

ESTIMATES OF VARIABILITY PARAMETERS FOR YIELD AND ITS COMPONENTS IN LINSEED (*LINUM USITATISSIMUM* L.)

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Abstract: The present study of genetic variability was carried out using 30 genotypes of linseed for 10 quantitative characters. The results showed significant differences and wide range of variability for all the characters. The seed yield per plant was recorded highest values for phenotypic and genotypic coefficients of variation followed by number of capsules per plant. The high heritability coupled with high genetic advance as percent of mean was observed for seed yield per plant, test weight, capsules per plant, plant height, branches per plant, days to first flowering and days to 50% flowering indicated the predominance of additive gene action in the expression of these traits and can be improved through individual plant selection.

Keywords: Linseed, Variability, Heritability

INTRODUCTION

Linseed (*Linum usitatissimum* L.) is one of the important oil and fiber yielding crop of India. It has nutritional, medicinal and industrial uses. India is the third largest producer of linseed oil in the world. Linseed occupies an area of about 525.5 lakh ha with an annual production of 211.9 lakh tones and average productivity of 403 kg/ha in India (Agropedia, 2010). In Madhya Pradesh, it is grown in an area of 126 thousand hectare with a production of 48 thousand tonnes with productivity of 381 kg/ha (Anonymous 2009-10). Seed yield per hectare of this crop is very low in India. Its cultivation under marginal/sub-marginal lands and poor crop management are the major reasons for low productivity of the crop. Thus, there is need to develop or identify high yielding linseed varieties. Development of high yielding cultivars requires information on nature and magnitude of variation in the available germplasm. The observed variability is a combined estimate of genetic and environmental cause of which only the former one is heritable. Heritability and genetic advance of the seed yield and its components is prerequisite for the improvement through selection. The present investigation provides better insight and scope for the improvement of seed yield through component characters in linseed.

MATERIAL AND METHOD

The experimental material comprised of 30 linseed strains/varieties were grown in Randomized Block Design with three replications at Research Farm, Rajoula, Mahatma Gandhi Chitrakoot Gramodaya Vishwavidyalaya, Chitrakoot, Satna (Madhya Pradesh) during Rabi 2011-12. Observations were recorded on five randomly selected plants from each

plot for 9 quantitative characters viz. days to flowering, days to 50% flowering, number of branches per plant, plant height (cm), number of capsules per plant, number of seeds per capsule, 1000-seed weight (g), days to 80% maturity and seed yield per plant (g). The variability parameters were determined as per the methodology suggested by Burton and de Vane (1953) and Johnson *et al.*, (1955).

RESULT AND DISCUSSION

The analysis of variance among the genotypes for various characters is given in Table 1. The analysed data revealed highly significant differences among the genotypes evaluated for all the characters studied, indicating the existence of genetic variability among the selected material. Mean, range, GCV, PCV, heritability and genetic advance as per cent of mean are presented in Table 2. The variability estimates, in general, phenotypic coefficient of variation (PCV) was higher than corresponding genotypic coefficient of variation (GCV). The estimates of phenotypic and genotypic coefficients of variation indicated the existence of fairly high degree of variability for seed yield per plant and number of capsules per plant. Moderate variability was observed for number of branches per plant, 1000-seed weight and plant height. The minimum genotypic and phenotypic coefficients of variation were observed for days to first flowering, days to 50% flowering, number of seeds per capsule and days to 80% maturity. Days to first flowering, days to 50% flowering, plant height, number of capsules per plant, number of seeds per capsule, 1000-seed weight and days to 80% maturity showed almost similar values of phenotypic and genotypic coefficients of variation, indicating that variability was primarily was due to genotypic

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differences and environment has played little role in the expression of this character. The observations are in agreement with the findings of Savita *et al.* (2007) and Dubey *et al.* (2007).

The major function of heritability estimates is to provide information on transmission of characters from the parents to the progeny. Such estimates facilitate evaluation of hereditary and environmental effect in phenotypic variation and thus aid in selection. Heritability estimates are used to predict expected advance under selection so that breeders are able to anticipate improvement from different selection intensity. Johnson *et al.* (1955) have suggested heritability estimates in association with genetic advance are much useful for selection than heritability alone.

In the present study, estimates of heritability in broad sense ranged from 79.80 per cent for number of branches per plant to 99.83 for 1000-seed weight. High heritability estimates were found for all the characters indicated that the dependence of phenotypic expression reflect the genotypic ability to transmit the genes to their offspring. Similar results were also reported by Rao and Singh (1985).

Genetic advance expressed as per cent of mean ranged from 4.90 per cent to 69.45 per cent. High

estimates of expected genetic advance were found for seed yield per plant, number of capsules per plant, 1000-seed weight, and plant height, number of branches per plant, days to first flowering and days to 50% flowering. Low estimates of expected genetic advance were found for number of seeds per capsule and days to 80% maturity.

High heritability coupled with high genetic advance was observed for seed yield per plant, number of capsules per plant, 1000-seed weight, plant height, number of branches per plant, days to first flowering and days to 50% flowering indicated that most likely the heritability is due to additive gene effects and the improvement of these characters can be achieved by adopting simple selection procedure. High heritability coupled with low genetic advance was observed for number of seeds per capsule and days to 80% maturity indicated non-additive type of gene action and selection is less effective. Similar results were also observed by Naik and Satapathy (2002).

The present study revealed that the clusters per plant, seed yield per plant, 1000-seed weight, branches per plant and plant height possessing high heritability alongwith high genetic advance and high to moderate variability estimates indicating a greater scope for the improvement through selection from the population.

Table 1. Analysis of variance for nine quantitative characters in linseed.

Source of variation	d.f.	Mean square								
		Days to first flowering	Days to 50% flowering	No. of branches per plant	Plant height (cm)	Number of capsules per plant	Number of seeds per capsule	1000-seed weight (g)	Days to 80% maturity	Seed yield per plant (g)
Replication	2	1.14*	5.80*	0.03	1.30	10.41	0.02	0.01	0.89	1.64
Treatments	29	94.32**	117.77**	3.22**	314.92**	677.29**	0.88**	3.28**	31.65*	55.20**
Error	58	0.32	1.87	0.25	3.29	6.50	0.06	0.01	0.42	3.65

* Significant at 5% probability level.

** Significant at 1% probability level.

Table 2. Mean, range, coefficient of variation, heritability and genetic advance as per cent of mean for nine characters in linseed.

S.N.	Characters	Grand mean X±SE	Range		GCV	PCV	Heritability (%)	Genetic advance as % of mean
			Min.	Max.				
1	Days to first flowering	56.70±0.32	49.20	68.93	9.87	9.92	98.98	20.23
2	Days to 50% flowering	77.55±0.79	69.27	88.93	8.01	8.20	95.36	16.12
3	Number of branches per plant	5.66±0.28	4.47	10.00	17.59	19.69	79.80	32.37
4	Plant height (cm)	62.01±1.04	38.40	80.47	16.43	16.69	96.92	33.33
5	Number of capsules per plant	61.50±1.47	28.13	95.53	24.31	24.66	97.17	49.37
6	Number of seeds per capsule	7.45±0.14	6.13	8.33	7.02	7.77	81.63	13.07
7	1000-seed weight	5.59±0.02	4.03	7.83	18.73	18.74	99.83	38.55
8	Days to 80% maturity	132.82±0.37	125.53	138.20	2.42	2.47	96.13	4.90
9	Seed yield per plant (g)	11.17±1.10	4.70	26.37	37.12	40.88	82.46	69.45

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