of sowing dates on emergence, growth rate and days to earing of wheat (*Triticum aestivum* L.) varieties. *Sarhad J. Agric*., **2**: 3-28.
[17] Sardana V, Sharma SK, Randhawa AS and Sardana V. 2000. Performance of wheat (*Triticum aestivum* L.) varieties under different sowing dates and nitrogen levels the sub-mountain region of Punjab. *Indian J. Agron*., **47**: 372-377.
[18] Shirpurkar G N, Wagh M P and Patil D T. 2008. Comparative performance of wheat genotypes under different sowing dates. *Agricultural Science Digest* **28**: 231-232.
[19] Singh CB, Kumar J, Khan AA, Katiyar RA and Katiyar AK. 2002. Effect of nitrogen and dates of sowing on yield and quality of wheat (*Triticum aestivum* L.) seeds. *Progressive Agric*., **2**: 92-93.