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Effect of Different Date of Sowing in Different Stages Of Wheat Crop at Allahabad Climatic Conditions

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ABSTRACT
Present study was focused on "Effect of different date of sowing in different stages of wheat crop at Allahabad climatic condition" conducted in Forest Nursery, College of Forestry, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, (U.P.). Study explore the Allahabad climatic condition and effect on Germination percentage, Plant Height, length of spike,No. of tillers, No. of Grains per Spikeand Grain Yield (q/ha)in wheat crops. Study results indicated that maximum germination was 9-13% in 8-12 days, plant height observes during the period 7 to 14 days and minimum observation is 98 to 105 days.The decreasing trend observed during 14-42 days then slightly increment in plant height in 49 to 56 days.Theimportant factors of increasing or decreasing in grain yield are time of sowing, solar radiation, temperature, atmosphere condition, rainfall, irrigation, humidity and soil moisture.
Key Words:*Wheat, Climatic Condition, Growth, Yield, Correlation*

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INTRODUCTION
Climate variation is not a new miracle in the biosphere. The rise in temperature of the earth surface and in atmosphere, variability in rainfall, decreasing ground water, flooding due to high rainfall, drought, soil erosion, heavy wind, rising sea level due to melting of glacier, cyclone, wind speed, hail storm, fog, earthquake and landslide etc., are all the clear indication of climate change phenomenon [1]. Climate and its change ability influence all sectors of economy in several ways like abnormality in rainfall, results in severity and frequency of floods. Any augmentation in maximum temperature may increase mean sea levels and it would affect large populations in peninsular and coastal areas. It may increase 15 to 40% rainfall there and raise the annual mean temperature by 3 to 6 degree [11].Indian agriculture is facing challenges due to several factors such as increased competition for land, water and labour from non-agricultural sectors and increasing climatic variability. The latter associated with global warming will result in considerable seasonal/annual fluctuations in food production. All agricultural commodities even today are sensitive to such variability. Droughts, floods, tropical cyclones, heavy precipitation events, hot extremes and heat waves are known to negatively impact agricultural production, and farmers' livelihood. It is also predicted that a rise in temperature may reduce yields of rice, wheat and other cereals crops **[4].** Changes in global climate are likely to influence spatial and temporal trends of temperature and rainfall, which will affect crop phenology and yield [5].

Wheat has a prominent position among cereals. It is high source of protein, good source of fibre and good in manganese andmagnesium in unrefined state. Its area andproductivity is increasing rapidly across theglobe, due to its wider adaptability and sustainability under diverse agro climaticconditions [6]**.** Thereare various factors, which are responsible forlow yield of wheat crop in the country but among these sowing time and varietal selection are of primary importance.Selection of suitable crop varieties according to the agroclimatic conditions may playcrucial role in realizing the optimumproduction of any crop commodity [10]. Delay in sowing results in poortillering and crop growth is generally slowdue to low temperature.

In late planting the wheat variety should be of short duration that may escape from high temperature at the grain filling stage [8]. Late sowing results in reduction of yield contributing characters like number of tillers and number of grains per spike [2]**.** The release of new varieties is a continuous process and different varieties perform differently under different sowing total number of grain were calculated and then mean value was taken. A random sample of 1000 grains from each treatment was collected and weighed with digital balance for 1000 grain weight. The biological yield and seed yield were recorded on plot basis and were converted to quintal/hectare.

MATERIALS METHODS

EXPERIMENTAL SITE:

The experiment was carried out during Rabi season 2017-18 at Forest Nursery, Sam Higginbottom University of Agriculture, Technology and Sciences (SHUATS), Allahabad. U.P., which is, located at 25.57° N latitude 81.50° E longitude and 98 m altitude above the mean sea level.

Soil of the experimental field:

To ascertain physico-chemical characteristics of the soil, before sowing, soil sample were collected randomly from 0-30 cm depth from different spots of experimental field just before layout of experiment. A representative homogenous composite sample was drawn by mixing these entire soil samples together. This composite soil sample was analyzed to determine the physico-chemical properties of the soil.

Climatic conditions

Allahabad is located in the south-eastern part of Uttar Pradesh and has tropical to subtropical climate with extremes of summer and winter. During winter months especially Dec-Jan temperature drops down to as low as 5°C while in summer temperature reaches above 45°C. Hot scorching winds (commonly known as Loo) is regular feature during the summer whereas there may be an occasional spell of frost during the winter. The annual rainfall is 1100 mm mostly during the monsoon autumn i.e. July-Sept with a few occasional showers during winter months.The experiment was conducted in one fixed plot with 6 sub-plots and 20 December.The plot size of the experimental plot was 2.0 x 2.0 m and wheat was shown with spacing of 22.5 cm.

Fertilizer application: Recommended dose of fertilizer was applied through chemical fertilizers at the time of sowing. The nutrients were applied in the form of urea, Di-ammonium phosphate and muriate of potash. Nitrogen was applied in three split doses with 50 per cent as basal application, 25 % at 21 days after sowing and remaining 25 % at 45 days after sowing.

Date of sowing: Sowing date of wheat (D1) in months of December 2017 and Sowing date of wheat (D2) is 10th January, 2018.

Germination percentage (%) in D1

Form the perusalof table 1observed that the germination percentage of crop wheat in sub plot 1 to 6. After date of sowing, the maximum germination of seed in subplots 6 and total germination in 1-7 DAS was 11, 11, 12,12,12,13 and 11 % and total percentage of germination after 7 DAS is 82 %. It is concluded that the cause of higher germination rate was climate and the active factors are responsible. Similar results were reported by [9]**.**

Table: 1. Germination percentage of seed in Subplots of D1

Sub Plots	Total no. of seeds sown	1-6 DAS	7 DAS	8 DAS	9 DAS	10 DAS	11 DAS	12 DAS	13 DAS	Total Per-cent germination
S1P1	100	0	11	09	12	13	10	14	11	
S2P2	100	0	10	14	12	09	14	12	13	
S3P3	100	0	13	11	09	15	16	13	10	
S4P4	100	0	09	12	14	13	10	16	11	
S5P5	100	0	14	10	15	10	15	10	13	
S6P6	100	0	12	13	12	14	10	14	09	
Total	**600**	**0**	**69**	**69**	**74**	**74**	**75**	**79**	**67**	
Germination (%)		**0**	**11%**	**11%**	**12%**	**12%**	**12%**	**13%**	**11%**	**82%**

Germination percentage (%) in D2

Table 2, indicated that germination percentage of crop wheat in sub plot 1 to 6. After date of sowing, the maximum germination of seed in subplots 6 and total germination in 1-7 DAS was 10, 13, 12,13,12,13 and 11 % and total percentage of germination after 7 DAS is 82 %. It is concluded that the cause of higher germination rate was climate and the active factors are responsible. Similar results were reported by **Sawant *et al.*, [9].**

Table: 2. Germination percentage of seed in Subplots of D2

Sub Plots	Total no. of seeds sown	1-5 DAS	6 DAS	7 DAS	8 DAS	9 DAS	10 DAS	11 DAS	12 DAS	Total % germination
S1P1	100	0	10	11	12	15	11	13	12	
S2P2	100	0	11	13	12	13	12	13	12	
S3P3	100	0	10	14	13	16	11	14	10	
S4P4	100	0	10	12	11	15	13	13	12	
S5P5	100	0	09	13	14	12	11	15	11	
S6P6	100	0	11	16	13	11	14	12	10	
Total	**600**	**0**	**61**	**79**	**75**	**82**	**72**	**80**	**67**	
Germination percentage		**0**	**10%**	**13%**	**12%**	**13%**	**12%**	**13%**	**11%**	**84%**

Plant Height

Form the perusal of table 3, plant height of wheat crop in different sowing date (D1 and D2) with the interval of ten days the observations of on day basis after the date of sowing but date reported seven days interval because the content of data and handling in difficult to all the observe data. The observation of plant height (centimetre) for D1after date of sowing with the interval of one week started fromdays 7, 14,21,28,35,42,49,56,63,70,77,84,91,98 and 105 days and height of plants for mentioned date is 8.89, 17.50, 24.71, 31.72, 38.50, 44.61, 52.73, 61.25, 69.38, 76.41, 81.36,85.49,87.04, 87.03 and 87.03cm respectively and D2 after date of sowing with the interval of one week started from days 7, 14,21,28,35,42,49,56,63,70,77,84,91,98 and 105 days and height of plants for mentioned date is 8.47, 17.36, 24.62, 31.75, 38.28, 44.36, 54.90, 61.13, 69.41, 76.35, 81.19, 85.50, 87.11, 87.24and 87.25cm respectively.

The growth of plant height observes during the period 7 to 14 days and minimum observation is 98 to 105 days. The decreasing trend observed during 14 days 42 days then slightly increment in plant height in 49 to 56 days, then rapidly decreasing trend observe during 56 to 105 days the result of study indicated that wheat crop height increases up to after date of sowing and slightly increasing trends found up to 56 days the major factor are influence the plant height, solar radiation, temperature, atmosphere condition, rainfall, humidity and soil moisture the region. Similar results were reported by [11, 3].

Table: 3. Plant height and No. of tillers spike^{-1}of Subplots of D_1 and D_2

DAS	Plant height		DAS	No. of Tillers spike^{-1}	
	D1	D2		D1	D2
7	8.89	8.47			
14	17.50	17.36			
21	24.71	24.62	7 to 19	0	0
28	31.72	31.75	26	4.53	4.65
35	38.50	38.28	33	9.33	9.99
42	44.61	44.36	40	11.89	12.00
49	52.73	54.90	47	11.90	12.00
56	61.25	61.13	54	11.90	12.00
63	69.38	69.41	61	11.90	12.00
70	76.41	76.35	68	11.90	12.00
77	81.36	81.19	75	11.90	12.00
84	85.49	85.50	82	11.90	12.00
91	87.04	87.11	89	11.90	12.00
98	87.03	87.24	96	11.90	12.00
105	87.03	87.25	105	11.90	12.00

No. of Tillers

Form the perusal of table 3, indicatedthat no. of tillers of wheat crop in different sowing date with the interval of ten days in each sowing. The observations on day basis but date reported seven days interval because of the content, data and handling in difficult to data calculation. The observation of no. of tillers in D1 and D2 days after sowingwith the interval of one week started from day7thto 19th,26th, 33th, 40th, 47th, 54th, 61st, 68th, 75th, 82nd, 89th, 96th and 105thdays respectively.

There is no growth of tillerswere observed during the period 7thto 19thDAS.The minimum tillers observed26thDAS. Then vigorously growthof no. tillers recorded during 26th to 40thDAS then number of tillers remains same on or after 41stto 105thDAS.The best results of tillers were observed in experiment no. of D2.Slightly increasing trends was observed upto40 DAS then the growth of tillers was negligible till 105 days after sowing. The major factors are influence the tillers are solar radiation, temperature, atmosphere condition, rainfall, humidity and soil moisture the region. Similar results were reported [11, 3].

Length of spike (cm)

Form the perusal of table 4, it is concluded that length of spike in wheat crop, on different sowing date with the interval of ten days D_1 and D_2. The length of spikes (D1and D2)days after sowing. After the germination to 7-55th day there lengths of spikes observed but after 62ndDAS the spike was observed in the different plots are P1- 4.82 and P2- 4.88. On 69thDAS, the length of spikes P1- 6.80 and P2- 6.88.On 76thDAS the length of spikes in P_1- 8.88 and P2- 8.92. On 83rdDAS the no. of spikes in P_1- 10.87, and P_2- 10.93.On 90 DAS the length of spikes in P1- 12.66 and P2- 12.75.On 97thDAS the length of spikes in P_1- 13.76 and P_2- 13.81.On 105thDAS the no. of spikes P_1- 13.99 and P2- 14.01respectively. It is found that the best result on length of spike found in D2.Slightly increasing trends found up to 62 DAS then the growth of spikes was increasing weakly, till 105 days after sowing. Therefore the major factor are influenced in length of spikes are solar radiation, temperature, atmosphere condition, rainfall, humidity and soil moisture the region. Similar results were reported [12, 3].

Table: 4. Length of spike and No. of grain spike^{-1}of Subplots of D_1 and D_2

DAS	Length of spike		DAS	No. of grain spike^{-1}	
	D1	D2		D1	D2
7 to 55	0	0	7 to 57	0	0
62	4.82	4.88	64	28.20	28.67
69	6.80	6.88	71	44.23	43.04
76	8.88	8.92	78	59.37	57.30
83	10.87	10.93	85	74.90	72.40
90	12.66	12.75	92	90.43	90.97
97	13.76	13.81	99	102.81	109.29
105	13.99	14.01	105	106.16	113.13

No. of grains per spike

Table 4reflected that the no. of length of spikeand grains spike^{-1} per plant afterdate of sowing sowing (D1 and D2) from days 7 to 57 there is no grain, On 64th DAS no. of grains spike^{-1}in plots P1- 28.20 and P2- 28.67. On 71 DAS no. of grains spike^{-1}in P1- 44.23 and P2- 43.04.On 78 DAS no. of grains spike^{-1}in P1- 59.37 and P2- 57.30.On 85 DAS no. of grains spike^{-1} in P1- 74.90 and P2- 72.40.On 92 DAS no. of grains spike^{-1}in P1- 90.43 and P2- 90.97.An on 99 DAS no. of grains spike^{-1} in P1- 102.81 and P2- 109.29. On 105 DAS no. of grains spike^{-1} in P1- 106.16 and P2- 113.13and grains spike^{-1} per plants respectively. It is found that the max. Grains spike^{-1} found in D2.slightly increasing trends found up to 64 DAS then the growth of no. of grains spikes^{-1} was increasing weakly, till 105 days after sowing. Therefore the major factors are influenced in no. of grains spikes^{-1}are solar radiation, temperature, atmosphere condition, rainfall, humidity and soil moisture the region. Similar results were reported by [11, 3].

Grain Yield (q/ha)

The observation of grains yield for (D1 and D2) reported in Table 5, It clearly indicated that maximum grains yield was obtained in sub plots -5(44.18 q/ha) but average yield under D1 is (42.62 q/ha).

Table: 5. Grain Yield (q/ha) of Subplots of D_1 and D_2

Sub- Plots	DAS	
	D1	D2
S1P1	42.35	44.16
S2P2	44.15	46.18
S3P3	43.15	42.88
S4P4	40.08	43.58
S5P5	44.18	47.10
S6P6	42.23	45.53
Total yields	**42.62**	**44.90**

The maximum grains yield was obtained in sub plots -5 (47.10 q/ha) but average yield under D2 is (44.90 q/ha). The quantity of grain yield is maximize in late sown variety of wheat. Therefore, the important factors of increasing or decreasing in grain yield are solar radiation, temperature, atmosphere condition, rainfall, irrigation, humidity and soil moisture. Similar results were reported by [3, 7].

CONCLUSION

From the present study it is concluded thatdate of sowing and climatic factor play aimportant role on growth of plant or cropfrom every stages.The difference of yields production with date of sowing is 2.28 q/ha. Results of study indicated that plant height, number of tiller, length of spike,number of grain and yields are highlyinfluence due to the climatic factors.

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