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Effect of different sowing dates on the yield and attributing characters of linseed

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Abstract
A survey was conducted at the farmer's field of Mawai village in Banda district of Bundelkhand during 2022-23 to signify the effect of different sowing dates on the yield and its attributing characters on linseed. Four different date were assumed as treatments (T_1= 10 Oct 2022, T_2= 22 Oct 2022, T_3= 31 Oct 2022 and T_4= 10 Nov 2022) and from each sowing dates three fields were selected. It was found that the yield and its attributing characters were significantly affected by different sowing dates and the farmers who sown their crop at 20th October (T_2) gave the best results contrasting to 10th November (T_4). The probable reason for the highest out yielding in T_2 is merely due to the climatic variation and impounded rainfall. The results indicated that treatment T_2 enhanced the crop yield as well as its attributing characters. The lowest yield was recorded in the treatment T_4.

Keywords: Linseed, sesame, sowing date

Introduction
Sesame (*Sesamum indicum* L.) is an annual, self-pollinated, indeterminate minor oil crop which belongs to the family Pedaliaceae [1]. It is a significant oil-producing crop which grows widely in different parts of the world. Among the various oil crops grown in Bundelkhand, sesame is one of them but now it is losing its identity over the mentioned area [2]. It is commonly known as Alashi or Alsi. Every part of the linseed plant is utilized commercially, either directly or after processing [3]. On a very small scale seed is directly used for edible purposes. It contains 33 to 47% of oil. About 20% of the total oil produced is used at farmer's level and the rest 80% oil goes to industries in various forms such as boiled oil, borated oil, eposidized oil, aluminates oil, urethane oil, isomerizes oil etc. The oil is rich in linolenic acid (>66%) and it is a perfect drying oil. Linseed seeds contain high levels of dietary fiber as well as lignin, an abundance of micronutrient and omega-3 fatty acids. It is good in taste and contains 36% protein, 85% of which is digestible. It is also used as organic manure and contains about 5% N, 1.4% P_2O_5 and 1.8% K_2O [4].
India is an important linseed growing country in the world and it contributes 7 per cent to the world linseed pool [5]. At present, linseed is cultivated in about 2.63 lakh hectares with contribution of 1.26 lakh tones to the annual oilseed production of the country. The average productivity of linseed is 477 kg/ha (2015-16). Major linseed growing states in India are Madhya Pradesh, Uttar Pradesh, Chhattisgarh, Bihar, Rajasthan, Orissa and Karnataka. Madhya Pradesh has largest growing area (1.16 lakh ha) and production (0.55 lakh tones) with 474 kg/ha productivity (Anonymous 2015-16) [6].
The crop is grown in Rabi seasons in Bundelkhand and with improved practices its yield and quality can be improveed. Linseed (*Linum usitatissimum* L.) is one of the most important cultivated plants concerning oil (non-edible and edible oil) and fibre. This crop is gaining momentum for manufacturing several items of industrial significance [7]. Linseed is becoming increasingly popular as a nutritional and functional food due to its high content of health promoting substances such as omega 3 fatty acid, soluble and insoluble fibre and lignans [8]. Among various factors responsible for low yield of linseed in Bundelkhand, sowing time and varietal selection are of primary importance.

Sowing time is a non-monetary input, but has noticeable impact on productivity of crop. Planting dates significantly affect growth characters, yield and its component as well as oil yield in flax [9, 10]. The appropriate sowing date is very important since it ensures good seed germination, as well as the timely appearance of seedling and the optimum development of the root system [11]. Therefore, to ascertain the optimum dates of sowing for linseed genotypes this survey was undertaken.

Materials and Methods

A survey was conducted at the farmer's field in Mawai village of district Banda (Bundelkhand) who had sown the similar variety of sesame (Parvati) during 2022-23 at different dates with the hypothesis that yield and its attributes are affected by different sowing dates (fig: 1). 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 °C, having maximum temperature in the month of May (48.5 °C) and minimum in the month of January (6.4 °C), 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 experimental field was having 45% moisture content at the time of sowing which was best suited for the germination. The seeds were sown on 10 October, 22 October, 31 October and 10 November 2022 with the fixed dose of fertilizer (60:30:30 kg/ha N, P_2O_5 and K_2O) were applied. Half dose of N and full dose of P_2O_5 and K_2O were applied as basal dressing and remaining N was applied as top dressing after first irrigation. The crop was sown by desi plough at row spacing of 30 cm. Other packages of practices were followed as per recommendation for linseed crop. Weeding, thinning, irrigation, application of pesticide etc. were done when found necessary. The sesame crop from each treatment were harvested on the 15th - 18th January 2023. Yield and its attributing characters were recorded from 5 randomly selected plants from each plot. Data were then subjected to analysis of variance (ANOVA) using Statistix10 package and the means were compared according to Least Significant Difference Test @ 5% level of significance.

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 (%)	Av. 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

Results and Discussion

The seed yield varied significantly from 8.9 Kg/ha (T_4) and 13.8 Kg/ha (T_2) among the various treatments with an average 11.10 kg/ha. The significance variance among the treatment @ 5% was 0.570 (±) 0.197 (Table – 2). Similar to the yield, the other yield attributing characters viz - stover yield, shoot length, number of primary branches, secondary branches and tertiary branches ranges from 19.89, 61.21, 2.87, 12.13, 25.96 (T_4) to 28.56, 72.44, 5.77, 12.13, 19.88, 40.38 (T_2). The variation among the treatment for each yield attributing character was found to be significant @ 5% degree of freedom (Table – 2). The shifting of north-west monsoon in this region and lower infestation of weed at this time facilitates higher water and nutrient uptake and thus, highest yield and its attributing characters were reported for T_4 treatment compared to T_2 [12]. In addition to this, the favourable temperature at the time of growth stage favoured the vegetative and reproductive stages of the crop production [13]. As per farmers view, the number of effective seeds per pod were highest in T_4 treatment compared to T_2.

Table 2: Description of treatments

S. No.	Treatment number	Description of the treatments (Various dates of sowing)
1	T_1	10 Oct 2022
2	T_2	22 Oct 2022
3	T_3	31 Oct 2022
4	T_4	10 Nov 2022

Table 3: Effect of sowing dates on yield and its attributing characters of linseed (g/ha)

Treatments	Seed yield	Stover yield	Height of main shoot (cm)	Primary branch	Secondary branch	Tertiary Branch
Sowing dates						
10 Oct	11.39	24.81	70.59	4.61	17.36	36.09
22 Oct	12.99	28.56	72.44	5.77	19.88	40.38
31 Oct	10.87	21.73	64.81	3.92	13.45	28.22
10 Nov	9.15	19.89	61.21	2.87	12.13	25.96
CD (0.05 %)	0.570	1.514	4.332	0.211	0.764	2.083
SEm±	0.197	1.122	1.496	0.073	0.264	0.719

Conclusion

The experimental finding on the yield and its attributing character on different sowing date ecluides T_2 having the best yield and its attributing character which merely depends largely on the climatic factors. Hence, the recommendation can made 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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