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## Evaluation of wheat yield in different growing environments

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### Abstract

A field experiment was conducted at the Agrometeorology research farm, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C. G.) during 2017 - 18 to evaluate the influence of variety and date of sowing on yield of wheat. The experiment consisted three wheat variety viz., CG1013, HD2967 and Kanchan and three sowing date viz., 25 November (D<sub>1</sub>), 05 December (D<sub>2</sub>) and 15 December (D<sub>3</sub>). Result revealed that First date of sowing had more duration from sowing to maturity as compared to delayed sowing. Maximum grain yield was observed in first date of sowing (25 Nov) as compared to delayed sowing, highest grain yield 4077.6 kg/ha was recorded in D<sub>1</sub> followed by D<sub>2</sub> (3895.5 kg/ha) and D<sub>3</sub> (3684.5 kg/ha), respectively. In varieties, Kanchan showed maximum grain yield (4093.4 kg/ha) followed by CG 1013 (3908.3 kg/ha) and HD 2967 (3655.9 kg/ha), respectively.

**Keywords:** Phenology, Anthesis and Kanchan

### Introduction

Large inter seasonal variability in yield occurs because weather influences growth and development of crop. Variation in sowing date and temperature interact to influence growth, development and its yield because wheat is a thermo sensitive crop (Sharma and Kumar 2005) [6]. Growth and development of crop are mainly dependant on weather. The temperature effect on plant is studied by heat unit concept, to correlate phenological development in crop and to predict maturity dates (Gilmore and Rogers, 1958) [1]. Temperature is a major determinant of wheat growth and development. Yields decreased 3% to 5% by increasing temperature of 1 °C above 15 °C. Grain yield decrease when temperature is high before anthesis (Hunt *et al.* 1991) [2]. After anthesis, high temperature decreases the rate of grain-filling and if it occurs near to anthesis it can reduce the number of grains per ear resulting in lower yields. High temperature can also cause both male and female sterility in winter wheat and warming shortens phenophasic duration and decrease wheat yield, mainly due to a shorter growing period, which decreases the duration of photosynthesis and biomass accumulation (Wheeler *et al.* 2000) [6].

### Materials and Methods

#### Description of study area

The field experiment was conducted at research and instructional farm of IGKV, Raipur situated in near center part of Chhattisgarh at latitude 21.16 °N, longitude 81.36 °E and altitude of 289.5 m and above mean sea level.

#### Data for the study

##### Weather condition during crop period

During the crop growth period, the maximum temperature ranged from 27.4 °C to 39.2 °C whereas minimum temperature ranged from 9.5 °C to 23.4 °C. The total rainfall was recorded 57 mm, morning relative humidity varied from 54 to 89% whereas; in after noon, it varied from 15 to 41%. The wind speed, evaporation and bright sunshine hours ranged were recorded from 1.7 to 5.2 kmph, 19.8 to 51.2 mm and 6.3 to 9.8 hrs respectively during crop growth period.

##### Soil of study area

The soil of the experimental field was sandy loam with moderately course texture of Inceptisol group locally known as "Matasi." This soil contains low phosphorous, medium nitrogen & potassium and neutral in reaction.

### Experimental details

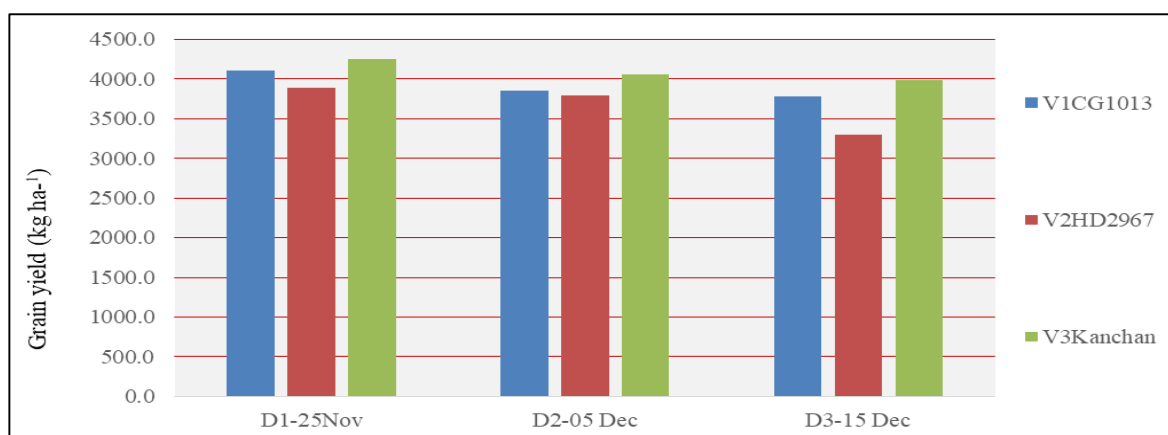
The experiment was laid out in factorial RBD with 9 treatment combinations of three dates of sowing and three varieties of wheat, which were replicated three times in *rabi* season. The Experimental gross area was 7.7 x 6.0 m (46.2 m<sup>2</sup>) and Net area 7.7 x 5.2 m (40.04 m<sup>2</sup>). The land was prepared by ploughing twice with tractor drawn cultivator and rotavator was used to break the clods, make the field well pulverized and well leveled. After field preparation, the sowing was done with the help of manual labour. The seed was sown @ 120 kg ha<sup>-1</sup>. Keeping 20 cm as row to row

distance. As per the recommendations nutrients were applied uniformly to the crop *i.e.* 100 kg N, 60 kg P<sub>2</sub>O<sub>5</sub> and 40 kg K<sub>2</sub>O ha<sup>-1</sup>. Data on growth parameter, yield contributing characters and yield were recorded. The grain from each bundle was threshed out and the weights of cleaned grains were noted. By subtracting the grain yield from the total biomass of respective treatments the straw yield was obtained. Thus, the plot wise yield of grain and straw were finally converted in quintal per hectare.

### Result and Discussions

**Table 1:** Grain yield (kg ha<sup>-1</sup>) of 3 wheat varieties under different growing environments.

Varieties	D1(25 -11-17)	D2(05-12-17)	D3(15-12-17)	Mean
V1-CG1013	4100.9	3848.2	3775.9	3908.3
V2-HD2967	3886.9	3786.6	3294.2	3655.9
V3-KANCHAN	4244.9	4051.7	3983.5	4093.4
Mean	4077.6	3895.5	3684.5	3886
	SE m ±	CD (P=0.05)	CV (%)	
Date	125.83	NS	9.71	
Variety	125.83	NS		
DXV	217.95	NS		



**Fig 1:** Grain yield (kg ha<sup>-1</sup>) of 3 wheat varieties under different growing environments.

It was observed from the table 1 that maximum grain yield was observed in first date of sowing as compared to delayed sowing. Highest grain yield 4077.6 kg/ha was recorded in D<sub>1</sub> followed by D<sub>2</sub> (3895.5 kg/ha) & D<sub>3</sub> (3684.5 kg/ha), respectively. Significant difference was not found in different dates of sowing and varieties. Interaction between date of sowing and varieties was also non-significant.

In varieties, Kanchan showed maximum grain yield (4093.4 kg/ha), followed by CG1013 (3908.3 kg/ha) and HD2967 (3655.9 kg/ha), respectively.

Figure 1 depicted that highest grain yield 4244.9 kg/ha was recorded in Kanchan followed by CG1013 (4100.9 kg/ha) & HD2967 (3886.9 kg/ha), respectively under D<sub>1</sub>. In D<sub>2</sub> Kanchan showed highest grain yield 4051.7 kg/ha and CG1013 showed lowest grain yield 3848.2 kg/ha. Under D<sub>3</sub> Kanchan variety recorded highest grain yield of 3983.5 kg/ha followed by CG1013 (3775.9 kg/ha) & HD2967 (3294.2 kg/ha), respectively.

Sowing of wheat on 25 November produced higher yield (4077.6 kg/ha) as compared to the delayed date of sowing. This may be attributed to the fact that sowing of wheat on 25 Nov. provide sufficient period for vegetative growth of crop and favorable temperature resulting in higher yield. Higher temperature during later part of the crop growth in delayed sowing caused forced maturity of the crop and resulting in lower grain yield. Lathwal and Thakral (1999) [3] reported that

crop sown on November 5 and 15 recorded 48% and 39% more grain yield as compared to crop sown on December 5 and 23 and 15% over November, 25 sowing, respectively. Similar finding were also reported by Sharma *et al.* (2006) [5].

### Conclusion

Crop yield are dependent on soil properties, agronomical practices, genetic potential of cultivars and prevailing weather conditions. Among these factors, genetic potential of cultivars remains constant. Agronomical practices change slowly and soil properties can vary to a small extent across the years, while weather may vary quite significantly. Thus, year to year variation in agricultural output is regulated by weather to a large extent.

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