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Performance of new wheat varieties at different dates of sowing under irrigated condition

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Abstract
The experimental study for the research entitled ''Performance of new wheat varieties at different dates of sowing under irrigated conditions'' was carried out at Instructional Farm of Barrister Thakur Chhedilal College of Agriculture and Research Station, Sarkanda, Bilaspur during *Rabi* 2021-22. The design was split plot with three replications. The treatment comprised of two dates of sowing in main plot *viz*, D_1 (13th November) and D_2 (3rd December) with seven genotypes in subplot *viz* HI1650, MACS6768, MP3535, GW513 (I), HI1544 (C), GW322 (C) and HI1636 (I). 100 kg of seeds were used per hectare, spaced 20 cm between, to sow the crop. The experimental site had neutral soil (6.9), which had a clay loam texture. Potash (268 kg ha^{-1}), low accessible nitrogen (275 kg ha^{-1}), medium phosphorus (13.75 kg ha^{-1}), and medium organic carbon (0.75 percent) were all present in the soil. For this experiment, a fertilizer dose of 120:60:40 NPK kg ha^{-1} was advised. The outcome demonstrated that plant population, growth parameters, including plant height, dry matter accumulation (g $plant^{-1}$), number of tillers, and yield attributes, including ear length (cm), weight of grain ear^{-1} head, number of grain ear^{-1} head, grain yield (q ha^{-1}), test weight (g), straw yield (q ha^{-1}), and harvest index (percent), were recorded maximum under the sowing date of 13th November (D_1) and minimum value was recorded under the sowing date of 3rd December (D_2). Among the genotypes, maximum growth and yield attributing parameters *viz*. number of tillers (m^{-2}), dry matter production (g $plant^{-1}$), grain yield and straw yield were recorded maximum in genotype (V_4) GW513 (I) which was at par with (V_5) HI1544 (C) followed by (V_2) MACS6768, while the minimum was recorded in genotype (V_3) MP3535.The genotype (V_4) GW513 (I) recorded the highest B:C ratio (1.93), net return (58,175 ₹ ha^{-1}), and gross return (88,275 ₹ ha^{-1}), and while the genotype (V_3) MP3535 recorded the lowest B:C ratio (1.45), net return (43,573 ₹ ha^{-1}) and gross return (73,673 ₹ ha^{-1}). Cost of cultivation was found same in all treatments.

Keywords: Wheat, varieties, yield, *Triticum aestivum* L.

Introduction
In India, wheat (*Triticum aestivum* L.) is the most widely consumed staple. With a global production of 792.40 million tonnes and a productivity of 3.52 t ha^{-1}, wheat covers an area of 224.49 million hectares. In India, between 82 and 85% of crops are irrigated; the remaining are farmed using a rain-fed environment.

Wheat has emerged as the foundation of India's food security. Due to its wide range of adaptability and great nutritional value, it is grown all over the world. It is a significant winter cereal that contributes around 38% of India's total grain production.

In India, 109.52 million tonnes of wheat are produced annually, with a productivity of 3.81 tonnes per hectare in 2017–18. After China, India is the country with the second-highest production and consumption of wheat (12% of global production). With 1.05 million hectares of land under cultivation, 3.05 million tonnes of wheat produced, and an average yield of 2.89 tonnes per hectare in 2017–18. Wheat is a significant *rabi* crop in Gujarat (Anonymous 2017-18). With an average productivity of 1.6 tonnes, wheat is grown on around 227 (000) ha of land in Chhattisgarh. (Anonymous 2021) [1].

In Chhattisgarh, almost 50% of the wheat is planted after the first week of December and suffers from heat stress, which drastically reduces production. Wheat that is planted too late experiences severe yield losses that might reach 40 to 50 percent. Heat stress has already been shown to have a substantial impact on lowering wheat production and quality.

Lack of improved varieties appropriate for late sowing conditions and having a short maturity due to the significantly shorter growing season accessible to crops is another crucial factor.

Additionally, in late-sown conditions, cultivars differ in production and nutrient uptake (Singh *et al*., 1998) [8].

The pre-dominant farming system in Chhattisgarh is rice and wheat. Wheat is sown later than usual in this cropping technique, making it more difficult to maintain a good yield. At tillering stage, optimum planting date could create good crop development that boosts the cold tolerance. Low temperature owing to late planting could create fewer tillers. The most significant wheat yield component is the number of kernels and spikes per m^{-2}. Reduced kernel counts per spike are a result of both early and late seeding of wheat. Temperature stress following anthesis produce dramatic effect on grain yield output through diminishing the kernel weight. The benefits of sowing at the right time include improved seed germination, plant height, spikelet number, grain weight, and 1000-grain weight.

Material and Methods

The experiment was carried out at the BTC College of Agriculture and Research Station's Research Farm in Bilaspur, Chhattisgarh, India, during the *rabi*of 2021–2022. At an elevation of 292.3 m above mean sea level, Bilaspur can be found at latitudes 22 098" N and 82 15" E. The area belongs to India's Eastern Plateau and Hill Region (Agro-climatic zone 7). The state of Chhattisgarh is divided into three agro-climatic zones, including the Chhattisgarh Plains zone including Bilaspur.The experimental site is classified as sub humid with hot summers and cool winters and is located in the country's seventh agro-climatic zone, the Eastern Plateau and Hills. At the experimental site, annual rainfall averages 1503 mm (based on an 80-year mean), with the majority of the rainfall (85%) falling between June and September. Summertime temperatures range from 37.9°C to 8.5°C. The hottest and coldest months are May and December, respectively. The wheat field experiment was done in with two parameters, namely two sowing dates and seven genotypes, the experiment was set up as a split plot design and replicated three times. Recommended dose of fertilizer 120:60:40 N:P:K kg ha^{-1} was applied through urea, Single super phosphate and murate of potash respectively. All treatments applied a base dose of 50% nitrogen together with full doses of P and K at the time of sowing, and the remaining 50% nitrogen was applied in two equal splits, with 1/4 applied after first irrigation (CRI) and the second dose applied right before ear emergence. Irrigation was originally used shortly after seeding in order to encourage robust germination throughout the crop season. At critical junctures in the crop's growth, subsequent irrigation was supplied as needed. As a result, the flood irrigation method was used to irrigate the wheat crop a total of five times. Initially, irrigation was used soon after seeding to promote strong germination all through the agricultural season. The crop received additional irrigation as necessary at pivotal points in its growth. As a result, the wheat crop was irrigated using the flood irrigation technique a total of five times. After harvest, bundles were transferred from the field to the threshing floor where they were sun dried for four days. After the bundle had dried in the sun, it was weighed. Bundle weighing was followed by independent threshing using a thresher in multiple conditions. The weight of the grain was measured after cleaning. The weight of the grain was then subtracted from the weight of the bundle to get the weight of the straw.

Results and Discussion

Plant height (cm)

Result revealed that numerically the highest plant height was recorded in D_1 (timely sown crop) on 13th November while the lowest plant height was recorded in D_2 (late sown crop) on 3rd December. Amongst the seven genotypes under study, plant height was statistically different. Among these genotypes maximum plant height was recorded in (V_4) GW513 (I) which was statistically at par with (V_5) HI1544 (C) and (V_2) MACS6768 while the minimum was recorded in (V_3) MP3535.

Interaction between sowing dates with genotypes was recorded to be non-significant.

Pathania *et al.* (2018) [3] the results reveal that the wheat sown on 20th November produced the maximum plant height, tillers per square metre, dry matter accumulation, grains per spike, and grain and straw yield. Among the cultivars, VL-907 demonstrated significantly higher grain yield in terms of grains/spike, grains, and straw.

Number of tillers (m^{-2})

Result revealed that numerically the maximum number of tillers was recorded in D_1 (timely sown crop) on 13th November while the minimum number of tillers was recorded in D_2 (late sown crop) on 3rd December. Similar trends were observed at 60DAS, 90 DAS and at harvest.

Amongst the seven genotypes under study, number of tillers was statistically different. Among these genotypes maximum number of tillers was recorded in (V_4) GW513 (I) which was statistically at par with (V_5) HI1544 (C) and (V_2) MACS6768 while the minimum was recorded in (V_3) MP3535.Interaction between sowing dates with genotypes was recorded to be non-significant.

Prajapat *et al.* (2018) [4] reported that GW 366 was sown on November 15th, and that this resulted in significant increases in the number of effective tillers $plant^{-1}$, effective tillers $meter^{-1}$, total tillers $meter^{-1}$, length of spike, number of grains $spike^{-1}$, weight of spike, test weight, grain yield, straw yield, biological yield, and harvest index.

Dry matter accumulation (g $plant^{-1}$)

Different sowing dates significantly influenced the total dry matter accumulation $plant^{-1}$ at all stages of growth. At 30th day, maximum total dry matter accumulation $plant^{-1}$ was noticed under plant grown in 13th November (D_1) which was significantly superior over 3rd December (D_2). Similar trends were observed at 60 DAS, 90 DAS and at harvest.

All genotype had significant effect on total dry matter accumulation $plant^{-1}$. It is depicted from data that at 30DAS, (V_4) GW513 (I) was recorded maximum for total dry matter accumulation, which was statistically at par with (V_5) HI1544 (C), (V_6) GW322 (C), (V_2) MACS6768, (V_1) HI1650 and (V_7) HI1636 (I) while the minimum was recorded under the genotype (V_3) MP3535. Similar trends were noticed at 60 DAS, 90 DAS and at harvest.

Alam *et al.* (2013) [5], reported that crop growth rate was recorded significantly more on 25th November than on 20th December.

Table 1: Plant height (cm) at successive stages of wheat as influenced by sowing dates and genotypes

		Plant height (cm)		
Treatments	**30 DAYS**	**60 DAYS**	**90 DAYS**	**AT Harvest**
A. Sowing dates				
D_1 (13th November)	31.34	70.51	97.13	94.12
D_2 (3rd December)	27.25	65.37	92.79	91.37
SEm ±	0.66	0.82	0.68	0.39
C.D. (P=0.05)	4.07	5.01	4.14	2.38
B. Genotypes				
HI1650	27.61	66.44	93.38	91.14
MACS6768	30.49	68.93	95.38	93.18
MP3535	26.54	64.89	91.73	89.27
GW513 (I)	32.32	71.52	98.79	96.95
HI1544 (C)	31.16	69.9	97.49	95.33
GW322 (C)	29.45	68.04	95.24	92.86
HI1636 (I)	27.52	65.89	92.69	90.5
SEm ±	0.85	0.92	0.72	0.94
C.D. (P=0.05)	2.48	2.7	1.02	2.77
Interaction				
SEm ±	1.2	1.3	1.02	1.34
C.D. (P=0.05)	NS	NS	NS	NS

Table 2: No. of tillerm^{-2} at successive stages of wheat as influenced by sowing dates and genotypes.

	No of tillers, m^{-2}			
Treatments	**30 DAYS**	**60 DAYS**	**90 DAYS**	**AT Harvest**
A. Sowing dates				
D_1 (13th November)	195.60	298.26	381.80	379.50
D_2 (3rd December)	192.25	294.68	376.25	373.36
SEm ±	0.54	0.53	0.89	0.98
C.D. (P=0.05)	3.32	3.24	5.44	5.97
B. Genotypes				
HI1650	192.53	292.30	374.59	372.38
MACS6768	197.06	303.17	385.45	383.10
MP3535	185.00	284.76	368.78	364.75
GW513 (I)	201.16	308.22	390.53	388.17
HI1544 (C)	198.74	303.00	385.28	382.92
GW322 (C)	194.70	299.46	381.78	379.25
HI1636 (I)	188.31	284.40	367.77	364.41
SEm ±	3.47	5.02	5.10	4.99
C.D. (P=0.05)	10.13	14.66	14.89	14.56
Interaction				
SEm ±	4.91	7.10	7.21	7.05
C.D. (P=0.05)	NS	NS	NS	NS

Table 3: Dry matter accumulation (g day^{-1} plant^{-1}) of wheat as influenced by sowing dates and genotypes.

	Dry matter accumulation (g day^{-1} plant$^{-1)}$			
Treatments	30 DAYS	60 DAYS	90 DAYS	AT HARVEST
A. Sowing dates				
D_1 (13th November)	0.70	7.85	21.14	29.53
D_2 (3rd December)	0.67	6.29	15.86	21.63
SEm ±	0.005	0.20	0.46	0.62
C.D. (P=0.05)	0.029	1.22	2.79	3.81
B. Genotypes				
HI1650	0.68	7.01	18.27	25.20
MACS6768	0.69	7.48	19.10	26.23
MP3535	0.66	6.39	17.23	24.03
GW513 (I)	0.71	8.05	20.03	27.37
HI1544 (C)	0.69	7.65	19.52	26.74
GW322 (C)	0.69	7.24	18.60	25.90
HI1636 (I)	0.67	5.69	16.74	23.63
SEm ±	0.008	0.30	0.30	0.46
C.D. (P=0.05)	0.023	0.90	0.89	1.34
Interaction				
SEm ±	0.011	0.43	0.43	0.65
C.D. (P=0.05)	NS	NS	NS	NS

Ear length (cm)

It is obvious from data that highest ear length (cm) was recorded in D_1 (13th November) while the minimum ear length was recorded in D_2 (3rd December).

As per data different genotypes indicated that genotypes had significant difference in ear length**.** Amongst seven genotypes, maximum ear length was recorded in (V_4) GW513 (I), which was at par with (V_5) HI1544 (C) while the minimum was recorded in genotype (V_3) MP3535.

Interaction effect between sowing dates and genotypes of ear length (cm) head was recorded as non-significant at harvest.

Similar result was reported by Prajapat *et al.*, (2018) [4] on sowing dates 15th November with genotype GW 366 gave maximum result.

Number of grains ear head^{-1}

The crop sown on 13th November (D_1) had the highest number of grains ear^{-1} head, while lowest number of grain ear^{-1} head was recorded in plant sown on 3rd December (D_2).

Amongst different genotypes, maximum number of grains per ear heads was recorded in (V_4) GW513 (I), which was at par with which was at par with (V_5) HI1544 (C), (V_6) GW322 (C), (V_2) MACS6768, (V_1) HI1650 and HI1636 (I) while the minimum was recorded in genotype (V_3) MP3535.

Interaction effect between sowing dates and genotypes of number of grain ear^{-1} head was recorded to be non-significant at harvest.

This may be because late-sowing conditions have lower temperatures, which inhibit cell division and cell expansion. Reduced cell growth also has a major impact on the meristematic development of yield-related components, such as the development of wheat's inflorescence or tiller initiations, which may result in undersized reproductive organs and decreased production. Due to the shortened growing period, there were fewer grains in ear-1 as compared to early sowing. These results are in line with those of Poonam and Uma (2015), Rahman *et al.*, (2015**)**.

Test weight (g)

The crop was grown on 13th November (D_1) had the maximum test weight, while the lowest test weight was recorded in plant grown on 3rd December (D_2).

Amongst different genotype (V_4) GW513 (I) was recorded with maximum test weight, which was at par with (V_5) HI1544 (C), followed by (V_6) GW322 (C) and (V_2) MACS6768, while the minimum was recorded in (V_3) MP3535.

Interaction effect between sowing dates and genotypes for test weight of wheat was recorded to be non-significant at harvest.

When compared to early sowings, delayed sowings produced the lowest test weight. Due to windy conditions that prevailed during the milking and grain filling stages, the drop in test weight caused by the delay in seeding was mostly the result of a shorter growth period. Charanjeet Kaur (2017) also reported similar finding.

Grain yield (q ha^{-1})

The crop was grown in 13th November (D_1) had the maximum grain yield, while the minimum grain yield was recorded in plant grown on 3rd December (D_2).

Amongst different genotypes, the maximum value of grain yield (44.66 qha^{-1}) was recorded in genotype (V_4) GW513 (I) which was at par with (V_5) HI1544 (C) and (V_2) MACS6768 while the minimum was recorded in genotype (V_3) MP3535.

Interaction effect between sowing dates and genotypes of grain yield was recorded to be non-significant at harvest.

Straw yield (q ha^{-1})

The crop grown on 13th November (D_1) had the maximum straw yield, while the minimum straw yield was recorded in plant grown on 3rd December (D_2). As per data, different genotypes also indicated that genotypes had significant difference in straw yield. Amongst different genotypes, the maximum value of straw yield (47.91 qha^{-1}) was recorded under the genotype (V_4) GW513 (I) which was at par with (V_5) HI1544 (C) (46.69 qha^{-1}), followed by (V_6) GW322 (C) (45.58 qha^{-1}) and (V_2) MACS6768 while the minimum was recorded in genotype (V_3) MP3535 (43.36 qha^{-1}).

Interaction effect between sowing dates and genotypes of straw yield was recorded as non-significant at harvest.

Pathania *et al.* (2018) [3] reported that wheat sown on 20th November recorded significantly highest straw yield. Among varieties, VL-907 recorded significantly highest straw yield and hence recorded significantly highest grain yield.

Table 4: Ear length (cm), grains ear^{-1} head, test weight (g), grain yield (q ha^{-1}), straw yield (q ha^{-1}) of wheat as influenced by sowing dates and genotypes.

Treatments	Ear length (cm)	No. of grains ear^{-1} head	Test Weight (g)	Grain yield (q ha^{-1})	Straw yield (q ha^{-1})
A. Sowing dates	9.96	31.27	43.21	44.71	46.37
D_1 (13th November)	9.71	28.45	40.86	37.35	44.23
D_2 (3rd December)	0.04	0.52	0.18	1.03	0.32
SEm ±	0.24	1.53	1.12	6.29	1.97
C.D.(P=0.05)	9.96	31.27	43.21	44.71	46.37
B. Genotypes					
HI1650	9.59	29.45	41.61	39.40	43.65
MACS6768	10.17	30.46	42.38	42.90	46.69
MP3535	8.81	28.67	41.33	37.27	43.36
GW513 (I)	10.61	30.72	43.09	44.66	47.91
HI1544 (C)	10.31	30.69	42.63	43.24	46.95
GW322 (C)	10.00	30.06	41.95	41.30	45.58
HI1636 (I)	9.37	29.47	41.26	38.47	42.94
SEm ±	0.11	0.52	0.42	0.78	1.20
C.D.(P=0.05)	0.31	1.53	1.25	2.28	3.21
Interaction					
SEm ±	0.15	1.74	1.60	1.11	1.70
C.D.(P=0.05)	NS	NS	NS	NS	NS

Conclusion

It is concluded from the study that 13th November is the best sowing time for wheat crop for getting higher yields and economic returns. Amongst the genotypes, (V_4) GW513 (I)was found superior in crop growth parameters, yields and economic returns followed by (V_5) HI1544 (C)and (V_2) MACS6768 respectively. Maximum gross, net return and B:C ratio was recorded under D_1 (date of sowing) and were recorded minimum under (D_2).

Reference

1. Anonymous. Krishi Darshika, Annual publication of Directorate of Extension Setrvices, IGKV, Raipur (C.G); c2021. p. 4.
2. Saini AD, Dadhwal VK. Sowing date on grain-growth and size in wheat. Indian Journal of Agricultural Sciences. 1988;56:439-447.
3. Pathania, Ranu, Prasad Rajendra, Rana, Ranbir Singh, Mishra Sudhir, *et al*. Growth and yield of wheat as influenced by dates of sowing and varieties in north western Himalayas. Journal of Pharmacognosy and Phytochemistry. 2018;7(6):517-520.
4. Prajapat BS, Jat RA, Diwedi A, Bairwa DD. Identification of Suitable Date of Sowing and Variety of Wheat (*Triticum aestivum* L.) for South Saurashtra, Gujarat under Changing Climatic Conditions, Int. J Curr. Microbiol. App. Sci. 2018;7(7):963-969.
5. Alam MDP, Kumar S, Ali N, Manjhi RP, Kumar N, Lakra RK, *et al*. Performance of wheat varieties under different sowing dates in Jharkhand, Journal of wheat research. 2013;5(2):16-64.
6. Poonam, Uma. effect of sowing dates on yield contributing characters and yield of some new wheat genotypes under irrigated conditions. Journal of Multidisciplinary Advance Research. 2015;4(1):32-35.
7. Charanjeet Kaur. Performance of wheat varieties under late and very late sowing conditions. ISSN: 2319-7706 2017;6(9):3488-3492.
8. Singh KB. Transcriptional regulation in plants: the importance of combinatorial control. Plant Physiology. 1998 Dec 1;118(4):1111-20.