International Journal of Advanced Biochemistry Research

ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2025): 5.29
IJABR 2025; SP-9(10): 1611-1616
www.biochemjournal.com
Received: 22-07-2025
Accepted: 25-08-2025

Laxmi Parja
Department of Agronomy, Indira Gandhi Krishi Vishwavidyalaya, RMD College of Agriculture and Research Station, Ambikapur Chhattisgarh, India

PS Rathiya
Department of Agronomy, Indira Gandhi Krishi Vishwavidyalaya, College of Agriculture and Research Station, Pratappur, Surajpur, Chhattisgarh, India

RS Sidar
Department of Agronomy, Indira Gandhi Krishi Vishwavidyalaya, RMD College of Agriculture and Research Station, Ambikapur, Chhattisgarh, India

Lalita Rajwade
Department of Agronomy, Indira Gandhi Krishi Vishwavidyalaya, RMD College of Agriculture and Research Station, Ambikapur, Chhattisgarh, India

Corresponding Author:
Laxmi Parja
Department of Agronomy, Indira Gandhi Krishi Vishwavidyalaya, RMD College of Agriculture and Research Station, Ambikapur, Chhattisgarh, India

Performance of wheat (*Triticum aestivum* L.) varieties under different dates of sowing in northern hill zone of Chhattisgarh

Laxmi Parja, PS Rathiya, RS Sidar and Lalita Rajwade

DOI: https://www.doi.org/10.33545/26174693.2025.v9.i10St.6069

Abstract
The present investigation entitled "Performance of wheat (*Triticum aestivum* L.) varieties under different dates of sowing in northern hill zone of Chhattisgarh" was carried out during *Rabi* of 2024-25 at Department of Agronomy under field, Raj Mohini Devi College of Agriculture and Research Station Ajirma, Ambikapur (C.G.). The experiment was conducted in split plot design with 03 replication 09 treatments were allocated in each replication. The treatment consisting of three varieties as main plot *viz*. V_1-Kanishka, V_2-Vidya and V_3-Mavanti with three dates of sowing as sub plot *viz*. D_1-30th November, D_2-15th December and D_3-30th December. 120:60:40 (NPK) kg of fertilizers was used per hectare for the crop, spaced 22.5 cm in rows.

Result showed that growth parameters, including plant stand (m^{-2}), plant height (cm), number of tillers (m^{-2}), dry matter accumulation (g $plant^{-1}$), crop growth rate (g m^{-2} day^{-1}), 50% ear head emergence and yield attributes, including effective tillers (m^{-2}), number of ear $plant^{-1}$,length of ear (cm), ear $weight^{-1}$ (g), number of grains ear^{-1}, 1000-grain weight (g), grain yield (45.13 q ha^{-1}), straw yield (51.36 q ha^{-1}), harvest index (48.40%), net return (₹ 85535 ha^{-1}) and B:C ratio (2.72) were highest under variety Mavanti (V_3) as compared to Vidya (V_2) and Kanishka (V_1).

Among the dates of sowing, maximum all growth parameters, plant stand (m^{-2}), plant height (cm), number of tillers (m^{-2}), dry matter accumulation (g $plant^{-1}$), crop growth rate (g m^{-2} day^{-1}), 50% ear head emergence and yield attributing characters *viz*. effective tillers (m^{-2}), number of ear $plant^{-1}$, length of ear (cm), ear $weight^{-1}$ (g), number of grains ear^{-1}, 1000-grain weight (g), grain yield (46.00 q ha^{-1}), straw yield (51.58 q ha^{-1}), harvest index (48.21%), net return (₹ 87637 ha^{-1}), and B:C ratio (2.78) were highest crop sown on 30th November (D1) as compared to 15th December (D2) and 30th December (D3).

Keywords: Wheat, variety, date of sowing, growth and yield

Introduction
Wheat (*Triticum aestivum* L.) is one of the predominant meals grain crops of the sector together with India is the second one largest wheat producing united states of america after China which contributes extra than 30% to the arena wheat production. India produced about 113.29 million tons of wheat form an area of 31.83 million hectare with an average productiveness of 3560 kg ha^{-1} (IPAD, 2024)[1]. Chhattisgarh, which is one of the principal wheat growing states, produced 4.20 million tons of wheat from 2.67 million hectares vicinity with a median productivity of 1600 kg ha^{-1} (Anonymous, 2025) [2].

Wheat is cultivated beneath various agro-climate situations (four hundred m to 1000 m amsl) low to medium hill of northern hill region in Chhattisgarh at some stage in the rabi season. Yield capability of wheat in northern hill place isn't always being exploited completely due to many factors, amongst which use of mistaken sowing date and low yielding sorts are the maximum vital ones. The productiveness of wheat in the area is round 1.6 t/ha, compared to the countrywide common of 3.5 t/ha. Around 90% of the wheat in the vicinity is cultivated under rainfed condition, even as irrigated location is most effective 4%. Relatively cooler season and lengthy crop length in this area presents congenial situation to achieve pretty suitable yield. No matter this, wheat productivity inside the vicinity, is pretty low as compared with the country wide average. Maximum of the wheat, which is sown on this vicinity, is late sown. Date planting performs an critical function in productivity of wheat. Drastic discount in yield of wheat has been recorded with the delay of sowing beyond most fulfilling time.

it has been anticipated that put off in sowing of wheat past 15 December, led to yield reduction of 50 kg advantage/day/ha (Singh *et al.*, 2001) [19]. Overdue sown wheat is uncovered to each the extreme of temperature i.e. low temperature in the course of early increase period, which limit the vegetative section and excessive temperature for the duration of put up anthesis period, which lessen the duration of grain development and therefore the grain yield. well timed sowing of wheat presents top-quality environment for crop increase to accumulate more biomass and eventually better grain yield. beneath past due sown condition wheat crop exposed to low temperature at the germination, which behind schedule the crop emergence and to better temperature at the reproductive phase results in force maturity and led to reduction of the yield and yield attributes (Gupta *et al.*, 2017) [5]. at the same time as too early sowing produced susceptible vegetation with negative root gadget which in the long run affected boom, yields attributes and yield of the crop adversely (Nahar *et al.*, 2010) [10].

Materials and Methods

The field experiment was carried out during Rabi, 2024-25 at Department of Agronomy under field, Raj Mohini Devi College of Agriculture and Research Station Ajirma, Ambikapur (C.G.) Geographically, Ambikapur is situated in the north of Chhattisgarh and lies between 2309' N latitude and 83008' E longitude having an altitude of 592.62m mean sea level. The soil was neutral (pH 6.2) in nature with medium in fertility having 0.38% soil organic carbon, low N (254.52 kg ha^{-1}), medium P (12.5 kg ha-1) and medium K (306.56 kg ha^{-1})

The experiment was laid out with three varieties V1-Kanishka, V2-Vidya and V3-Mavanti along with three dates of sowings D1-30th November, D2-15th December and D3-30th December under split plot design with three replications, varieties as main plot and dates of sowing as sub plot at northern hill zone of Chhattisgarh.

Results and Discussion

Plant stand (m^{-2})

Plant stand was recorded at 30 DAS was found to be non-significant as influenced by varieties and dates of sowing, were observed among the varieties. The highest plant stand was recorded with Mavanti (V3), which was statistically at par with Vidya (V2), whereas the lowest plant stand was recorded with Kanishka (V1). It was found that there was no significant interaction between varieties and dates of sowing.

Similarly, among the dates of sowing highest plant stand was observed when the crop sown on 30th November (D1), followed by 15th December (D2), while the lowest plant stand was recorded when crop sown on 30th December (D3).

Plant height (cm)

The information on the progression of plant height, which measured at harvest. Among the varieties, Mavanti (V1) consistently recorded higher plant height at all the crop stages of observation, while Kanishka (V3) showed the lowest plant height at all the crop stages of investigation. It was found that there was no significant interaction between varieties and dates of sowing.

Among the dates of sowing, the highest plant height was observed the crop sown on 30th November (D1), whereas shortest plants height was observed under the crop sown on 30th December (D3). In the present study, November month sowing treatments showed a more favorable impact on the crop compared to December month sowing. The result obtained by Gowda *et al.* (2017) [6].

Number of tillers (m^{-2})

The information on the number of tillers recorded at harvest. Among the varieties, Mavanti (V3) produced a maximum number of tillers at all observation stages, while Kanishka (V1) consistently recorded the lowest number of tillers. It was found that there was no significant interaction between varieties and dates of sowing.

Among the dates of sowing, the maximum number of tillers was recorded the crop sown on 30th November (D1) at all observation stages. The minimum number of tillers was consistently recorded under the crop sown on 30th December (D3). The result was according to Nizamuddin *et al.* (2014) [11] and Dubey *et al.* (2019) [4].

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

Dry matter accumulation recorded 0-30, 30-60, 60-90 DAS and at harvest. Among varieties, Mavanti (V3) consistently exhibited the maximum dry matter was recorded at all growth stages, followed by Vidya (V2), whereas Kanishka (V1) recorded the minimum. The decline in dry matter under delayed sowing was due to the hormonal stress tolerance capacity of a particular variety to higher temperature.

Among the dates of sowing, the maximum dry matter was recorded the crop sown on 30th November (D1), followed by Vidya (D2), while the minimum was recorded with 30th December (D3). The increase in dry matter accumulation was also reported by Singh *et al.* (2022) [21] and Kaur *et al.* (2018) [7]. A timely sown crop may have taken longer than expected to reach the required growth and development which could account for the higher dry matter accumulation. It was found that there was no significant interaction between varieties and dates of sowing.

Crop growth rate (g m^{-2} day^{-1})

Crop growth rate of wheat was recorded between 90 DAS-at harvest intervals. Among the varieties, Mavanti (V3) recorded the highest crop growth rate at all the crop growth stages, followed by Vidya (V2), while the minimum crop growth rate was observed in Kanishka (V1) at all stages of crop.

Among the dates of sowing, the crop sown on 30th November (D1) recorded the maximum crop growth rate during all growth intervals, followed by 15th December (D2) whereas the crop sown on 30th December (D3) exhibited the lowest CGR values. It can be concluded that Mavanti (V3) variety with 30th November (D1) sowing was the most effective treatment in achieving higher crop growth rate, which is a crucial determinant for realizing maximum grain yield in wheat. It was found that there was no significant interaction between varieties and dates of sowing.

Days to 50% ear head emergence

Among the varieties, the crop attained 50% earhead emergence earliest in Kanishka (V1), followed by Vidya (V2) whereas Mavanti (V3) took the maximum number of days to reach 50% earhead emergence. The variation in duration among varieties may be attributed to their inherent genetic differences and growth habits. It was found that there was no significant interaction between varieties and dates of sowing.

Among the dates of sowing, the crop sown on 30th November (D1) attained 50% earhead emergence earlier compared to the crop sown on 15th December (D2) and 30th December (D3). The late-sown crop 30th December (D3) recorded delayed earhead emergence, which may be due to exposure to lower temperatures and shortened growing period during reproductive stages. These results were according to Ram *et al.* (2012) [15].

Effective tillers (m^{-2})

Among the varieties, Mavanti (V3) recorded the maximum number of effective tillers (m^{-2}), followed by Vidya (V2), whereas the minimum number of effective tillers was observed in Kanishka (V1). Among the dates of sowing, the crop sown on 30th November (D1) produced the highest number of effective tillers, which was significantly superior to crops sown on 15th December (D2) and 30th December (D3). The lowest number of effective tillers was observed under late sowing 30th December (D3). These results are in conformity with the findings of Kumar *et al.* (2024) [9] and Shah *et al.* (2006) [17]. It was found that there was significant interaction between varieties and dates of sowing.

Number of ear plant^{-1}

Among the varieties, the maximum number of ears per plant was recorded in Mavanti (V3), followed by Vidya (V2), whereas the lowest number of ears plant^{-1} was observed in Kanishka (V1).

Among the dates of sowing, the crop sown on 30th November (D1) produced the maximum number of ears per plant, followed by15th December (D2), while the crop sown on 30th December (D3) recorded the minimum. The reduction in the number of ears plant^{-1} under delayed sowing (30 December) might be due to unfavorable climatic conditions and reduced tiller survival during the reproductive phase. Interaction effect between varieties and dates of sowing was found to be non-significant.

Length of ear (cm)

Among the varieties, longer ear length was observed in Mavanti (V3), followed by Vidya (V2), whereas the shortest ear length was recorded in Kanishka (V1). The superiority of Mavanti may be attributed to its better genetic potential for spike development and efficient utilization of assimilates for reproductive growth.

Among the dates of sowing, the crop sown on 30th November (D1) produced longer ears as compared to15th December (D2) and 30 December (D3). The lowest ear length was noticed under late sowing 30th December (D3), which may be due to shorter growing period and adverse climatic conditions during the reproductive stage, thereby restricting spike elongation. Similar result was reported by Prajapat *et al.* (2018) [14]. The interaction effect between varieties and dates of sowing was found to be non-significant.

Ear weight^{-1} (g)

Among the varieties, the maximum ear weight^{-1} was recorded in Mavanti (V1), followed by Vidya (V2), whereas the minimum ear weight^{-1} was recorded in Kanishka (V3).

Among the dates of sowing, the crop sown on 30th November (D1) registered significantly higher ear weight as compared to 15th December (D2) and 30 December (D3). The lowest ear weight was observed in the late-sown crop 30th December (D3), which may be attributed to the reduced grain-setting capacity and shorter grain filling duration under unfavorable temperature conditions. These results were reported by Shivpurkar *et al.* (2008) [18]. It was found that there was no significant interaction between varieties and dates of sowing.

Number of grains ear^{-1}

Among the varieties, the maximum number of grains ear^{-1} was recorded in Mavanti (V3), followed by Vidya (V2), while the minimum was observed in Kanishka (V1). The superiority of Mavanti may be attributed to its longer spike length, better floret fertility, and efficient assimilate partitioning towards the developing grains. The interaction between varieties and dates of sowing was found to be non-significant.

Among the dates of sowing, the crop sown on 30th November (D1) registered significantly higher number of grains ear^{-1} compared to 15th December (D2) and 30 December (D3). The lowest number of grains ear^{-1}was recorded under late sowing 30th December (D3), which could be due to adverse climatic conditions during the flowering and grain-setting stage, leading to reduced pollination and spikelet fertility. Similar results were reported by Pathania *et al.* (2018) [12].

1000-grain weight (g)

Among the varieties, the maximum 1000-grain weight was recorded in Mavanti (V3), followed by Vidya (V2), while the minimum 1000-grain weight was observed in Kanishka (V1). The superiority of Mavanti may be attributed to its bold grains, better assimilate translocation during grain filling, and longer duration for maturity, which enhanced grain weight.

Among the dates of sowing, the crop sown on 30th November (D1) produced the highest 1000-grain weight, followed by15th December (D2), whereas the lowest 1000-grain weight was recorded under late sowing 30th December (D3). The reduction in grain weight under delayed sowing might be due to shortened grain filling period and high temperature stress during the reproductive stage, leading to shriveled and lighter grains. It was found that there was no significant interaction between varieties and dates of sowing. Similar results were reported by Kaur *et al.* (2020) [8].

Grain yield (q ha^{-1})

Among the varieties, Mavanti (V3) recorded the highest grain yield (45.13 q ha^{-1}) which was significantly superior to Vidya (V2) and Kanishka (V1). The Crop sown on 30th November (D1) produced the maximum grain yield (46.00 q ha^{-1}) which was significantly superior to 15th December (D2) and 30th December (D3) sowing. The reduction in yield under late sowing might be due to exposure of the crop to terminal heat stress and shorter grain filling duration, thereby adversely affecting translocation of photosynthates. These results are in agreement to the findings of Alam *et al.* (2013)[3] and Singh *et al.* (2018) [20]. The interaction effect varieties and dates of sowing was found to be significant.

Straw yield (q ha^{-1})

Among the varieties, Mavanti (V3) recorded the highest straw yield (50.10 q ha^{-1}) whereas the minimum was observed in Kanishka (V1). Amongst the dates of sowing, the crop sown on 30th November (D1) recorded significantly higher straw yield (50.05 q ha^{-1}) which was significantly superior to 15th December (D2) and 30th December (D3) sowing. The lowest straw yield was noticed in the late-sown

crop (30 December), which may be attributed to reduced vegetative period, poor growth conditions, and restricted biomass accumulation due to unfavorable climatic factors. These results are in line with those of Ram *et al.* (2012) [15], Poonam and Uma (2015) [13] and Rahman *et al.* (2015) [16]. The interaction effect varieties and dates of sowing was found to be significant.

Harvest index (%)

Significantly the highest harvest index was recorded 48.40%) with crop variety Mavanti (V3) over rest of other varieties. Among the dates of sowing on 30th November (D1) gave highest harvest index over other sowing dates. The interaction between varieties and dates of sowing showed non-significant effect on harvest index. These results according to Ram *et al.* (2012) [15].

Economics (Gross return, Net return, and B:C ratio)

The variety Mavanti (V3) brought out the highest gross return of ₹116955 q ha^{-1}, net return of ₹85535 q ha^{-1} and B:C ratio of 2.72 respectively, which excelled over those computed under other varieties. Among the dates of sowing, maximum gross return ₹119057 q ha^{-1}, net return ₹87637 q ha^{-1} and B:C ratio of 2.78 respectively, were crop sown on 30th November (D1). The interaction of varieties and dates of sowing had non-significant influence on gross return, net return, and B:C ratio.

Table 1: Effect of date of sowing on plant stand (m^{-2}), plant height (cm), number of tillers (m^{-2}), dry matter accumulation (g $plant^{-1}$) of wheat varieties

Treatments	Plant stand (m^{-2})	Plant height (cm)	Number of tillers (m^{-2})	Dry matter accumulation (g $plant^{-1}$)
	30 DAS	At harvest	At harvest	At harvest
Varieties				
V_1-Kanishka	80.22	75.49	283.75	22.96
V_2-Vidya	83.67	76.38	288.24	23.99
V_3-Mavanti	86.89	78.98	293.79	25.10
SEm (±)	2.47	0.41	1.29	0.13
CD (P = 0.05%)	NS	1.60	3.87	0.51
Date of sowing				
D_1-30 November	86.11	78.71	299.62	25.01
D_2-15 December	82.78	77.13	286.37	24.11
D_3-30 December	80.89	75.00	285.62	22.92
SEm (±)	2.53	1.26	3.26	0.24
CD (P = 0.05%)	NS	3.89	9.76	0.74
Interaction (V x D)	NS	NS	NS	NS

Table 2: Effect of date of sowing crop growth rate (g m^{-2} day^{-1}) and days to 50% ear head emergence of wheat varieties

Treatments	Crop growth rate (g m^{-2} day^{-1})				Days to 50% ear head emergence
	0-30 DAS	30-60 DAS	60-90 DAS	90 DAS-At harvest	
Varieties					
V_1-Kanishka	0.021	0.172	0.383	0.191	50.56
V_2-Vidya	0.023	0.178	0.413	0.193	52.11
V_3-Mavanti	0.024	0.199	0.422	0.199	55.00
SEm (±)	0.09	0.01	0.01	0.01	0.96
CD (P = 0.05%)	0.03	0.05	0.04	0.06	3.77
Date of sowing					
D_1-30 November	0.025	0.202	0.408	0.203	55.89
D_2-15 December	0.026	0.176	0.401	0.198	52.67
D_3-30 December	0.021	0.171	0.392	0.187	49.11
SEm (±)	0.01	0.09	0.04	0.04	0.34
CD (P = 0.05%)	0.06	0.03	0.01	0.02	1.04
Interaction (V x D)	NS	NS	NS	NS	NS

Table 3: Effect of date of sowing on effective tillers (m^{-2}), number of ear $plant^{-1}$, length of ear (cm), ear $weight^{-1}$ (g), number of grains ear^{-1}, 1000-grain weight (g) of wheat varieties

Treatments	Effective tillers (m^{-2})	Number of ear $plant^{-1}$	Length of ear (cm)	Ear $weight^{-1}$ (g)	Number of grains ear^{-1}	1000-grain weight (g)
Varieties						
V1-Kanishka	304.67	4.03	8.05	1.45	48.20	38.02
V2-Vidya	308.44	4.23	9.01	2.65	52.60	40.01
V3-Mavanti	310.67	5.07	9.06	2.80	55.10	41.05
SEm (±)	0.82	0.20	0.18	0.05	1.25	0.45
CD (P = 0.05%)	3.22	0.78	0.54	0.14	3.75	1.35
Date of sowing						
D1-30 November	313.00	5.50	9.07	2.90	56.40	42.00
D2-15 December	307.89	4.04	9.00	2.65	51.90	40.00
D3-30 December	302.89	3.79	8.05	1.35	47.80	37.08
SEm (±)	0.63	0.15	0.20	0.06	1.35	0.50
CD (P = 0.05%)	1.95	0.48	0.60	0.18	4.05	1.50
Interaction (V x D)	S	NS	NS	NS	NS	NS

Table 4: Interaction effect of date of sowing on effective tillers of wheat varieties

Dates of sowing /Varieties	Effective tillers (m^{-2})			
	30 November (D1)	15 December (D2)	30 December (D3)	Mean
V1-Kanishka	308.67	304.00	301.33	304.66
V2-Vidya	315.00	308.67	301.67	308.44
V3-Mavanti	315.33	311.00	305.67	310.66
Mean	313.00	307.89	302.89	
	Varieties	Dates of sowing	V x D	
SEm (±)	0.82	0.63	1.20	
CD (P = 0.05%)	3.22	1.95	3.50	

Table 5: Effect of date of sowing on grain yield (q ha^{-1}), straw yield (q ha^{-1}), harvest index (%) of wheat varieties

Treatments	Grain yield (q ha^{-1})	Straw yield (q ha^{-1})	Harvest index (%)
Varieties			
V_1 – Kanishka	39.75	47.22	47.12
V_2 – Vidya	40.60	48.53	47.92
V_3 – Mavanti	45.13	51.36	48.40
SEm (±)	0.34	0.26	0.12
CD (P = 0.05)	1.32	1.03	0.46
Date of sowing			
D_1 – 30 November	46.00	51.58	48.21
D_2 – 15 December	40.95	49.71	47.89
D_3 – 30 December	38.53	45.81	47.34
SEm (±)	0.39	0.39	0.49
CD (P = 0.05)	1.19	1.21	1.50
Interaction (V × D)	S	S	NS

Table 6: Interaction effect of date of sowing on grain yield of wheat varieties

Dates of sowing / Varieties	30 November (D_1)	15 December (D_2)	30 December (D_3)	Mean
V_1 – Kanishka	43.05	37.43	35.66	39.74
V_2 – Vidya	45.33	40.53	39.03	40.60
V_3 – Mavanti	49.61	44.89	40.89	45.12
Mean	46.00	40.95	38.53	
SEm (±)	Varieties	Dates of sowing	V × D	
	0.34	0.39	0.67	
CD (P = 0.05%)	1.32	1.19	2.07	

Table 7: Interaction effect of date of sowing on straw yield of wheat varieties

Dates of sowing / Varieties	30 November (D_1)	15 December (D_2)	30 December (D_3)	Mean
V_1 – Kanishka	50.04	48.98	42.62	47.21
V_2 – Vidya	51.01	49.21	45.36	48.52
V_3 – Mavanti	53.69	50.92	49.46	51.35
Mean	51.58	49.71	45.81	
SEm (±)	Varieties	Dates of sowing	V × D	
	0.26	0.39	0.68	
CD (P = 0.05%)	1.6	1.21	2.09	

Table 8: Effect of date of sowing on gross return (₹ ha^{-1}), net return (₹ ha^{-1}), B:C ratio of wheat varieties

Treatments	Gross return (₹ ha^{-1})	Net return (₹ ha^{-1})	B:C ratio
Varieties			
V_1 – Kanishka	103118	71698	2.08
V_2 – Vidya	103466	72042	2.29
V_3 – Mavanti	116955	85535	2.72
SEm (±)	4555	4556	0.18
CD (P = 0.05%)	18811	18814	0.77
Date of sowing			
D_1 – 30 November	119057	87637	2.78
D_2 – 15 December	106448	75720	2.46
D_3 – 30 December	100035	69653	2.29
SEm (±)	5585	5284	0.14
CD (P = 0.05%)	23072	21824	0.59
Interaction (V × D)	NS	NS	NS

Conclusion: The following important conclusion may be drawn from the results of present investigation: The finding indicate that sowing wheat on 30th November (D1) is the most suitable time for achieving higher yields and better

economic returns. Among the tested varieties, Mavanti (V3) exhibited superior performance over Vidya (V2) and Kanishka (V1) with respect to growth attributes, yield and profitability. The highest gross return, net return and B:C ratio were recorded under 30th November (D1) sowing, particularly with variety Mavanti (V3).

Reference

1. Anonymous, 2024. International Production Assessment Division, USDA.
2. Anonymous, 2025. Krishi Darshika, IGKV, pp-4.
3. Alam P, Kumar S, Ali N, Manjhi RP, Kumari N, Lakra RK, Izhar T. Performance of wheat varieties under different sowing dates in Jharkhand. J Wheat Res. 2013;5:61-64.
4. Dubey R, Pathak H, Singh S, Chakravarti B, Thakur AK, Fagodia RK. Impact of sowing dates on terminal heat tolerance of different wheat (*Triticum aestivum* L.) cultivars. Nat Acad Sci Lett. 2019;42:445-449.
5. Gupta S, Singh RK, Sinha NK, Singh A, Shahi UP. Effect of different sowing dates on growth and yield attributes of wheat in Udham Singh Nagar District of Uttarakhand, India. Plant Arch. 2017;17:232-236.
6. Gowda NK, Patil B, Patil BN. Effect of sowing time on yield of wheat variety. Karnataka J Agric Sci. 2017;21(3):366-368.
7. Kaur R, Kumar S, Parewa HP. Effect of nutrient management on growth and development of wheat under saline and canal irrigation water. Int J Pure Appl Biosci. 2018;5(6):744-751.
8. Kaur A, Akarsh SG, Prasad R. Effect of date of sowing and varieties on growth and yield of wheat in mid hill conditions of Himachal Pradesh. Int J Chem Stud. 2020;8(4):1490-1493.
9. Kumar R, Choudhary K, Bochalya RS, Sharma D, Chandel S. Effect of different sowing dates on growth and yield of wheat varieties. Int J Res Agron. 2024;7:17-24.
10. Nahar K, Ahmad K, Fujita M. Phenological variation and its relation with yield in several wheat (*Triticum aestivum* L.) cultivars under normal and late sowing mediated heat stress condition. Not Sci Biol. 2010;2:51-56.
11. Nizamuddin, Kabir R, Hussain M, Tajudin, Jan R, Gurman ZA. Effect of sowing dates on growth and yield of wheat (*Triticum aestivum* L.). Life Sci Int J. 2014;8(30):67-70.
12. Pathania R, Prasad R, Rana RS, Mishra S, Sharma S. Growth and yield of wheat as influenced by date of sowing and varieties in north western Himalayas. J Pharmacogn Phytochem. 2018;7(6):517-520.
13. Poonam U, Uma K. Effect of sowing dates on yield contributing characters and yield of some new wheat genotypes under irrigated conditions. J Multidiscip Adv Res. 2015;4(1):32-35.
14. 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.
15. Ram H, Singh G, Mavi GS, Sohu VS. Accumulated heat unit requirement and yield of irrigated wheat (*Triticum aestivum* L.) varieties under different crop growing environments in central Punjab. J Agrometeorol. 2012;14:147-153.
16. Rahman MA, William R, Sharma K. Sowing time and varietal performance of wheat at higher elevation in hill environment at Khagrachari. Bangladesh J Agril Res. 2015;40(4):521-528.
17. Shah WA, Bakht J, Ullah T, Khan AW. Effect of sowing dates on the yield and yield components of different wheat varieties. J Agron. 2006;5(1):106-110.
18. Shivpurkar GN, Wagh MP, Patil DT. Comparative performance of wheat genotype under different sowing dates. Agric Sci Digest. 2008;28(3):231-232.
19. Singh SB, Sarma BK, Datta KK. Transition in agriculture of north eastern hill states of India-implication and development. Indian J Hill Farming. 2001;14(2):1-12.
20. Singh DP, Chandra V, Tiwari T. Effect of sowing dates on yield and yield components of wheat in Maharajganj district, Eastern Uttar Pradesh. Pharma Innov J. 2018;11(1):228-231.
21. Singh YP, Singh S, Dhagrah VK, Mishra T. Effects of sowing dates on yield and yield components of different varieties of wheat (*Triticum aestivum* L.) in Western Uttar Pradesh. Int J Econ Plants. 2022;8(4):188-192.