Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2019; 8(1): 1066-1068
Received: 17-11-2018
Accepted: 20-12-2018

Chetan Lal
Department of Agrometeorology, College of Agriculture Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India, India

Correspondence
Chetan Lal
Department of Agrometeorology, College of Agriculture Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India, India

Yield attributes and yield of various varieties of wheat under different dates of sowing in rice based cropping system in Chhattisgarh

Chetan Lal

Abstract
A field experiment was carried out at Research cum Instructional Farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur during *rabi* season of 2011-2012 to find out suitability of various varieties of wheat under different dates of sowing in rice based cropping system in Chhattisgarh. The experiment was laid out in a Split plot design with five sowing dates (26 November, 06 December, 16 December, 26 December and 05 January) and four varieties (Kanchan, GW-273, Sujata and Amar). The results of experiment reveals that maximum numbers of grains/ ear head were observed in earlier sowings as compare to delay sowing highest value of observed in D_1 in the variety GW-273 (43.9) and Kanchan (35.7). Dates of sowing significantly influenced grain yield (kg/ha) in different varieties. Maximum grain yield was observed in D_1 as compare to delayed sowings (D_2, D_3, and D4). Under the D_1 the grain yield was observed maximum in Sujata and minimum in Kanchan.

Keywords: Wheat, cropping system, grain yield

Introduction
Wheat (*Triticum* spp.) is the major *Rabi* crop in India and is sensitive to various biotic and abiotic stresses like weather and inter-seasonal climatic variability (in terms of changes in temperature, rainfall, radiation) soil conditions and agricultural inputs like nitrogen, water and pesticides. In India, wheat is grown in an area of 27.75 million ha and production 80.68 million tonn with an average productivity of 2907 kg/ha which contributes about 25 percent of total food grain production of the country (Anonymous, 2010) [1]. Time of sowing is one of the most important factors which govern the crop phenological development and total biomass production along with efficient conversion of biomass into economic yield. Delayed sowing of wheat crop is exposed to sub- optimal temperatures at establishment and supra-optimal temperatures at reproductive phases resulting into reduction of not only crop duration but also the yield (Sardana *et al.*, 1999) [4]. Temperature, being a key component of climate, determines the seeding time and consequently the rate and duration of growth and productivity of any crop. The optimum date of sowing is considered equally important which helps in good germination and better growth of crop plants which leads finally to better harvest. Too much delay in sowing resulted in reduction in crop yields. Dwarf wheat being photo-insensitive, suits in early as well as late sowing, thus well fitted in double and multiple cropping patterns. However, too early sowing produces less tillers and too late sown crop produce wrinkled seeds due to higher temperature. The productivity of wheat is largely dependent on the magnitude of temperature change. One ^{0}C increase in temperature throughout the growing seasons will have no effect or slight increase on productivity in north India. But, an increase of 2 ^{0}C temperature reduced potential grain yield at most of the places (Agrawal and Sinha, 1993) [2].

Materials and Methods
A field experiment "yield attributes and yield of various varieties of wheat under different dates of sowing in rice based cropping system in Chhattisgarh condition was carried out at Research farm of Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.). The soil of the experimental field was sandy loam with moderately course texture of Inceptisol group locally known as "*Matasi.*" The soil was neutral in reaction and had low phosphorous and medium nitrogen & potassium content. Prior to the present experiment, the field was cropped with rice (*Oryza sativa* L.) during *Kharif* and wheat (*Triticum aestivum* L.) during *Rabi* in the preceding three years. Recommended dose of nutrients were applied uniformly to the crop. i.e. 100 kg N, 60 kg P_2O_5, and 40 kg K_2O/ ha. One third of N and full quantity of P_2O_5, and K_2O were applied before sowing as basal.

The remaining half quantity of nitrogen was applied as two equal split doses, first at the crown root initiation stage and second at ear head initiation stage. Six irrigations (excluding rainfall) were given to the crop for proper growth and development from sowing to maturity. Come up irrigation was given just after sowing and the rest five irrigations were given at crown root initiation, tillering, late jointing, flowering and dough stages, respectively. Harvesting of the crop was done as per the maturity of the different varieties.

Result an Discussion

The data showing the influence of sowing dates on number of ear heads/m^2 of different wheat varieties are shown in Table 1. It was observed from the table that there was significant influence of sowing dates and on an average maximum number of ear heads/m^2 was observed in variety Amar (398) followed by Knchan (377) and Sujata (360) whereas, Minimum no. of ear heads /m^2 was recorded in variety GW-273 (335). Higher number of ear heads /m^2 (437) was observed in 26 November sowing as compared to 26 November, 26 December and 05 January sowing (520, 481 and 400, respectively) but significantly at par with that with 16 December sowing (350). Ear heads/m^2 decreased slowly up to 26 December and after it decreased sharply when sowing was done on 05 January (D_5). Under 26 November, 06 December, 16 December and 26 December sowing variety Amar, Kanchan and Sujata performed well and produced comparatively higher ear heads/m^2 as compared to GW-273 while under 05 January sowing it also produced good numbers of tillers and found next to Kanchan.

It can be seen from the Table 2 that there was significant influence of different sowing dates on number of grains/ear head and maximum numbers of grains/ear head (38.9) were observed in 26 November sowing which decreased significantly when the sowing was delayed. Number of grain/ear head with 06 December sowing was found next to that of 26 November sowing but significant superior over 16 and 26 December and 05 January sowing. Among different variety GW-273 produced significantly higher number of grains/ear head over Kanchan, Sujata, and Amar which were found statistically similar to each other. The interaction between varieties and sowing dates was also significant and it was found that variety GW-273 produced higher number of grains/ ear head when sown on 26 December followed by 26 November sowing, while the lowest was observed with variety Amar sown on 26 December followed by 05 January.

The data showing the influence of sowing dates on length of ear heads of different wheat varieties are shown in Table 3. Significantly higher length of ear heads was observed in earlier sowing of 26 November (8.8 c.m.) followed by 16 December (8.4 cm) other three sowing dates showed similar length of year heads. It was observed from the table that on an average the highest length of ear heads was observed in varieties GW-273 (8.8 c.m.) followed by Sujata (8.7 c.m.) which was significant superior over other two varieties whereas the lowest length of ear head was observed in variety Amar (8.0 c.m.). Length of ear heads of different wheat varieties was influenced due to temperature and shifting thermal environment. Longer ear head (8.8 c.m.) was observed in first date of sowing (26 November) as compared to delayed sowing of 16 December, 26 December and 05 January. Longer ear head was observed in variety GW-273 (8.8 c.m.) while minimum (8.0 c.m.) was observed in Amar. This may be due to different genetic constituents of these wheat varieties. Behra (1994) reported that higher temperature during different part of the crop growth in delayed sowing caused forced maturity of crop and resulted in reduced ear length. Patel *et al.*, (1999) [3] also reported similar trend of observation.

Test weight (1000 seed weight) of wheat varieties was influenced by different sowing dates and is shown in Table 4. It revealed that different sowing dates had significant influence on test weight of wheat varieties and maximum test weight of grains was observed in first date of sowing (26 November) closely followed by 2nd sowing date (06 December). Sowing beyond 06 December to 16, 26 December and 05 January reduced the test weight considerably and were found significantly at par to each other in decreasing order. The test weight of all the varieties were found similar to each other However on an average numerically the higher test weight of grains was observed in Sujata (40.3g) followed by GW-273, Amar and Kanchan. The test weight of different wheat varieties was influenced significant by different thermal environment and delayed sowing ultimately resulted in lower test weight. On an average the higher test weight (40.31) was observed in D_1 (26 November) at par with 06 December sowing as compared to late sown conditions. It was due to higher temperature above 35 ^{0}C of maximum, 18 ^{0}C of minimum and 26 ^{0}C of mean temperature during grain filling under delayed sowing of 16, 26 December and 05 January. Similar findings were reported by Pandey (2003) and Khichar and Niwas (2006).

Grain yield (kg/ha) as influenced by different sowing dates are given in Table 5. Varieties and sowing dates showed significant effect on grain yield. On the mean basis the variety Kanchan produced higher grain yield (3214.7 kg/ha) followed by Amar (3130.0 kg/ha), Sujata (3002.2 kg/ha) and GW-273 (2898.3 kg/ha). On an average wheat varieties sown on 06 December produced maximum grain yield followed by sowing on 16 December. The varieties Sujata, Kanchan and GW-273 produced maximum grain yield (3837.5 kg/ha, 3670.0 kg/ha and 3643.3 kg/ha respectively) when sown on 06 December (D2), whereas the variety Amar, sown on 26 December (D4) produced maximum grain yield (3875.0 kg/ha).

Table 1: Effect of sowing dates on Number of ear heads/m^2 of different wheat varieties

	Number of ear heads/m^2					
Varieties	**D1-26 Nov.**	**D2-06 Dec.**	**D3-16 Dec.**	**D4-26 Dec.**	**D5-05 Jan.**	**Mean**
Kanchan	481	386	348	350	320	377
GW-273	348	332	367	310	317	335
Sujata	400	383	326	367	326	360
Amar	520	359	376	362	371	398
Mean	437	365	354	347	334	367
	SEm ±	CD (P=0.05)	CV (%)			
D	7.5	21.4	7.0			
V	6.7	19.1				
DXV	14.9	42.8				

Table 2: Effect of sowing dates on Length of ear heads (cm) of different wheat varieties.

Length of ear heads (cm)						
Varieties	**D1-26 Nov.**	**D2-06 Dec.**	**D3-16 Dec.**	**D4-26 Dec.**	**D5-05 Jan.**	**Mean**
Kanchan	8.0	8.2	8.1	8.5	8.4	8.3
GW-273	9.2	8.2	8.4	9.2	8.9	8.8
Sujata	9.3	8.9	8.9	8.2	8.2	8.7
Amar	8.8	8.0	8.1	7.4	7.6	8.0
Mean	8.8	8.3	8.4	8.3	8.3	8.4
	SEm ±	CD (P=0.05)	CV (%)			
D	0.10	0.28	4.01			
V	0.09	0.25				
DXV	0.19	0.56				

Table 3: Effect of sowing dates on Number of grains/ear head of different wheat varieties

Number of grains/ear head						
Varieties	**D1-26 Nov.**	**D2-06 Dec.**	**D3-16 Dec.**	**D4-26 Dec.**	**D5-05 Jan.**	**Mean**
Kanchan	35.7	32.2	29.5	31.4	33.8	32.5
GW-273	43.9	32.3	32.6	45.0	39.1	38.6
Sujata	37.8	38.2	35.6	28.3	29.1	33.8
Amar	38.1	33.9	33.6	26.1	27.5	31.8
Mean	38.9	34.2	32.8	32.7	32.4	34.2
	SEm ±	CD (P=0.05)	CV (%)			
D	1.0	2.9	10.2			
V	0.9	2.6				
DXV	2.0	5.8				

Table 4: Effect of sowing dates on Test weight (g) of different wheat varieties

Test weight (g)						
Varieties	**D1-26 Nov.**	**D2-06 Dec.**	**D3-16 Dec.**	**D4-26 Dec.**	**D5-05 Jan.**	**Mean**
Kanchan	44.1	39.5	37.8	32.8	32.3	37.3
GW-273	36.4	43.1	41.2	37.0	35.6	38.6
Sujata	49.5	40.6	37.9	38.7	34.9	40.3
Amar	42.5	42.2	33.7	38.7	35.1	38.4
Mean	43.1	41.4	37.6	36.8	34.5	38.7
	SEm ±	CD (P=0.05)	CV (%)			
D	1.2	3.4	10.7			
V	1.1	NS				
DXV	2.4	NS				

Table 5: Effect of sowing dates on Grain yield (kg/ha) of different wheat varieties

Grain yield (kg/ha)						
Varieties	**D1-26 Nov**	**D2-06 Dec**	**D3-16 Dec**	**D4-26 Dec**	**D5-05 Jan**	**Mean**
Kanchan	2705.0	3670.0	3386.7	2983.3	3328.3	3214.7
GW-273	2800.0	3643.3	3415.0	2291.7	2341.7	2898.3
Sujata	2900.0	3837.5	3175.0	2808.3	2290.0	3002.2
Amar	2810.0	3333.3	2883.3	3875.0	2748.3	3130.0
Mean	2803.8	3621.0	3215.0	2989.6	2677.1	3061.3
	SEm ±	CD (P=0.05)	CV (%)			
D	85.5	244.7	9.5			
V	76.4	218.9				
DXV	170.9	489.4				

Reference

1. Anonymous. Agricultural statistics at a glance, 2010. Directorate of Economics and Statistics, Ministry of Agriculture, Govt. of India, 2010.
2. Agrawal PK, Sinha SK. Effect of probable increase in carbon dioxide and temperature on wheat yield in India. Journal of Agricultural Meteorology. 1993; 48(5):811-814.
3. Patel SR, Thakur DS, Lal N. Response of wheat varieties to sowing dates in the eastern Madhya Pradesh in Rice based cropping system. Journal of Maharashtra Agriculture Universities. 1999; 24(1):53-55.
4. Sardana V, Sharma SK, Randhawa AS. Performance of wheat cultivars under different sowing dates and levels of nitrogen under rainfed condition. Annals of Agricultural Research. 1999; 20(1):60-63.
5. Pandey V, Patel HR, Patel VJ. Empact assessment of climate change on wheat yield in Gujarat using CERES-wheat model. Journal of Agrometeorology. 2007; 9(2):149-157.