International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
www.chemijournal.com
IJCS 2021; 9(2): 240-242

Received: 07-12-2020
Accepted: 15-01-2021

Neeraj Singh
Department of Agronomy, ANDUAT Ayodhya, Uttar Pradesh, India

Shashank Shekher Singh
Department of Agronomy, ANDUAT Ayodhya, Uttar Pradesh, India

Gajendra Singh
Department of Agronomy, ANDUAT Ayodhya, Uttar Pradesh, India

Anurag Srivastava
Department of Soil Science & Agriculture Chemistry, ANDUAT Ayodhya, Uttar Pradesh, India

Raghvendra Singh
Department of Agronomy, ANDUAT Ayodhya, Uttar Pradesh, India

Corresponding Author:
Neeraj Singh
Department of Agronomy, ANDUAT Ayodhya, Uttar Pradesh, India

Effect of optimum date of sowing and varieties on growth and yield of wheat (*Triticum aestivum* L.)

Neeraj Singh, Shashank Shekher Singh, Gajendra Singh, Anurag Srivastava and Raghvendra Singh

DOI: https://doi.org/10.22271/chemi.2021.v9.i2d.11812

Abstract
An experiment was conducted during the *Rabi* season of 2019-20 at the Agronomy Research Farm of A.N.D. University of Agriculture & Technology Kumarganj, Ayodhya (UP) to find out the effect of dates of sowing and different varieties on growth and yield of wheat. The experiment consisted of 16 treatment combinations comprised of four dates of sowing and four varieties, tested in split plot design with three replications. The observation on different growth and yield parameters were recorded and analyzed statistically. The results indicated that different dates of sowing and varieties significantly influenced the growth, yield and nutrient uptake of wheat. Among the various dates of sowing, D2 (November 28) being at par with D1 (November 18) recorded highest plant height, number of tillers m-2, leaf area index, dry matter accumulation, number of spikes m-2, length of spike, grains spike-1, yield and nutrient uptake. The similar trend was observed with variety V4 (DBW- 187) compared to V1 (HD-2967), V3 (NW-5054) and V2 (NW-1012).

Keywords: Nutrient, research, influenced, sowing

Introduction
In India, wheat occupies second place after rice. It is cultivated on an area of 29.58 million ha with the production of 99.70 million tones having productivity of 3.37 tonnes ha-1 (Anonymous, 2018) [1]. As per Indian Council of Agricultural Research, the demand for wheat in the country will reach 140 million tonnes by 2050. Most of this demand in production will have to manage by increasing productivity as the land area under wheat is not expected to expand. Efficient input management along with varietal improvement are the two basic element that can help in achieving the target.

Wheat is more nutritive as compared to the other cereals. It has good nutrition profile with 12.1 per cent protein, 1.8 per cent lipids, 1.8 per cent ash, 2.0 per cent reducing sugars, 6.7 per cent pentose's, and provides 314 Kcal/100g of food. Wheat is also a good source of minerals and vitamins *viz*., calcium (37 mg/100g), iron (4.1mg/100g), thiamine (0.45mg/100g), riboflavin (0.13mg/100g) and nicotinic acid (5.4mg/100mg). Unlike other cereals, wheat contains a high amount of gluten, the protein that provides the elasticity necessary for excellent bread making. Hard wheat is high in protein (10-17%) and yields a flour rich in gluten, making it particularly suitable for yeast breads.

Among the factors of crop production the sowing time is most important. It has been observed that early sowing gives high yield as compared to late sowing due to longer growing season (Tanveer *et al.* 2003). Delay sowing from 20th November Onward decreased the wheat grain yield @ 39 kg per hectare per day (Singh and Uttam 1994). From an agronomic point of view sowing time is a key factor, which is reflected in high production of wheat as well as understanding of early crop establishment factors (Soomroat *et al.* 2009).

Materials and Methods
The experiment was conducted at the Agronomy Research Farm of the Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, (UP). The experimental site is situated in the main campus of the university, about 42 km away from Ayodhya district head quarter on Ayodhya-Raibareili road at 26047 N latitude and 82012 E longitude and an altitude of 113 meters above mean sea level.

Summary and Conclusion

Significant professed growth and development have been recorded with the variation in the dates of sowing, where crop sown on November 28 and November 18 caused superiority due to favourable temperature resulted in better germination and other growth parameters as compare to crop sown in December.'

Dry matter accumulation is the result of better plant growth in terms of plant height, more number of plants and more number of leaves which was recorded highest in November sown crop and reduced appreciably due to low temperature during initial stage of crop under delay in sowing in December. Number of tillers m-2, plant height and leaf area index also exhibited similar trend and being highest with November sown crop. These

results are in close conformity with the findings of Ghosh *et al.* (2000), Kumar and Sharma (2003), Tahir *et al* (2009), Dar *et al*. (2018) [12] The lesser dry matter production due to delay in sowing in December may be attributed by adverse effect of low temperature and heavy rains occurred at the time of sowing and high temperature at the time of seed formation in the month of March and April.

Therefore, crop suddenly jumped from vegetative phase to its reproductive phase in late sowing in December, consequently produced lesser shoots, plant height, leaf are index and dry matter accumulation.

Dates of sowing played an important role in influencing yield contributing characters like no. of effective tillers m-2, length of spike, grain weight of spike, grains per spike and test weight. The maximum grain yield (59.00 q/ha) was obtained when the crop was sown November 28 followed by November 18, December 8 and December 18 sowing which yield at 57.05 q/ha, 44.00 q/ha and 40.00 q/ha respectively. This indicate that with delay in sowing beyond November 28 resulted in reduction in grain yield significantly. Sowing of wheat beyond November 28 reduced the grain yield to the tune of 3.32%, 25.42% and 32.20% over November 18, December 8 and December 18 sown crop, respectively. The reduction in yield attributes under late sowing in December might be due to poor growth in terms of number of tillers, plant height, dry matter production and leaf area index owing to low temperature and shorten in vegetative phase coupled with rise in temperature in reproductive phase which resulted poor source under late sown crop.

The maximum values all yield attributes was significantly highest with November 28 sown crop being at par with November 18 sown crop but significantly superior over December 8 and December 18 sown crop.

Grain yield of the crop is manifestation of growth characters. The low yield under delayed sowing in December may partially due to the loss growth period available to the crop which might have adversely affected the normal growth and development of crop. It may also be noted that there was an abrupt rise in the mean temperature from the end of march and up to end of April which reduced the yield under delayed sowing.

Delay in sowing means early flowering and grain filling phase during the hot month of April. The high temperature particularly in the month of April coupled with hot western wind hastens maturity and does not permit proper manufacture and translocation of food to the developing grain. This has also produced immature and shriveled grain which resulted in lower thousand grain weight in the late sown crop. Therefore, early sowing (November) was at the advantage because after having completed its vegetative growth satisfactory, it had come in the month of January when the temperature remained quite favorable. The grain development and maturity kept a favorable imbalance with the steady rise in temperature during the mid-growth period (before ear emergence) with the normal sowing at November 28 and November 18. The adverse effect of weather was associated more with late sowing (December 8 and December 18) which resulted in significantly lesser no. of effective tillers m-2, no. of grains, grain weight spike-1and 1000 grain weight which ultimately reflected in reduced per hectare grain yield. These results are in close conformity with those of Dube *et al*. (2008) and Naniwal and Singh (2000).

Similar to grain yield straw yield was also decrease significantly as the sowing was delayed beyond November 28 over November 18, December 8 and December 18, respectively.

Dhaka *et al.* (2006) [9], Dubey *et al.* (2018), Thorat *et al.* (2015), Akram *et al.* (2016) [3] have also reported that straw yield was decreased as the sowing of wheat was beyond November. The reduction in straw yield as a result of delayed sowing was mainly due to reduction in crop growth parameters like plant height, tillers m-2, dry matter accumulation and leaf area index which continued to be declined with the delay in sowing.

Table 1: Plant height (cm) as affected by date of sowing and varieties at successive growth stage.

Treatments	Days after sowing			
	Plant height (cm)			
	30	60	90	At harvest
Date of Sowing				
18-11-2019	25.53	69.20	86.50	88.23
28-11-2019	26.03	72.40	90.50	92.31
08-12-2019	24.53	64.56	80.63	82.24
18-12-2019	23.98	61.05	76.25	77.84
S.Em±	0.52	1.72	2.31	2.36
CD at 5%	1.33	4.34	5.85	5.98
Varieties				
HD 2967	25.28	70.18	87.59	89.35
NW 1012	24.38	59.00	73.75	75.23
NW 5054	24.73	63.00	78.75	80.39
DBW 187 (Karan Vandana)	25.68	75.03	93.78	95.66
S.Em±	0.46	1.32	1.25	1.72
CD at 5%	0.99	2.82	2.68	3.67

Table 2: Dry matter accumulation (gm^{-2}) as affected by date of sowing and varieties at successive growth stage.

Treatments	Days after showing			
	Dry matter accumulation			
	30	60	90	At harvest
Date of Sowing				
18-11-2019	62.20	690.62	1151.04	1308.00
28-11-2019	63.24	713.46	1189.10	1351.25
08-12-2019	59.59	547.29	912.14	1036.53
18-12-2019	58.23	504.50	840.86	955.53
S.Em±	1.36	14.91	24.59	30.40
CD at 5%	3.46	37.79	62.29	77.01
Varieties				
HD 2967	61.42	635.05	1058.42	1202.75
NW 1012	59.20	547.47	912.45	1036.88
NW 5054	60.01	593.09	988.48	1123.28
DBW 187 (Karan Vandana)	62.39	680.28	1133.79	1288.40
S.Em±	1.47	12.64	18.36	24.22
CD at 5%	3.16	27.00	39.22	51.74

Table 3: Numbers of tillers/m^2 as affected by Dates of sowing and varieties at successive growth stage.

Treatments	Days after showing			
Number of tillers m-2				
	30	60	90	At harvest
Date of Sowing				
18-11-2019	218.70	321.92	402.40	394.51
28-11-2019	223.20	327.24	409.05	401.03
08-12-2019	210.30	270.18	337.44	330.83
18-12-2019	205.50	255.72	319.37	313.37
S.Em±	4.51	7.46	10.43	10.39
CD at 5%	11.44	18.90	26.42	26.34
Varieties				
HD 2967	216.60	298.25	372.26	364.96
NW 1012	209.10	277.89	347.36	340.55
NW 5054	211.80	289.36	361.71	354.87
DBW 187 (Karan Vandana)	220.20	309.55	386.94	379.35
S.Em±	3.96	5.55	5.47	7.03
CD at 5%	8.46	11.86	11.68	15.02

Table 4: Leaf Area Index (LAI) as affected by Dates of sowing and varieties at successive growth stage.

Treatments	Days after showing		
	30	60	90
Date of Sowing			
18-11-2019	1.55	5.44	3.88
28-11-2019	1.58	5.61	3.92
08-12-2019	1.49	4.85	3.40
18-12-2019	1.46	4.45	3.11
S.Em±	0.034	0.120	0.088
CD at 5%	0.087	0.304	0.222
Varieties			
HD 2967	1.53	5.30	3.71
NW 1012	1.46	4.71	3.29
NW 5054	1.50	4.90	3.44
DBW 187 (Karan Vandana)	1.56	5.44	3.81
S.Em±	0.037	0.102	0.065
CD at 5%	0.079	0.217	0.138

Conclusion

Wheat variety DBW-187 may be sown on November 28 followed by variety DBW-187 with November 18 to get maximum yield and benefit.

References

1. Anonymous. Agricultural statistics at glance. Directorate of economics and statistics, DAC & FW, Govt of India 2018, pp.78.
2. Ali A, Ullah Z, Ali N, Anjum MM. Evaluation of Wheat Advanced Lines for Agronomic Traits under Vary Sowing Dates. Agri Res & Tech 2017;7(1):01-011.
3. Akram M. Growth and yield components of wheat under water stress of different growth stages. Bangladesh J. Agril. Res 2016;36(3):455-468.
4. Bachhao KS, Kolekar PT, Nawale SS, Kadlag AD. Response of different wheat varieties to different sowing dates. Journal of Pharmacognosy and Phytochemistry. 2018;7(1):2178-2180.
5. Bashir MU, Wajid SA, Ahmad A, Iqbal M. Potential Soil Moisture Deficit: An Alternative Approach for Irrigation Scheduling in Wheat. International Journal of Agriculture & Biology 2016, 16-22.
6. Behera UK, Chougule BA, Thakur RS, Ruwali KN, Bhawsa, RC, Pandey HN. Influence of planting dates and nitrogen levels on yield and quality of durum wheat (*Triticum durum*). Indian Journal of Agricultural Sciences 2000;70(7):434-436.
7. Bouyoucos GJ. Direction for making mechanical analysis of soil by hydrometer method. Soil Sci 1936;42:225-228.
8. Brijkishor. To assess the performance of newly developed strain of wheat under zero tillage condition with varying nitrogen levels. M.Sc. (Ag.) thesis submitted to N.D.U.A.&T., Kumarganj, Faizabad 1998.
9. Dhaka AK, Bangarwa AS, Pannu RK, Malik RK, Garg R. Phenological development, yield and yield attributes of different wheat genotypes as influenced by sowing time and irrigation levels. Agricultural Science Digest 2006;26(3):174-177.
10. Defra. India-UK collaboration on impacts of climate change in India 2005. http: //www. defra. ov.uk/envirnviro nm e nt/cli mate change/intemat/d evcountry/india2.
11. Dubey AP, Singh CB, Khan N, Yadav PN, Tiwari AN. Influence of weather parameters on wheat yield under varying sowing dates. CAB Abstracts Journal of Agrometeorology 2008;10(2):457-461.
12. Dar SB, Kanth RH, Raja W, Bangroo SA, Mir SA. Performance of Wheat in Relation to Sowing Dates and Nitrogen Levels under Rainfed Conditions of Kashmir. Int. J. Curr. Microbiol. App. Sci 2018;7(4):2600-2608.
13. Gupta S, Singh RK, Sinha NK, Singh A, Sahi UP. Effect of different sowing dates on growth and yield attributes of wheat in Udham Singh nagar district of Uttarakhand. India. Plant Archives 2017;17(1):232-236.
14. Ghosh DC, Nandi P, De B. Phenological development and productivity of wheat (*Triticum aestivum*) at different dates of sowing. Indian Journal of Agricultural Sciences 2000;70(6):393-395.
15. Gizawy BE, Nasser Kh. Effect of Planting Date and Fertilizer Application on Yield of Wheat under No till System. World J. Agric. Sci 2009;5(6):777-783.
16. Hassan MZU, Wahila AJ, Waqar MQ, Ali A. Influence of sowing dates on the growth and grain yield performance of wheat varieties under rainfed conditions. Science Technology and Development 2014;33(1):22-25.
17. Jackson ML. Soil chemical analysis. Prentice Hall of India Pvt. Ltd. New Delhi 1973.