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EFFECT OF DATE OF SOWING AND INTEGRATED NUTRIENT MANAGEMENT ON YIELD ATTRIBUTES AND YIELD OF WHEAT (*TRITICUM AESTIVUM* L.) IN SOUTH-WEST HARYANA

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SUMMARY

The field experiment was conducted during *Rabi* season of 2021-22 at Research Farm of Chaudhary Charan Singh Haryana Agricultural University, Regional Research Station, Bawal, Rewari (Haryana) to find out the effect of different date of sowing and integrated nutrient management on growth, yield attributes and yield of wheat crop. Sowing of wheat on 31st October resulted in significantly higher yield attributes as compared to 21st November sown crop. Significantly higher grain yield (5017 kg/ha) and straw yield (7361 kg/ha) were recorded under the crop sown on 31st October as compared to 21st November, which were statistically at par with 7th and 14th November sown crop. Among nutrient management, significantly higher yield (5144 kg/ha) was fetched under 100% RDF through chemical fertilizer as compared to control (3511 kg/ha), whereas, it was statistically at par with 75% RDF + 25% N (FYM) + *Azotobacter* +PSB and 75% RDF + 25% N (FYM).

Key words: Wheat, integrated nutrient management, date of sowing, yield attributes and yield

Wheat (*Triticum aestivum* L.) is an important grain crop belonging to the family *Gramineae*. India is the seventh-largest country by area having the second largest population in the world. In India during 2020-21, wheat was harvested from an area of 31125.16 thousand hectares with a production of 109586.50 thousand tonnes and 3521 kg/ha productivity. In Haryana during 2020-21, wheat was harvested from an area of 2564 thousand hectares with a production of 12394.38 thousand tonnes and 4834 kg/ha productivity (Indiastat, 2022). Sowing time is the most important factor in determining productivity. Hassan *et al.* (2014) reported that several factors are responsible for far below potential wheat yield and the most important of these is the sowing time. In general, the timing of wheat sowing depends on the local climate and the varieties used. When compared to late sowing, it has been found that wheat crops sown on normal date have longer crop durations, which gives them a chance to acquire more biomass. Therefore, sowing time optimization is crucial for maximizing yield and ensuring that biological yield is effectively converted into economic yield. In view of the declining productivity levels, greater emphasis is now being given to the integrated nutrient supply system which may play an important role in sustaining production. High cost of fertilizer and the low purchasing power of the small and marginal farmers of the region restrict the use of costly fertilizer inputs. Under such a condition there is a great need to explore an alternate source that can supplement partially as wholly the use of chemical fertilizer. It was, therefore, realized to study the feasibility as well as to explore the possibilities of sowing time and suitable sources of nutrient application which can help in improving wheat productivity.

MATERIALS AND METHODS

A field experiment was conducted at the Research Farm of Chaudhary Charan Singh Haryana Agricultural University, Regional Research Station, Bawal, Rewari (Haryana) during *Rabi* 2021-22. Bawal is situated in western Haryana at 28.07 °N and 76.59 °E. It is about 266 metres (872 feet) above mean sea level. It is located in the semi-arid part of Haryana's

agroclimatic zone II. The climatic conditions in Bawal are normally semi-arid and marked by extreme temperatures in both the *Kharif* and *Rabi* seasons. In the summer, the temperature can reach 44°C in June and July, while in the winter, it can go as cold as -0.5°C in December and January. The yearly rainfall averages between 250 and 300 mm. Winter 2021-2022 saw a total of 163 mm of precipitation. The soil of the experimental site (28.07 °N, 76.59 °E; 266 m above mean sea level) was sandy loam in texture, slightly alkaline in reaction (8.14), low in organic carbon (0.19), poor in available nitrogen (114.8 kg/ha), medium in phosphorus (11.8 kg/ha) and medium in available potassium (165.8 kg/ha). The experiment was laid out in split plot design with four dates of sowing (31st October, 7th, 14th, and 21st November) in main plots and four nutrient management levels (Control, 100% RDF, 75% RDF + 25% N (FYM) and 75% RDF + 25% N (FYM) + *Azotobacter* + PSB) in sub-plots with three replications. Sowing was done by adopting all agronomical practices with conventional drill as per treatment requirements. The data on yield contributing characters, grain, and straw yield were recorded at harvest. The data were computed using standard methods of statistical analysis. Harvest index (HI) is expressed as a percentage and was computed by dividing grain yield by total biological yield (grain + straw yield).

$$HI\ (\%) = \frac{\text{Economic yield (grain)}}{\text{Biological yield (grain + straw)}} \times 100$$

RESULTS AND DISCUSSION

Yield attributes

The present study reveals that the number of effective tillers markedly decreased with delay in sowing time. Significantly higher number of effective tillers were recorded under 31st October sown crop (75.55) as compared to 14th (67.82) and 21st November (63.16), which was statistically at par with 7th November sown crop (70.75) Table 1. The reduction in the number of effective tillers at delayed sowing might be attributed to delayed emergence of seedlings resulting in the curtailing of the number of days available from the emergence to maturity. Similar results were reported by Madhu *et al.* (2018). Wheat crop sown on 31st October recorded a significantly higher number of grains per spike (40.38) as compared to 21st November (35.27), which was statistically at par with 7th November (38.30) and 14th November sown crop (38.09). This might be due to higher temperature at the grain filling period in delayed sowing and less days available for grain filling. Boldest grain was achieved when wheat was sown on 31st October (38.41 g) which was higher over 7th November (37.94 g), 14th November (37.84 g), and 21st November (36.58 g). The decrease in test weight in 21st November sown crop was mainly due to a reduction in the growth period and shriveling of grains due to higher temperature prevailing during milk and grain filling stages. These results are in line with those of Singh and Dwivedi (2015).

TABLE 1
Effect of date of sowing and integrated nutrient management on yield attributes of wheat at harvest

Treatments	Number of effective tillers/mrl	Spike length (cm)	Grains/ spike (No.)	Test weight (g)
Date of sowing				
31st October	75.55	8.87	40.38	38.41
07th November	70.75	8.75	38.30	37.94
14th November	67.82	8.66	38.09	37.84
21st November	63.16	7.92	35.27	36.58
SEm±	1.36	0.12	0.79	0.45
CD (p=0.05)	4.81	0.43	2.80	NS
Nutrient Management				
Control	62.81	7.73	33.32	35.96
100% RDF	72.53	8.98	40.66	38.66
75% RDF + 25% N (FYM)	69.50	8.68	38.82	37.98
75% RDF + 25% N (FYM) + *Azotobacter* +PSB	72.45	8.81	39.24	38.17
SEm±	1.66	0.12	0.51	0.25
CD (p=0.05)	4.88	0.34	1.48	0.75

Under integrated nutrient management significantly higher number of effective tillers/mrl, spike length, and 1000-grains weight were observed under 100% RDF through chemical fertilizer as compared to control, which were statistically at par with 75% RDF + 25% N (FYM) + *Azotobacter* + PSB and 75% RDF + 25% N (FYM). The maximal number of grains per spike was found under 100% RDF through chemical fertilizer as compared to control and 75% RDF + 25% N (FYM) which was statistically at par with 75% RDF + 25% N (FYM) + *Azotobacter* + PSB (Table 1). Similar results have been reported by Shekhar *et al.* (2021).

Yield

The grain yield of wheat is the combined effect of various yield-attributing components. Significantly higher grain yield was produced under 31st October sown crop (5017 kg/ha) as compared to 21st November (4272 kg/ha), which was statistically at par with 7th (4866 kg/ha) and 14th November (4609 kg/ha) sown crop (Table 2). This might be due to the prevailing of favorable temperature required for wheat crops for higher photosynthate accumulation consequently resulting in higher yield parameters in 31st October sown crop. These results are also in conformity to that of Vashisht *et al.* (2017). The straw yield was significantly higher in 31st October sown crop (7361 kg/ha) as compared to 21st November (6375 kg/ha), which was statistically at par with 7th (7160 kg/ha) and 14th November (6818 kg/ha) crop. This might be due to the considerable increase in number of tillers, plant height and dry matter accumulation in the wheat crop sown on 31st October. Biological yield is reflected by growth parameters like tiller production and plant height. Biological yield markedly decreased with delay in sowing time and significantly higher biological yield produced under 31st October (12377 kg/ha) sown crop as compared to 14th (11426 kg/ha) and 21st November (10647 kg/ha), which was statistically at par with 7th November sown crop (12026 kg/ha). These findings are in agreement with those of Basir *et al.* 2018. The harvest index is an important parameter indicating the efficiency in partitioning of dry matter to the economic part of the crop. Higher the harvest index better is the economic return from the crop (Singh, 2016). Harvest index (%) followed the same trend as like grain yield that also decreased with delay in sowing time and 31st October sown crop resulted in highest harvest index (40.5%) followed by later sowings. Similar findings have been reported by Singh (2016).

But under different nutrient management treatments, the highest grain yield (5144 kg/ha) was fetched under 100% RDF through chemical fertilizer as compared to control (3511 kg/ha), whereas it was statistically at par with 75% RDF + 25% N (FYM) + *Azotobacter* +PSB and 75% RDF + 25% N (FYM). Although, the greatest straw yield was produced with the application of 100% RDF through chemical fertilizer as compared to 75% RDF + 25% N (FYM) and control, which was statistically at par with the 75% RDF + 25% N (FYM) + *Azotobacter* +PSB). The

TABLE 2
Effect of date of sowing and integrated nutrient management on grain, straw, biological yield and harvest index of wheat

Treatments	Grain yield (kg/ha)	Straw yield (kg/ha)	Biological yield (kg/ha)	Harvest index (%)
Date of sowing				
31st October	5017	7361	12377	40.5
07th November	4866	7160	12026	40.4
14th November	4609	6818	11426	40.1
21st November	4272	6375	10647	39.9
SEm±	148	197	258	1.0
CD (p=0.05)	522	697	911	NS
Nutrient Management				
Control	3511	5768	9279	37.8
100% RDF	5144	7647	12791	40.2
75% RDF + 25% N (FYM)	5002	7095	12097	41.4
75% RDF + 25% N (FYM) + Azotobacter +PSB	5107	7203	12310	41.6
SEm±	76	175	211	0.6
CD (p=0.05)	223	514	621	1.9

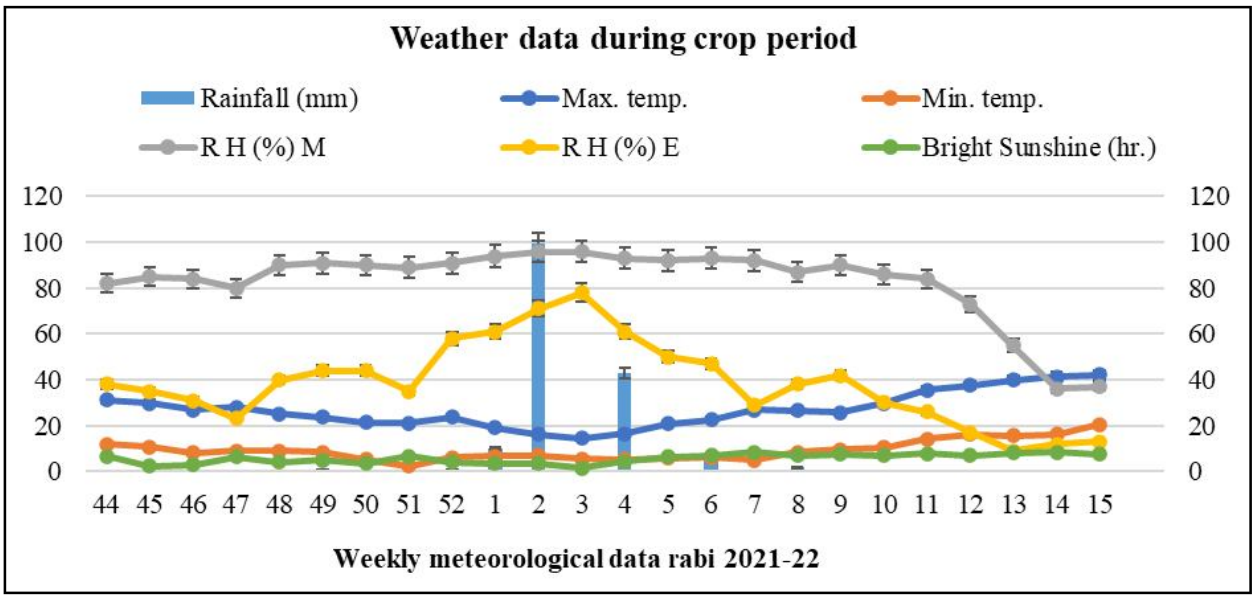

Fig. 1. Mean weekly weather data recorded at the agricultural meteorology observatory, CCS HAU, Hisar, during Rabi (2021-2022).

highest biological yield (12791 kg/ha) was under 100% RDF as compared to 75% RDF + 25% N (FYM) and control, which was statistically at par with 75% RDF + 25% N (FYM) + *Azotobacter* +PSB (12310 kg/ha). The harvest index was influenced significantly by the application of nutrient management treatments. A significantly higher harvest index (41.6) was found in 75% RDF + 25% N (FYM) + *Azotobacter* +PSB as compared to the control (37.8), which was statistically at par with 100% RDF and 75% RDF + 25% N (FYM). More and less similar yield enhancement in oat due to integrated crop management practices has amply been documented by Satyajeet *et al.* (2022).

CONCLUSION

This study emphasizes that a combination of ideal sowing dates and well-balanced nutrient management techniques is necessary to maximize wheat production in South West Haryana. The results give policymakers and farmers important information for creating sustainable wheat production methods. To guarantee sustainable agricultural expansion, future studies should concentrate on the long-term effects of these techniques on soil health, resource use efficiency, and climate resilience.

REFERENCES

Basir, A., S. Shah, A. Khan, W. Fazli, M. A. K. Inayat-ur-Rahman and R. Ali, 2018 : Optimization of sowing time and seed rates can enhance wheat yield in semi-arid environment. *Philippine Agricultural Scientist*, **101**(4): 462-468.

Hassan, M. Z. U., A. J. Wahla, M. Q. Waqar, and A. Ali, 2014. Influence of sowing date on the growth and grain yield performance of wheat varieties under rainfed condition. *Science Technology and Development*, **33**(1): 22-25.

Indiastat. 2022 : https://www.indiastat.com/table/haryana-state/agriculture/selected-state-wise-area-production-productivity-w/1423620.

Madhu, U., M. Begum, A. Salam, and S. K. Sarkar, 2018 : Influence of sowing date on the growth and yield performance of wheat (*Triticum aestivum* L.) varieties. *Archives of Agriculture and Environmental Science*, **3**(1): 89-94.

Satyajeet, Satpal, A. Nibhoria, and J. Kumar, 2022: Effect of integrated crop management practices on yield and economics of fodder oat in Haryana. *Forage Res.*, **47**(4): 496-498.

Shekhar, C., V. Nand, R. Kumar, N. Kumar, S. K. Diwakar, G. Kumar and M. Pratap, 2021 : Effect of integrated nutrient management practices on yield attributes, yield and economics of timely sown wheat (*Triticum aestivum* L.). *The Pharma Innovation Journal*, **10**(7): 1276-1279.

Singh, B., 2016 : Response of wheat (*Triticum aestivum* L.) varieties to different sowing dates and growth regulator. Thesis, M.Sc. (Agronomy), Punjab Agricultural University, Ludhiana.

Singh, P. and P. Dwivedi, 2015 : Morpho-physiological responses of wheat genotypes under late sown condition. *Vegetos*, **28**(1): 16-25.

Vashisht, A., G. Karad, R. S. Baloda, D. K. Joshi, and P. Krishnan, 2017 : Effect of weather on radiation use efficiency and yield of wheat crop. (Ab.) National Seminar on Agrometeorology for Sustainable Development from 12th-14th October, 2017, held at CCSHAU, Hisar: 25.