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RESEARCH PAPER

Effect of seed rate on linseed genotypes under utera condition

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Abstract : A field experiment was conducted under All India coordinated Research Project on linseed at Agriculture Farm, College of Agriculture, Nagpur in *Rabi* Season 2019-20. The experiment was laid out in Factorial Randomized Block Design with three replication in which effect of three seed rate *i.e.* 30, 40 and 50 Kg/ha was tested on three genotypes *i.e.* BRLS-106, Shekhar and T-397. The results revealed that among the genotype BRLS -106 was found superior over Shekhar and T-397 genotypes under *utera* condition with respect to growth, yield and yield attributes. However, the seed rate 50 kg^{-1} found superior in yield, GMR and NMR. The interaction of BRLS-106 with seed rate 40kg/ha has recorded the highest seed yield and net monetary returns also.

Key Words : Genotype, Seed rate, Linseed, *Utera*, Seed yield, Economics

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INTRODUCTION

Linseed (*Linum usitatissimum* L.) is an ancient oilseed crop grown widely across Asia, Europe and Americas for seed and fibre purpose. Its seeds are nutritious with complete protein (all 8 essential amino acids), higher order linolenic acid, complex carbohydrates, vitamins and minerals. Linseed is the cheapest source of Omega-3 and Omega-6 fatty acids which improves human nervous system. Its fibre is lustrous, coupled with strength there by durability and blends well with various natural and manmade fibres.

India contributes about 10.81 % and 5.30% to world area and production, respectively. In India linseed occupies an area of 1,72,710 ha yielding 99,070 tones with an average productivity of 574 kg ha^{-1} (2018-19). The major linseed growing states of country are Madhya Pradesh, Chattisgarh, Uttar Pradesh, Maharashtra, Bihar, Jharkhand, Karnataka, Nagaland and Assam accounting for about 97 % of total area of nation. In Maharashtra it occupies an area of 8,700 ha yielding 2,600 tones with an average productivity of 299 kg ha^{-1} in the Maharashtra (2019-20). In Vidarbha region the crop occupies 6570 ha with production of 2120 tones with productivity of 323 kg ha^{-1} (2018-19).

Using high seed rates with all varieties can have a negative impact on standing power, disease resistance and specific weight. If plant canopies are too thick this will have implications on crop management. Determining optimum seed rate is essential to maintain optimum plant

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population in the field for higher yield harvest and to ensure quality production. Also to prevent seed wastage from excess sowing such reduces the initial cost of production. A current national seeding rate recommendation for linseed production is 25 kg ha^{-1} for row planting and 30 to 40 Kg ha^{-1} for broadcasting. But, under utera condition several farmers often broadcast more than double and triple rates. Therefore, it is need to find out optimum seed rate of linseed under utera condition. These type of high seed rates Farmers are using certainly to reduce weeds pressure as they do not carry out weeding practices in this crops as they give their priority to cereal and pulse crops than to oilseed crops. Linseed is being produced under rainfed, low input and poor management. Abdul Wahed (2002) and Kinber (2003) revealed that increasing seeding rate found to increase seed and straw yields m^2. On the other hand, straw and seed yields $plant^{-1}$ were decreased by increasing seeding rate. Different genotypes also respond to various seed rate. The main objective of the present investigation is to find out the optimum quantity of seed rate for higher production under utera condition.

Material and Methods

All India coordinated Research Project on linseed conducted a field experiment on Agriculture Farm, College of Agriculture, Nagpur under Dr. P.D.K.V., Akola, Maharashtra in *Rabi* Season 2019-20 under *utera* condition. The soil of experimental site was medium black having low in organic carbon and available nitrogen and medium in available phosphorus. An Experiment was laid out in Factorial Randomized Block Design with three replication in which factor A consist of BRLS-106, Shekhar and T-397 whereas factor B includes three seed rate 30 kg/ha, 40 Kg/ha and 50 kg/ha. The sowing was done after harvest of paddy crop at the spacing 30 cm in between two rows. Growth parameters like Plant height, number of branches as well as yield attributes like number of capsules and number of seeds per capsules were recorded at the time of harvest. GMR, NMR were recorded at harvest. The observed data were analysed statistically and the appropriate standard error of mean SE (m±) and the critical difference (CD) were calculated at 5 % level of significance (Panse and Sukhatme, 1954).

Results and Discussion

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Effect on growth attributes:

Plant population:

A perusal data given in Table 1 revealed that plant population was found non-significant among the genotypes, whereas, the effect of seed rate shows significant results and highest seed rate recorded highest number of plants.

Plant height:

Significant influence of different genotypes and seed rate was recorded on plant height. Among the genotype T-397 recorded highest plant height which is significantly superior over other two genotypes *i.e.* BRLS-106 and Shekhar. The seed rate at 50 kg ha^{-1} recorded highest plant height followed by 40 kg ha^{-1} which are at par with each other while significantly superior over 30 kg ha^{-1}. Gubbels and Kenaschuk (1989) recorded the similar results.

Number of branches:

The data regarding effect of seed rate on number of branches are furnished in Table 1. Similar to that of plant height different genotypes and seed rate also shows significant influence of number of branches per plant. Genotypes BRLS 106 produced significantly higher number of branches per plant over other two *viz*., Shekhar and T-397. Though the plant height was highest in 50 kg ha^{-1} seed rate treatment the number of branches were significantly highest in the treatment in which the 30 kg ha^{-1} seed rate was used. This might be due to the dense plant population in 50 kg ha^{-1} seed rate treatment as compared to 30 kg ha^{-1}. Low seed rate gives more space for branching as compared to high seed rate, hence enhanced the cell division, cell multiplication and tissue differentiation which ultimately increase the number of branches. These result was corroborated with the findings of Meena *et al.* (2011).

Yield Attributes:

Number of capsules per plant:

The results of number of capsules $plant^{-1}$ as influenced by seed rate are presented in Table 1. Among different genotype the BRLS 106 recorded significantly higher number of capsules as compared to other genotypes. The results of different seed rate were similar to number of branches per plant reflecting significantly highest capsules per plant in the treatment containing 30 kg ha^{-1} seed rate. Similar results were also inconformity with findings of Meena *et al*. (2011) and Singh *et al.* (2007).

Number of seed per capsules:

Genotype BRLS 106 recorded significantly higher number of seeds per capsules than other genotypes. Increase in seed rate was reflected in decline of seeds per capsules, and highest seeds per capsule was recorded in the seed rate of 50 kg ha^{-1}. This might be due to the less number of capsules per plant at maximum seed rate, hence nutrient and moisture benefit is redirected in more number of seeds per capsule (Singh *et al*., 2007).

Seed yield:

Perusal of data presented in Table 1 and also graphically depicted in Fig. 1 revealed that Seed yield was significantly affected due to various genotype tested and highest seed yield was observed in the genotype BRLS-106 (752 kg ha^{-1}) as compare to Shekhar (653 kg

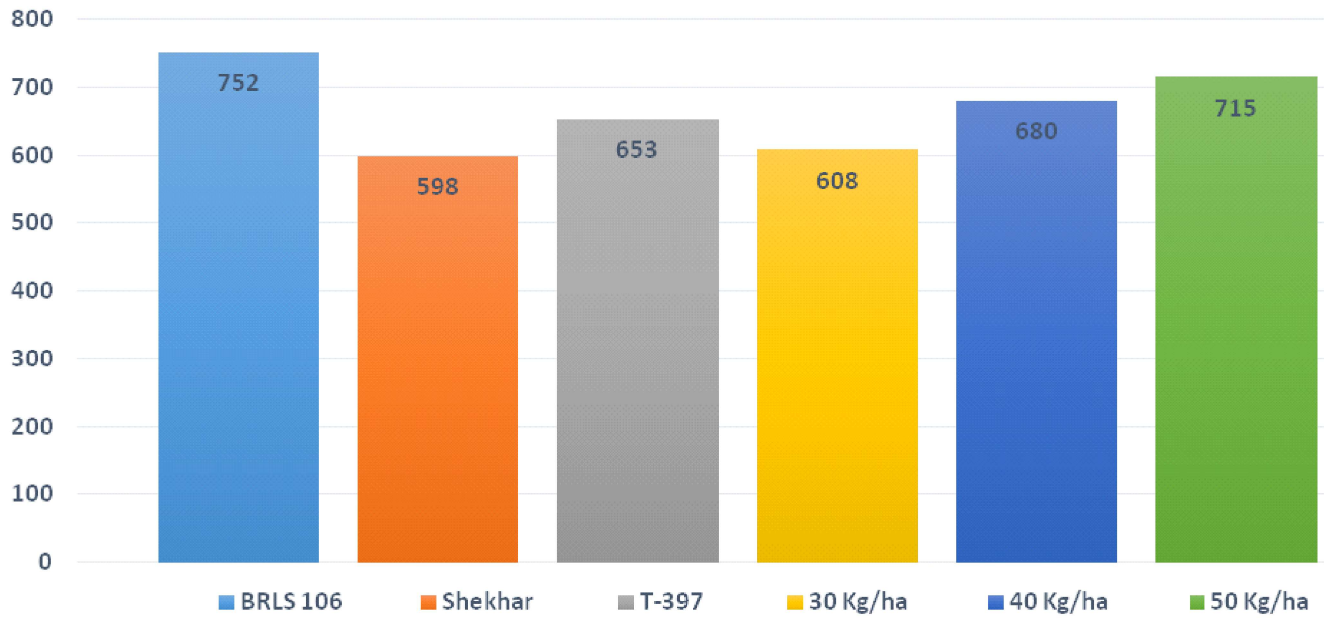

Fig. 1 : Performance of linseed genotypes to various levels of seed rate on yield kg/ha

Table 1 : Performance of linseed genotypes to various levels of seed rate regarding growth, yield and economics

Tr. No.	Treatments	Plant population at harvest	Plant height (cm)	No. of branches plant^{-1}	No. of capsules plant^{-1}	No. of seeds capsule^{-1}	Seed yield (kg ha^{-1})	GMR (Rs. ha^{-1})	NMR (Rs. ha^{-1})	B:C ratio
Factor A: Genotypes										
1.	BRLS 106	703	41.51	2.26	32.87	8.34	752	37589	23337	2.64
2.	Shekhar	802	40.62	1.87	19.89	7.03	598	29887	15635	2.09
3.	T-397	792	47.20	1.93	22.22	7.52	653	32663	18411	2.29
	S.E. ±	31	1.05	0.09	1.50	0.23	11	-	543	-
	C.D. (P=0.05)	NS	3.15	0.26	4.50	0.69	33	-	1627	-
Factor B: Seed rate										
1.	30 Kg/ha	658	41.60	2.36	29.44	6.67	608	30422	17170	2.30
2.	40 Kg/ha	757	43.82	2.07	24.71	7.95	680	33978	19726	2.38
3.	50 Kg/ha	883	43.91	1.63	20.82	8.27	715	35739	20487	2.34
	S.E. ±	31	1.05	0.09	1.50	0.23	11	-	543	-
	C.D. (P=0.05)	91.76	-	0.26	4.50	0.69	33	-	1627	-
Interaction										
	S.E. ±	53	1.82	0.15	2.60	0.40	19	-	940	-
	C.D. (P=0.05)	NS	5.45	-	-	1.19	56	-	2819	-

NS=Non-significant

Table 2: Interaction effect of seed rate and different genotypes on Seed yield (kg ha^{-1})

Genotypes	Seed rate		
	30 (kg ha^{-1})	40 (kg ha^{-1})	50 (kg ha^{-1})
BRLS – 106	708	786	762
Shekhar (ZC)	488	608	698
T – 397 (NC)	630	645	684
S.E. ±	19		
C.D. P=0.05	56		

Table 3: Interaction effect of seed rate and genotypes on Net Monetary Returns (Rs.ha^{-1})

Genotypes	Seed rate		
	30 (kg ha^{-1})	40 (kg ha^{-1})	50 (kg ha^{-1})
BRLS – 106	22126	25031	22854
Shekhar (ZC)	11137	16131	19637
T – 397 (NC)	18248	18015	18970
S.E. ±	940		
C.D. (P=0.05)	2819		

ha^{-1}) and T-397 (598 Kg ha^{-1}) under *utera* condition. This might be due to the more number of branches recorded in this genotypes and capsule number as well as seeds per capsule. The genotype BRLS-106 was recorded 25.8% more seed yield on Shekhar and 15.1% more seed yield on T-397 under utera condition.

The seed yield was significantly affected due to different seed rate and recorded maximum seed yield at the seed rate of 50 kg ha^{-1} which is significantly superior over 40 and 30 kg ha^{-1} seed rate. This might be due to the more number of plant population per hectare at maximum seed rate, maximum number of seeds per capsule. Increase in the seed rate from 30 to 40 kg ha^{-1} recorded 72 kg ha^{-1} increase in yield, however, when seed rate increases from 40 to 50 kg ha^{-1} recorded only 35 kg ha^{-1} increase in yield. These findings are in close conformity of Meena *et al*. (2011) and Singh *et al.* (2007).

Economics:

The gross monetary return, net monetary return and B:C ratio have been significantly affected due to different entries tested and highest was recorded in the entry BRLS-106. Net monetary return was observed significantly superior over zonal check Shekhar and national check T-397 under *utera* condition.

Different seed rate was significantly affected the net monetary return and B:C ratio. The gross and net monetary returns was recorded highest at maximum seed rate of 50 kg ha^{-1}, this might be due to the highest seed yield. But, B:C ratio was recorded higher at 40 kg ha^{-1} seed rate. This might be due to the difference in the cost of seed rate (Meena *et al*., 2011).

Effect of interaction:

The interaction effect of genotypes and seed rate was found significant on seed yield (kg ha^{-1}) and net monetary return of linseed and presented in Table 2 and Table 3, respectively. Highest seed yield (786 kg ha^{-1}) was recorded in the interaction of genotype BRLS-106 with 40 kg ha^{-1} seed rate followed by (762 kg ha^{-1}) in the interaction of same genotype with 50 kg ha^{-1} seed rate. Net monetary return was also recorded highest (25031 Rs. ha^{-1}) in the interaction of entry BRLS-106 with 40 kg ha^{-1} seed rate.

Conclusion:

The yield potential of the entry BRLS-106 was 25.8% highest on zonal check Shekhar and 15.1% more on national check T-397 under *utera* condition. Economic return was highest in the interaction of BRLS-106 at 40 kg ha^{-1} seed rate. Therefore it is concluded that BRLS - 106 is appropriate at 40 kg ha^{-1} seed rate

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