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Effect of different sowing dates on yield and attributing characters of local variety of tomato in the farmers field of Badokhar block of Banda (Bundelkhand)

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Abstract
A survey was conducted at the farmers field of Badokhar block in district Banda, Bundelkhand during 2022-23 with the hypothesis that effect of different sowing dates has significant effect on the yield and its attributing characters of tomato. Four treatments i.e. different sowing dates were considered in the survey. The sowing date were considered as treatments were T_1 = 1 Oct 2022, T_2= 13 Oct 2022, T_3 = 29 Oct 2022, T_4 = 12 Nov 2022 while number of farmers field were considered as replication. The survey was laid in randomized block design with 4 treatments and 3 replications. The results opts that the yield and attributing characters of tomato were significantly affected by different sowing dates. The treatment T_1 (sowing date 1 Oct 2022) gave the best results while the treatment T_4 (sowing date 12 Nov 2022) was recorded to have the lowest yield.

Keywords: Tomato, Banda, Badokhar, Bundelkhand

Introduction
In Bundelkhand region, the land holdings of the farmer are very high because population density is very low. But it is divided into two parts according to irrigation facilities, cultivation and soil types [1]. Few areas of this region are highly productive and availability of water is very high and having black cotton soil and other area of this region is totally rain-fed area and agriculture totally depends on monsoon and also having red soil (low productive soil). Agriculture sector is a life line of Bundelkhand because around 85% population of this region depends upon on agriculture for their livelihood. Agriculture is a dominating occupation in Bundelkhand but the land available and used for cultivation is lower when compared to other agriculture region of the India; only 60% of total lands are available for cultivation and out of which 42.3% land are irrigated lands of total land area in the Bundelkhand.

Tomato (Lycopersicon esculentum M.) is considered in the family of Solanaceae and it is supposed that it is originated from Tropical America especially Peru. It is one of the world's largest ever grown vegetable crop and known as protective food both because of its special nutritive value and also a crop of most of the kitchen gardens. It is considered as important commercial and dietary vegetable crop. India is the world's second-largest tomato producer, behind China. Tomato pulp, juice and oil have strong medicinal properties and are used to stimulaye gastric secreation, treat digestive disorders, and purify blood (2.4% oil content). Water makes up 95% of a tomato's fruit, with various other substances, mainly sugars and fibers, making up the remaining 5% (Khoso, 1994). Tomato is protective supplementary food. Tomato is used in preserved products like ketch-up, sauce, chutney, soup, paste and puree. Significant achievement in tomato production is possible due to development of high yielding varieties/hybrids, adaptation of improved agro-techniques for scientific cultivation of the crop and control on biotic and abiotic factors.

Tomato fruit contains a higher concentration of antioxidant lycopene during the ripening stage, which shields people against cancer. But carotenes, another type of antioxidant, are also known to have anti-cancer effects [3].

Compared to cereals and legumes like soybean, tomatoes are far more capable of producing a high amount of carbohydrates per unit area [2]. A substantial amount of vitamins and minerals can be found in tomato fruit [4].

In India, where it covers 789 thousand hectares and yields 7599 thousand metric tonnes annually, it is grown at an average rate of 25.04 tonnes per hectare. Because they contain a number of nutrients and metabolites that are good for human health, tomatoes are a staple in Indian kitchens and play a significant role in Indian cuisine. While tomatoes are usually consumed raw, they can also be cooked or processed to make a variety of goods, including sauces, pickles, soups, ketchup, pastes, and powders.

Materials and Methods
A survey was conducted at farmers field in Badokhar block of district Banda (Bundelkhand) U.P during the rabi season 2022-23 from the farmers field who had transplanted the tomato plants at different dates in order study the effect the present survey was conducted with the hypothesis that the yield and its attributing characters are affected by different dates of sowing. Bundelkhand lies in the Central Plateau Region of India with semi-arid (Sub-tropical) climatic condition. The average temperature of the area is 28.4 ℃, having maximum temperature in the month of May (48.5 ℃) and minimum in the month of January (6.4 ℃), with PET of 1853.2 mm. The experiment was carried out in a RBD design, which comprises of four treatments and each treatment is replicated three times (Table – 1). The different date of sowing was considered as the treatments which were replicated thrice by taking the plant samples from different farmers who led plantation in similar date of sowing. The different dates of sowing were Oct 1, Oct

13, Oct 29 and Nov 12 2022. Near about all the farmers had fertilized their fields with cow dung, Urea, TSP and MOP at the rate of 10ton ha^{-1}, 300 kg ha^{-1}, 250 kg ha^{-1}, 200 kg ha^{-1} respectively. The physico-chemical properties of the area are given in table 1.

Fig 1: Shows aerial view of Experimental Plot taken from GPS-google earth pro software

Table 1: Physico-chemical properties of initial soil

Soil analysis interpretation	Texture	pH	O.C (%)	Total N (%)	P (kg ha^{-1})	K (kg ha^{-1})	S (μgg^{-1})
	Sandy loam	8.09 Alkaline	0.38 Low	0.21 Low	14.63 Medium	359 High	14.0 Low

Result and Discussion
The crop yield varied from 26.36 (T$_4$) to 30.99 (T$_1$) t/ha among the treatments with an average value of 28.64 t/ha. The significance variance among the treatments @ 5% was 1.50±0.52 (Table- 3). Similarly, the yield and other attributing characters such as plant height, fruit length, fruit diameter and average fruit weight ranges from 35.83, 2.41, 2.53, 18.01 for T$_4$ to 40.98, 2.76, 2.83 20.39 for T$_1$. Variation among the treatments for each yield and its attributing character was found to be significant @ 5% level of significance (Table- 3). The yield reduction in the late sowing has been mainly seen due lower temperature and during winter season the high dewdrops might reduce the fruit size [5-8]. In addition to this, late sowing

of winter tomato might witness to the lower root development which impaired with the poor growth of plant and thus reduces the yield [11-13]. In some field apart from these two factors the miscaption of physiological disorder have been found to be the reason for the yield reduction [9 - 10].

Table 2: Description of treatments

S. No.	Treatment number	Description of the treatments (Various dates of sowing)
1	T1	1 Oct 2022
2	T2	13 Oct 2022
3	T3	29 Oct 2022
4	T4	12 Nov 2022

Table 3: Effect of sowing dates on yield and its attributing characters of Wheat

Treatment (sowing dates)	Plant height (cm)	Fruit length (cm)	Fruit diameter (cm)	Average fruit weight (g)	Yield (tha^{-1})
1 Oct 2022	40.98	2.76	2.83	20.39	30.99
13 Oct 2022	38.76	2.63	2.79	19.21	29.01
29 Oct 2022	37.64	2.52	2.61	18.23	28.21
12 Nov 2022	35.83	2.41	2.53	18.01	26.36
CD (0.05%)	1.84	0.17	0.14	0.94	1.50
S.Em±	0.64	0.06	0.05	0.33	0.52

Conclusion
The experimental finding accepts our null hypothesis that the yield and its attributing characters are affected by different sowing date and concludes our fact that T$_1$ having the best yield and its attributing character which merely depends largely on

the physiological and climatic factors. Hence, the recommendation can make as far date is concerned by choosing the suitable bio-climate from germination to maturity forecasted either by IMD or other governmental non-governmental organization.

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