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Wheat (*Triticum aestivum* L.) yield characteristics, yield, and economics are all impacted by the time of planting.

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Research Article

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ABSTRACT

During the rabi seasons of 2013–14 and 2014–15, the field experiment was conducted at Krishi Vigyan Kendra in Aurangabad and at farmers' fields to see how the timing of planting affected the yield characteristics, yield and economics of wheat (*Triticum aestivum* L.). The experiment was set up in a fully randomized block design with four sowing dates—November 5, November 15, November 25, and December 5—in a total of five replications between Rabi 2013–14 and 2014–15. Wheat seeded on November 5th was at par with November 15th in terms of highest grain yield (44.64 q/ha), both of which were substantially higher than November 25th and December 5th. 6.13% and 3.70% higher grain yields were observed on November 5 and November 15, respectively, compared to wheat planting on November 25, and 33.65% and 30.59% higher grain yields during December 5. Wheat sown on November 5th yielded more straw (52.90q/ha), which was comparable to November 15th and much higher than November 25th and December 5th. Straw output was observed at 8.49%, 7.51% higher on November 5 and 15 than on November 25, and 15.96% and 14.91% higher than on December 5 when wheat was sown. The 5th of November also had the significantly largest B-C ratio, which was statically comparable to the 15th of November above the 25th of November and the 5th of December. The highest returns were 6.13 and 3.71% and 33.65% and 30.60%, respectively, when wheat was seeded on November 5 and November 15 over November 25 and December 5, respectively..

Keywords: Wheat, terminal heat stress, and planting time

INTRODUCTION

One of the most common meals consumed by humans is wheat (Meena et al., 2013). Because of its greater flexibility and sustainability under a variety of agroclimatic conditions, its area and production are quickly expanding around the world (Kumar et al., 2014). However, a significant amount of wheat farmed in South Asia—mostly in India—is thought to be impacted by heat stress (Joshi et al., 2007a). According to Joshi et al. (2007a), one of the main causes of the wheat yield loss in India as a result of delayed planting is terminal heat stress. According to Singh et al. (2008), choosing the right crop types for the agroclimatic conditions may be essential to achieving the best possible output of any agricultural commodity. The Eastern Gangetic Plains (EGP) and central and peninsular India are South Asia's most heat-stressed regions, whereas the northwestern regions of the Indo-Gangetic Plains (IGP) are thought to have mild heat stress (Joshi et al., 2007b). Wheat that is planted too late has severe yield losses that might reach 40–50%. According to global climate projections, the mean ambient temperature will rise by 1.8 to 5.8 degrees Celsius by the end of this century (IPCC, 2007). The thermal duration accumulated above the base temperature of 310C has a negative correlation with grain production (Mianet al., 2007). Grain production and weight have been shown to be reduced by high temperatures over 32 °C (Wardlaw et al., 2002). Small, shriveled grains are produced, and several yield-related characteristics including tillering, grain weight, and grain numbers/spike are decreased. The majority of commercially cultivated wheat cultivars in India would lose almost 50% of their production potential when exposed to temperatures between 32 and 380 degrees Celsius during the critical grain formation period, according to calculations using this factor (3–4% loss each 10C over 15–20 degrees Celsius). During the rabi years 2013–14 and 2014–15, the experiment was carried out at Krishi Vigyan Kendra in Aurangabad with farmers in the Aurangabad district. When compared to timely sowing conditions, late planting caused the varieties to experience considerable temperature stress

during the grain filling stage.

MATERIALS AND METHOD

During the two successive rabi seasons of 2013–14 and 2014–15, the field experiment was carried out at Krishi Vigyan Kendra and farmers' field in Bihar's Aurangabad district. The trial location was assigned to the Aurangabad district at 240.50' N and 840.70' E, 332' above mean sea level. In 2013–14 and 2014–15, respectively, the highest temperature stayed above 35.60°C and 35.97°C. The total amount of rainfall received during the crop period was 10.77 mm in 2013–14 and 13.25 mm in 2014–15. The soil was clay-loam with a normal soil response (pH 7.5), low levels of available nitrogen (205.7 kg/ha) and organic carbon (0.51%), and medium levels of available potassium (198.5 kg/ha) and phosphorus (19.3 kg/ha). The experiment was set up in a fully randomized block design with five replications that included four sowing dates: November 5, November 15, November 25, and December 5. Wheat was established on experimental plots using a zero-till drill (ZTD). The wheat variety HD-2733 was evaluated at various planting dates. When all of the replications were being sown, the fields were leveled using a leveler to enable drill to plant seeds at a consistent distance and appropriate depth. The experimental plots intended for zero-till drill (ZTD) planting underwent two ploughings, harrowing, and planking prior to ZTD seeding. A fertilization rate of 120:60:40 kg NPK/ha was applied to the experimental field. While all of the P₂O₅ and K₂O were administered as a basal application, nitrogen was given in three splits (1/2 dosage of N during basal rest and 1/2 dose each at first and second irrigation). Pendimethalin was applied to all treatment plots in all replications using a backpack sprayer and 800 liters of water per hectare within a day after seeding. Metsulfuron @ 33g/ha was used as a post-emergence herbicide in all treatment plots in each replication at 25–30 days after sowing (DAS) using a backpack sprayer equipped with a flat-fan nozzle and 500 l/ha of water. Plant height, tiller count, crop biomass, and grain/spike count were all noted. In the second week of April, the crop was physically picked. Gross returns and the variable cost of cultivation were computed based on the current input and output prices.

Fig1: Maximum and Minimum Temperature during crop period 2013-14 and 2014-15

RESULTS AND DISCUSSION

Different sowing dates had a substantial impact on the number of effective tillers/m², spike length, grains/spike, and test-weight. The largest number of effective tillers/m² was reported during the harvest stage, with wheat seeded on November 5th being comparable to November 15th, both of which were much higher than November 25th and December 5th. Compared to other treatments, wheat seeded on November 5th had a much longer spike. The largest number of grain/spike was reported when wheat was seeded on November 5th compared to November 15th, November 25th, and December 5th. The date of sowing had a substantial impact on the amount of grain. The timing of sowing had a substantial impact on 1000 grain weight as well. Wheat seeded on November 5th had a maximum 1000 grain weight that was comparable to that of November 15th, but it was much greater than that of November 25th and December 5th (Table 1).

Table1: Effect of date of sowing on yield and yield attributes and yield on wheat (Pooled data of two years)

Treatment	No. of effective tillers/m ²	Length of Spike (cm)	No of grain/spike	1000 grain Weight (g)	Grain yield (q/ha)	Straw yield (q/ha)
T ₁ - 5 November	334.20	9.54	48.40	44.56	44.64	52.9
T ₂ -15 November	318.20	9.13	44.80	45.06	43.62	52.4
T ₃ -25 November	276.40	8.79	43.80	43.80	42.06	48.7
T ₄ -5 December	235.00	8.25	40.20	41.50	33.40	45.6
LSD (P=0.05)	22.97	0.37	2.98	0.91	2.32	2.85

Wheat sown on November 5th had a much higher grain yield (44.64 q/ha) than on November 25th and December 5th, both of which were comparable to November 15th. Early wheat seeding on November 5 and November 15 resulted in considerably higher grain yields over November 25 by 6.13% and 3.70%, respectively, and over December 5 by 33.65% and 30.59%. The largest straw yield (52.90 q/ha) was reported on November 5th, which was comparable to November 15th. Both dates were noticeably higher than November 25th and December 5th. Wheat sown on November 5 and November 15 yields 8.49% and 7.51% more straw over November 25 and 15.96% and 14.91% more straw over December 5, respectively (Table 1). Dwivedi et al. (2015) similarly found similar results. The advantage of seeding wheat on November 5th was greater than that of November 25th and December 5th, and it was statistically comparable to November 15th. In comparison to November 25 and December 5, the net return (Rs 39228/ha) was much higher on November 5 and statically on par with November 15. Additionally, the B-C ratio was much greater on November 5th and statically comparable to November 15th over November 25th and December 5th. Wheat seeded on November 5 and November 15 had larger yields than wheat sown on November 25 and December 5 by 6.13 and 3.71% & 33.65% & 30.60%, respectively (Table 2).

Table2: Effect of date of sowing on economics on wheat (Pooled data of two years)

Treatment	Cost of cultivation (Rs/ha)	Gross return (Rs/ha)	Net return (Rs/ha)	B:C Ratio
T ₁ - 5 November	25500	64,728	39,228	2.54
T ₂ -15 November	25500	63,249	37,749	2.48
T ₃ -25 November	25500	60,987	35,487	2.39
T ₄ -5 December	25500	48,430	22,930	1.90
LSD (P=0.05)	-	3,367	3,367	0.13

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