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Original Research Article

Response of Wheat Cultivars under Different Dates of Sowing in Central Plain Zone of Uttar Pradesh

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A B S T R A C T

The present study entitled "Response of wheat cultivars under different dates of sowing in *central plain zone* of Uttar Pradesh" was carried out during *Rabi* season of 2019-2020, at Student's Instructional Farm of Chandra Shekhar Azad University of Agriculture and Technology, Kanpur, Uttar Pradesh with the objective to study the effect of different sowing dates and varieties on growth attributes, yield attributes and yield and to find best treatment combination in terms of economics. The experiment was carried out in Split Plot Design (SPD) with four replications, three different dates of sowing as main-plot treatments and four varieties as sub-plot treatments. Among the growth parameters plant population (per m^2) was recorded at initial stage and dry matter production (g per m^2) was recorded at different phenophases of wheat. The dry matter production were significantly higher at all phenophases of wheat on early date of sowing i.e. 15th November than late dates of sowing and the interaction was found significant with dry matter production at anthesis, milking and dough stage under different dates of sowing and varieties. Among the yield attributes and yield, length of ear (cm) and test weight (g), biomass yield (kg per ha), grain yield (kg per ha), straw yield (kg per ha) were recorded and analysed. It was found that all yield attributes and yield recorded were found significantly higher with early date of sowing i.e 15th November. Early date of sowing i.e crop sown on 15th November produced significantly higher grain yield with HD 2967 variety over other dates of sowing and varieties. In order to find best treatment combination in terms of economic analysis found that the variety HD 2967 sown on early date of sowing i.e. 15thNovember was economical viable.

Keywords

Dates of sowing, Varieties, Length of ear, Yield, Economic analysis

Introduction

Wheat (*Triticum aestivum* L.) is the first important strategic cereal crop for the majority of world's populations. It is the single most important cereal crop that has been considered as integral component of the food security system of the several nations. It has been described as the 'King of cereals' because of the acreage and high productivity

which also occupies a prominent position in the international food grain trade. Area under wheat during the year 2018-2019 is about 29.14 million hectares and distribution of area under wheat among major crops is about 15.23% and production 102.19 million tonnes. Target of production of wheat for the period 2018 -2019 is 102.2 million tonnes and achievement is 102.19 million tonnes. All India crop-wise yield of wheat crop during 2018-19 is 35.07 q/ ha. Top three major producing states of wheat crop in India during 2018-2019 are Uttar Pradesh with a production of 32.75 million tonnes with 32.04 % share in all India production followed by punjab with a production of 18.24 million tonnes with 17.85% share in all India production and Madhya Pradesh with a production of 15.47 million tonnes with 15.14% share in all India production. Irrigated area of wheat crop during the period 2015-16 is 94.2%. (Source: Pocket book of agricultural statistics 2019, Government of India, Ministry of agriculture & Farmers welfare, Department of Agriculture, Cooperation & Farmers welfare, Directorate of Economics & Statistics, New Delhi).

Singh *et al.*, (2018) reported that under timely sown condition, wheat crop experienced prolonged favorable growth environment which resulted in higher accumulation of carbon photosynthates and ultimately enhanced the yield attributes positively. To improve the production of wheat, as in any other crop, introduction of varieties with a high yield potential is essential. Variety contributes more than 50% of the increased production. In India, numbers of wheat varieties are cultivated but due to fast changing ecosystem these varieties become susceptible to different insects, pests and diseases which cause a decline in yield. It was thus decided to generate a steady flow of new varieties, deriving resistant from diverse sources, to replace the old varieties for sustainable higher production. From above points in view the present experiment was framed and conducted to achieve better results.

Materials and Methods

The field experiment was conducted during Rabi season of 2019-20 at Students' instructional farm of Chandra Shekhar Azad University of Agriculture and Technology, Kanpur. The experiment was laid out in split plot design containing three sowing dates viz. 15th November, 30th November, 15th December in main plots and three wheat varieties viz. HD 2733, K 0307, K 9107, HD-2967 as sub plot treatments. The experimental field soil was sandy loam in texture having 140-150 kg ha-1, 19.58 kg ha-1 and 225.72 kg ha-1 nitrogen, phosphorus and potassium, respectively. Seed of each variety at the rate of 100 kg per hectare was used in each sowing date. A uniform recommended dose of 120 kg N, 60 kg P2O5 and 60 kg K2O ha-1 was applied for wheat crop through Urea, DAP and Muriate of potash, respectively and 25 kg ZnSo4. One-third dose of nitrogen and full dose of phosphorous and potassium were applied as basal and remaining 2/3rd of nitrogen was applied as top dressing in two equal splits at tillering and panicle initiation stage.

Results and Discussion

Plant population per m^2

The date of sowing has no affect on plant population per m^2 at different dates of sowing but the varieties has shown significant difference among different varieties with regard to plant population per m^2. The highest plant population per m^2 were recorded in wheat variety K 9107 (123.083 plants per m^2) and the lowest recorded in case of wheat variety HD 2733(120.083 plants per m^2) (Table 1).

Dry matter accumulation (g/m^2)

It is found that dry matter accumulation significantly decreased by delay in sowing time. The variety sown on 15th November accumulates highest dry matter, which was significantly higher than 30th November and 15th December. Varieties differed significantly in their dry matter accumulation. Variety k 9107 accumulated significantly higher dry matter than all other varieties under experiment at all stages of their crop growth. Similar findings were reported in Verma and Singh (1988).

Ghosh *et al.,* (2000) reported that delay in sowing decreased the dry-matter accumulation at all the growth stages under study. Early sown crop (16 November) recorded the highest dry-matter accumulation at all growth stages than the crop sown on 26 November and 6 December. The increased dry-matter accumulation in early sown crop was mainly because of favorable cool weather available for longer period than what was available to the late sown one.

Length of ear (cm)

On 15th November sown crop (10.094 cm) produced the ear of highest length which was significantly superior to the crop sown on 30th November (9.906 cm) and 15th December sown crop (9.538 cm). Varieties also showed significant influence on ear length and K 9107 (10.108 cm) was recorded maximum ear length followed by HD 2967 (10.033 cm), HD 2733 (9.783 cm) and K 0307 (9.458 cm).

Similar findings reported by Upadhyay *et al.,* (2015). Shahzad *et al.,* (2007) reported that the crop sown on November 15 produced the longest spikes (10.33 cm) that was statistically similar to those produced by November, 30 sowing (9.86 cm) and both of these crops significantly differed from the crop sown on December 15 which produced spikes of length 8.92 cm. This may be due to the availability of longer growing period.

Test weight (g)

The test weight significantly decreased with delay in sowing. It was highest in the crop sown on 15th November (36.725 g) which was significantly higher than 30th November sowing (34.869 g) and 15th December (33.494 g). The data clearly showed significant difference in test weight of varieties. The highest test weight was recorded in HD 2967 (36.008 g) followed by HD 2733 (35.317 g), K 0307 (34.658 g) and K 9107 (34.133 g).

Mahajan and Nayeem (1990) reported that the earliest sowing (November, 1) gave the highest test weight of grain in comparison to late sowing (November, 20). Similar results have also been reported by Sekhon and Singh (1991); Singh and Uttam (1993). Nainwal and Singh (2000) reported that with one month delay in sowing after 27 November there was significant reduction in 1000-grain weight. Immature and shriveled grains are produced in late sown crop, which remain in the milk stage during the period of high temperature.

On the other hand, the timely sown crop gets an advantage because after having completed its vegetative growth satisfactory it comes in the earing stage when the temperature is quite favourable. Shirpurkar *et al.,* (2007) reported non-significant effect of sowing dates on 1000-grain weight, however high test weight was recorded in November 11 in comparison to November, 27 sown crop. Shahzad *et al.,* (2007) reported that the earlier sowing resulted in better development of the grains accordingly and resulted in higher 1000-grain weight.

Table.1 Effect of dates of sowing and varieties with their interaction on dry matter production at different phenophases of wheat during *Rabi*, 2019-20

Treatments	CRI	Tillering	Jointing	Panicle initiation	Anthesis	Milking	Dough	Maturity
Dates of sowing								
D1:15th NOV	61.675	220.538	325.788	673.994	875.581	943.844	1018.738	1277.794
D2:30th NOV	59.794	213.806	319.081	654.963	845.950	888.575	942.919	1202.131
D3:15th DEC	56.856	207.300	313.086	628.781	795.813	827.538	894.125	1102.250
SE(d)±	0.366	1.040	1.739	1.815	3.654	7.081	2.824	8.278
C.D..(P=0.05)	0.914	2.595	4.338	4.528	9.115	17.663	7.045	20.649
Varieties								
V1:HD 2733	59.325	213.725	319.125	650.100	835.375	888.875	953.992	1200.217
V2:K 0307	56.683	207.083	313.333	639.583	777.600	837.875	900.375	1109.950
V3:K 9107	61.425	218.917	323.967	663.308	883.800	927.950	986.892	1244.567
V4:HD 2967	60.333	215.800	321.808	657.325	859.683	891.908	966.450	1221.500
SE(d)±	0.798	1.510	1.349	2.513	3.873	3.831	2.641	9.708
C.D..(P=0.05)	1.646	3.116	2.783	5.183	7.990	7.903	5.448	20.025
INTERACTION								
V X D								
SE(d)±	1.382	2.616	2.337	4.352	6.709	6.636	4.575	16.815
C.D.(P=0.05)	NS	NS	NS	NS	14.660	15.415	10.102	NS
D X V								
SE(d)±	1.252	2.493	2.668	4.183	6.864	9.119	4.865	16.750
C.D..(P=0.05)	NS	NS	NS	NS	14.998	21.185	10.744	NS

Table.2 Effect of dates of sowing and varieties with their interaction on plant population, length of ear, test weight, grain yield, straw yield of wheat and cost of cultivation and benefit – cost ratio during *Rabi*, 2019-20

Treatments	Plant population (no. of plants per m^2)	Length of Ear (cm)	Test weight (g)	Grain yield (kg/ha)	Straw yield (kg/ha)	Cost of cultivation (Rs)	B:C Ratio
Dates of sowing							
D1:15th NOV	122.438	10.094	36.725	47.144	80.569	42,336.000	3.040
D2:30th NOV	121.250	9.906	34.869	43.156	76.713	40,905.000	2.793
D3:15th DEC	121.688	9.538	33.494	35.281	74.875	39474.000	2.866
SE(d)±	0.991	0.063	0.153	0.672	0.745	-	3.152
C.D..(P=0.05)	NS	0.157	0.381	1.677	1.859	-	0.055
Varieties							
V1:HD 2733	120.083	9.783	35.317	43.750	76.317	40,905.000	3.040
V2:K 0307	122.167	9.458	34.658	40.067	70.600	40,905.000	2.793
V3:K 9107	123.083	10.108	34.133	37.417	86.950	40,905.000	2.866
V4:HD 2967	121.833	10.033	36.008	46.208	75.675	40,905.000	3.152
SE(d)±	0.945	0.071	0.146	0.914	0.476	-	0.055
C.D..(P=0.05)	1.949	0.147	0.300	1.886	0.982	-	0.113
INTERACTION							
V X D							
SE(d)±	1.637	0.124	0.252	1.583	0.825	-	-
C.D.(P=0.05)	NS	NS	0.556	NS	1.886	-	-
D X V							
SE(d)±	1.729	0.124	0.267	1.527	1.032	-	-
C.D..(P=0.05)	NS	NS	0.558	NS	2.362	-	-

Shirpurkar *et al.*, (2008) revealed that, the early sowing (8th Nov) gave significantly more 1000-grains weight (48.01 g) than the mid sowing (30th Nov) (47.93 g) and late sowing (20th Dec) (44.13 g).

Grain yield and straw yield (q/ha)

The data indicate that the grain yield significantly decreased as sowing was delayed from 15 November. All the dates of sowing differed significantly to each other in grain yield. The highest grain yield was obtained in the crop sown on 15th November (44.7144 q per ha) followed by 30th November (43.156 q per ha) and 15th December (35.281 q per ha). The grain yield was significantly influenced by different varieties and all varieties were noticed significant difference to each other. The highest grain yield was produced by HD 2967 (46.208 q per ha) followed by HD 2733 (43.750 q per ha), K 0307(40.067 q per ha) and K 9107 (37.417 q per ha), respectively. Similar findings were reported by Dubey *et al.*, (2008) and Verma and Singh, 1988. Das *et al.*, (1996) found that sowing on November, 15 produced the highest grain yield which was closely followed by sowing on November, 30 and both were significantly higher than December, 15 sowing. Reduction in number of spikes m -2 and 1000-grain weight due to delayed sowing ultimately resulted in lower grain yield, which has also been reported by Venkitaswamy *et al.*, (1991). Lathwal and Thakral (1999) recorded the decreasing trend in grain yield with the delay in sowing. The crop sown on November, 5 and 15 recorded 48 and 39% more grain yield over December, 5 and 23 and 15% over November, 25 sowing, respectively. Sarkar and Torofder (1992) also reported similar effects on grain yield under rainfed conditions. Straw yield significantly affected by sowing time of the crop. The highest straw yield was recorded in the crop sown on 15th November (80.569 q per ha) followed by the crop sown on 30th November (76.713 q per ha) and on 15th December (74.875 q per ha). Difference in straw yield of varieties was significant (Table 2).

Highest straw yield was recorded in K 9107 (86.950 q per ha) followed by HD 2733 (76.317 q per ha), HD 2967 (75.675 q per ha) and K 0307(70.600 q per ha). Similar findings were reported by Verma and Singh, 1988.Nainwal and Singh (2000) reported that the straw yield decreased significantly with delay in sowing. Das *et al.*, (1996) found that sowing on November, 15 produced the highest straw yield which was closely followed by sowing on November, 30 and both were significantly higher than December, 15 sowing. Kumar and Madan (1995) also recorded significantly higher straw yield in normal sowing time over late sowing.

Economics

Calculated data from treatment wise cost of cultivation shown that highest cost of cultivation recorded for 15th November date of sowing followed by 30th November sowing and 15th December sowing. Among varieties cost of cultivation was same for all four varieties such as HD 2733, K 0307, K 9107, HD 2967. Calculated data from treatment wise B:C Ratio shown that highest B:C Ratio recorded for 15th November date of sowing followed by 30th November sowing and 15th December sowing. Among varieties the highest B:C Ratio recorded for HD 2967 followed by HD 2733, K 9107 and K 0307.

On the basis of present study, it can be concluded that sowing of wheat during 15th November with variety HD 2967 was found to be best. By economic analysis it was found that best B:C ratio was recorded during 15th November with variety HD 2967.

References

Das, K., Das, S.Y. and Guha, B. 1996. Effect of sowing time on rainfed wheat varieties in Assam. Annals of Agricultural Research 17(2): 193-195.

Dubey, A. P., Singh, C. B., Khan, N., Yadav, P. N. and Tiwari, A. N. (2008). Influence of weather parameters on wheat yield under varying sowing dates. Journal of Agrometeorology: 4 (5):74-77.

Ghosh, D.C., Nandi, P. and De, B. 2000. Phenological development and productivity of wheat (*Triticum aestivum*) at different dates of sowing. Indian Journal of Agricultural Sciences 70(6): 393-395.

Kumar, R. and Madan, S. 1995. Effect of sowing time and fertilization on yield and quality of improved wheat (*Triticum aestivum* L.) cultivars. Crop Research 10(3): 253-257.

Lathwal, O.P. and Thakral, S.K. 1999. Performance of wheat varieties sown on different dates under rainfed conditions. Crop Research (Hisar) 18(3): 470- 471.

Mahajan, A.R. and Nayeem, K.A. 1990. Effects of dates of sowing on test weight, protein per cent and yield in wheat and triticale genotypes. Journal of Maharastra Agricultural Universities 15(1): 69-71.

Nainwal, K. and Singh, M. 2000. Varietal behaviour of wheat (*Triticum aestivum*) to dates of sowing under Tarai region of Uttar Pradesh. Indian Journal of Agronomy 45(1): 107-113.

Pocket book of agricultural statistics 2019, Government of India, Ministry of agriculture & Farmers welfare, Department of Agriculture, Cooperation & Farmers welfare, Directorate of Economics & Statistics, New Delhi.

Sarkar, S and Torofder, M.G.S. 1992. Effect of sowing and seed rate on wheat (*Triticum aestivum*) under rainfed conditions. Indian Journal of Agronomy 37: 352-354.

Sekhon, N.K. and Singh, G. 1991. Effect of sowing time and growth regulators on wheat productivity, new trends in Plant Physiology. Proceeding, national symposium on growth and differentiation in plants, New Delhi, India: Today and Tomorrow's printers and publishers pp 193-199.

Shahzad, M.A., Wasi-ud-Din, Sahi, S.T., Khan, M.M., Ehsanullah and Ahmad, M. 2007. Effect of sowing dates and seed treatment on grain yield and quality of wheat. Pakistan Journal of Agricultural Science 44(4): 581-583.

Shirpurkar, G.N., Kashid, N.V. and Pisal, A.A. 2007. Effect of different sowing dates and varieties on yield and yield attributes of wheat. Agricultural Science Digest 27(1): 68-70.

Shirpurkar, G.N., Wagh, M.P. and Patil, D.T. 2008. Comparative performance of wheat genotypes under different sowing dates. Agricultural Science Digest 28(3): 231-232. nd yield attributes of wheat. Agricultural Science Digest 27(1): 68-70.

Singh B, Kumar M, Dhaka AK. Relationship of temperature based meteorological indices with phenology and yield performance of wheat as influenced by sowing times. International Journal of Current Microbiology and Applied Sciences 2018; 7: 230-24.

Singh, V.P.N. and Uttam, S.K. 1993. Effect of different sowing dates on yield attributes and yield of different wheat cultivars in late sown conditions. Bhartiya Krishi Anusandhan Patrika 8(3): 158-162.

Upadhyay, R. G., Ranjan R., Negi, P. S.(2015). Influence of sowing dates

and varieties on productivity of wheat under mid Himalayan region of Uttarakhand. International Journal of Tropical Agriculture, 33(2): 1905-1909.

Venkitaswamy, R., Ramasami, K.P., Balasubramanianm, N. and Siddeswarn, K. 1991. Effect of time of sowing on the yield of rainfed wheat varieties. Madras Agricultural Journal 78: 347-350.

Verma, R. S. and Singh, M. (1988). Studies on grain development pattern and yield of wheat varieties under different sowing dates. Indian Journal of Agronomy, 33: 193-195.