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Effect of different dates of sowing on yield and yield attributes of wheat (*Triticum aestivum* L.) cultivars

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Abstract

A field experiment was carried out at Agromet. Research Farm of Narendra Deva University of Agriculture & Technology, Narendra Nagar (Kumarganj), Faizabad (U.P.) during *Rabi* season of 2016-17 to study the effect of different date of sowing on growth and yield of wheat (*Triticum aestivum* L.) cultivars. The experiment comprised of 9 treatment combinations and tested in Randomized block design (RBD) with four replications. Experiment consisted of two factors, *viz.* dates of sowing and cultivars. Three wheat varieties, *viz.* Malviya-234, PBW-343 and NW-1012 were sown under three dates *i.e.* 20 November, 30 November and 10 December. 20 November has suitable date of sowing for high yield of wheat. PBW-343 cultivar was found most suitable for obtaining higher yield of wheat. Variety PBW-343 produced significantly higher grain and straw yield (39.45 and 55.50q ha⁻¹, respectively). Regarding the time of sowing, highest grain and straw yield (39.60 and 54.77q ha⁻¹, respectively) was recorded in the crop, sown on 20 November.

Keywords: Sowing, yield, yield attributes, wheat, *Triticum aestivum* L.

Introduction

Wheat is the second most important cereal crop next to rice and a key crop of the green revolution and post green revolution era. India stands second among wheat producing countries after China. On an average wheat occupies 223.813 mha area, 733.144 mt production with 3280 kg ha⁻¹ productivity (USDA, 2016). Nearly 63 and 68% of the total cropped area in *kharif* and *rabi* seasons are occupied by rice and wheat, respectively, and 70 to 90% of rice area covers under wheat cultivation. Based on physiography and farmer's conception of land utilization, the land type *viz.* upland, mid land and low land are identified. Among them the medium land is most important for rice-wheat cropping system. Although, lowlands are exclusively utilized for growing rice and wheat, but the productivity of both rice and wheat from these lands is low. This low yield is primarily due to water stagnation and poor drainage. In a diagnostic survey, it was estimated that around 30% area of wheat is sown during the month of November; the ideal or normal sowing time, 50% of wheat is sown during December; the late sown wheat and rest 20% area is commonly sown during first fortnight of January; the very late sown crop. It has been realized that the average yield of wheat of this region, sown during the month of November, is well comparable to the state average, but the declining trend in wheat yield has been noticed with delayed sowing *i.e.* in the month of December and January. A sudden increase in temperature for a period of 4-5 days at any stage of the wheat crop can adversely affect the crop yield (Spiertz *et al.*, 2006) [10] and even a one-day abnormal increase in temperature at grain formation and filling stage can result in large grain losses (Alexander *et al.* 2010) [1]. It is mostly due to shorter growth period available to late sown wheat coupled with high temperature and hot winds during reproductive growth period, which leads to forced maturity and ultimately poor grain yield. In addition to this, improper selection of varieties in this region, also affects the crop yield.

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Materials and Methods

The field experiment was conducted at Agromet. Research Farm, of Narendra Deva University of Agriculture and Technology, Narendra Nagar (Kumarganj) Faizabad (U.P.), during *Rabi* season of 2016-2017. The experimental site was situated about at distance of 42 km from Faizabad district headquarters at Faizabad-Raibareilly road at 26°47' N latitude, 82°12' E longitude and an altitude of 113 meters above mean sea level and is subjected to extremes of weather conditions. The total rainfall during course of experimentation was 16.8

mm. During the crop season, the lowest temperature (4.9 °C) was recorded in the month of January and the maximum (39.6 °C) in the month of April. The highest mean relative humidity (88.2%) was recorded in the month of January. The experiment was laid out in randomized block design (RBD) with three varieties (HUW-234, PBW-343 and NW-1012), three date of sowing and four replications. Soil of the experimental field was having *apH* 8.2, low EC 0.23, organic carbon 0.37 g kg⁻¹, available nitrogen 194.2 kg ha⁻¹, phosphorus 15.2 kg ha⁻¹ and potassium 250.2 kg ha⁻¹.

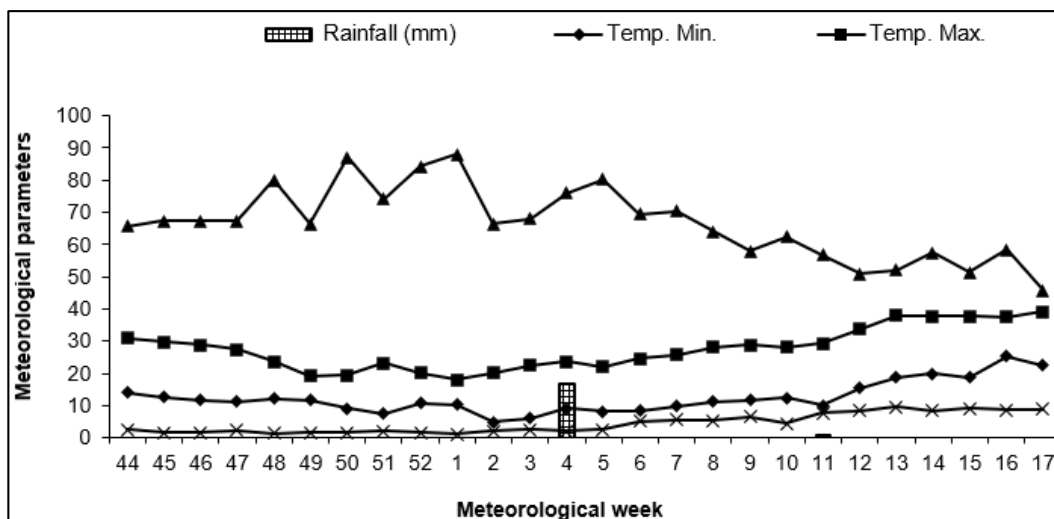


Fig 1: Mean weekly meteorological observations during crop season (November, 2016 to April, 2017)

Results and Discussion

Yield attributes

The number of effective tillers meter⁻² was significantly influenced by date of sowing and cultivars. The maximum number of effective tillers meter⁻² was recorded with 20 November date of sowing over 30 November and 10 December date of sowing and among the cultivars the maximum number of effective tillers meter⁻² recorded in cultivar PBW-343 which was significantly superior over rest of the cultivars. The maximum length of spike recorded with 20 November date of sowing over the 30 November and 10 December date of sowing and among the cultivars the maximum length of spike recorded with cultivar PBW-343 which was significantly superior over rest of cultivars. Such

observations were also reported by Mattas *et al.* (2011)^[7] and Tomar *et al.* (2014)^[11], they revealed that the ear length is mainly controlled by the genetic makeup of genotype, but up to some extent, it also affected by environmental conditions and thus it varies from variety to variety. The maximum number of grains spikes⁻¹ and test weight were recorded with cultivar PBW-343 which was significantly higher over Malviya-234 and NW-1012. As regards date of sowing, the maximum number of grains spike⁻¹ was reported with 20 November date of sowing which was significantly superior over 30 November and 10 December date of sowing. Similar results were obtained by Mumtaz *et al.* (2015)^[8], Marasini *et al.* (2016)^[6], Tomar *et al.* (2014)^[11] Desmukhn *et al.* (2015) and Bashir *et al.* (2016)^[2].

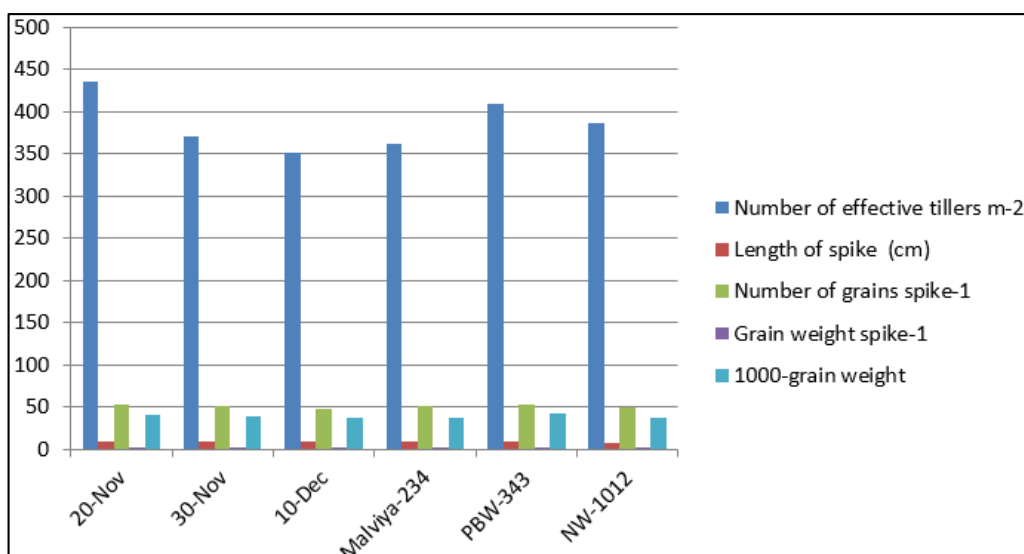


Fig 2: Effect of different date of sowing on yield contributing characters of wheat cultivars

Table 1: Effect of different date of sowing on yield contributing characters of wheat cultivars.

Treatments	Number of effective tillers m ⁻²	Length of spike (cm)	Number of grains spike ⁻¹	Grain weight spike ⁻¹ (g)	1000-grain weight (g)
Date of sowing					
20 November	436.00	9.38	53.00	2.15	40.60
30 November	370.07	9.18	52.00	2.07	39.80
10 December	351.56	8.72	47.38	1.79	37.81
<i>SEm</i> ±	6.69	0.16	0.85	0.03	0.72
<i>CD</i> (<i>P</i> =0.05)	19.65	0.46	2.50	0.10	2.13
Cultivars					
Malviya-234	361.25	9.11	50.80	1.92	37.69
PBW-343	410.05	9.18	52.73	2.24	42.42
NW-1012	386.33	8.10	48.83	1.86	38.09
<i>SEm</i> ±	6.69	0.16	0.85	0.03	0.72
<i>CD</i> (<i>P</i> =0.05)	19.65	0.46	2.50	0.10	2.13

Yield

Grain yield (q ha⁻¹)

The grain yield influenced significantly by date of sowing and cultivars. Among the cultivars, maximum grain yield was recorded with PBW- 343 which was significantly superior over rest of the cultivars. Similar results have also been reported by Kumar and Sharma (2003) [5] Dhaka *et al.* (2006) [4] and Shirpurkar *et al.* (2007). Regarding to date of sowing, the maximum grain yield 39.60 q ha⁻¹ was recorded with 20 November which was significantly superior over 30 November and 10 December. Similar results have also been reported by Kumar and Sharma (2003) [5].

Straw yield (q ha⁻¹)

The straw yield was affected significantly due to date of sowing and cultivars. The highest straw yield (54.77q ha⁻¹)

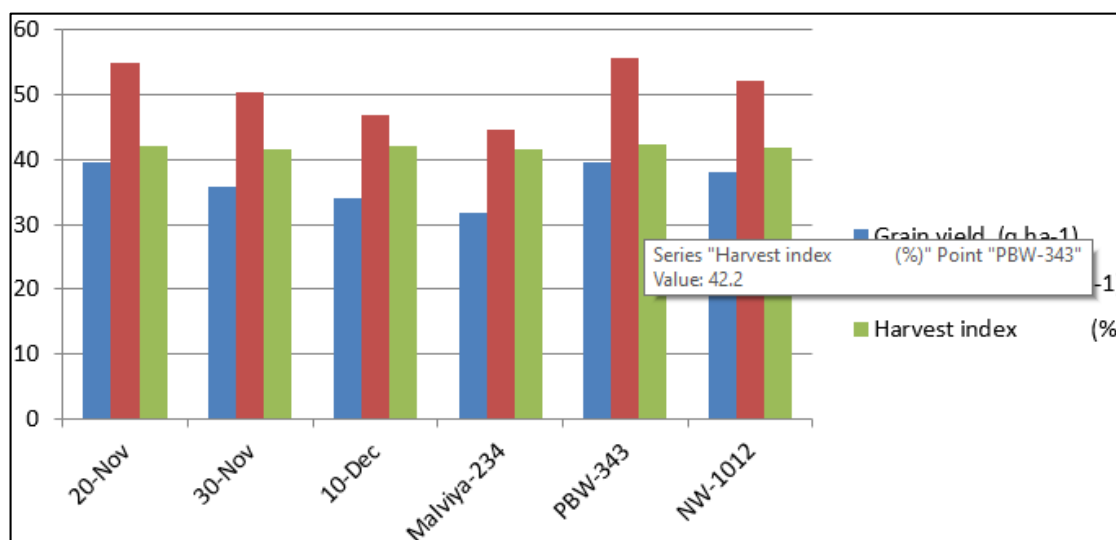
was noted with 20 November over 30 November and 10 December. Among the cultivars, maximum straw yield (55.50 q ha⁻¹) was recorded with PBW- 343, which was at par with cultivar NW-1012 and significantly superior over Malviya-234. Similar findings were reported by Mumtaz *et al.* (2015) [8] and Marasini *et al.* (2016) [6].

Harvest index (%)

Harvest index was not significantly influenced by date of sowing and cultivars. Regarding to date of sowing, the maximum harvest index was recorded with 20 November date of sowing being at par with 30 November date of sowing. The maximum harvest index (42.20%) was recorded with cultivar PBW-343 and lowest (41.56%) with cultivar Malviya-234.

Table 2: Effect of different date of sowing on yield and harvest index of wheat cultivars.

Treatments	Grain yield (q ha ⁻¹)	Straw yield (q ha ⁻¹)	Harvest index (%)
Date of sowing			
20 November	39.60	54.77	41.97
30 November	35.77	50.43	41.50
10 December	33.98	46.83	42.03
<i>SEm</i> ±	0.36	0.83	0.75
<i>CD</i> (<i>P</i> =0.05)	1.05	2.43	NS
Cultivars			
Malviya-234	31.87	44.47	41.56
PBW-343	39.45	55.50	42.20
NW-1012	38.02	52.07	41.75
<i>SEm</i> ±	0.36	0.83	0.75
<i>CD</i> (<i>P</i> =0.05)	1.05	2.43	NS

**Fig 3:** Effect of different date of sowing on yield and harvest index of wheat cultivars

Summary

Sowing dates and cultivars significantly influenced the yield contributing characters of wheat crop. The crop sown on 20 November recorded highest grain and straw yield, number of effective tillers (m^{-2}), length of spike (cm), number of grains spike⁻¹, grain weight spike⁻¹(g) and test weight (g) and among the cultivars, PBW-343 was found superior in all yield contributing characters than other varieties. PBW-343 also recorded highest number of effective tillers (m^{-2}), length of spike (cm), number of grains spike⁻¹, grain weight spike⁻¹(g) and test weight (g). Variety, PBW-343 produced significantly higher grain and straw yield than the rest varieties.

Conclusion

On the basis of foregoing discussion and the results of investigation, presented, it can be concluded that sowing of wheat crop on 20th November was most suitable for higher growth and yield of wheat, among the cultivars, PBW-343 found suitable cultivar of wheat to achieve higher yield. However, the interaction effect was found non-significant between date of sowing and different wheat cultivars.

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