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Short Communation

VARIABILITY STUDIES IN LINSEED

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Linseed (*Linum usitatissimum*), cultivated for its seed and fiber, is a self pollinated crop and belongs to the genus *Linum* of the family Linaceae. The oil extracted from the linseed (40-45 %) is high in linolenic fatty acid (45-60 %), which is used for a variety of industrial purposes such as linoleum, paint, varnish, soap and printer ink. Moreover, it has a high content of omega-3 fatty acid, alpha-linolenic acid (ALA). Every part of the linseed plant is utilized commercially either directly or after processing. Genetic variability for agronomic characters is a key component of breeding progarmmes for broadening the gene pool of crops. Heritability is a measure of the phenotypic variance attributable to genetic causes and has predictive function in plant breeding. It provides information on the extent to which a particular morphogenetic character can be transmitted to successive generations. Characters with high heritability can easily be fixed with simple selection resulting in quick progress. (Rajaravindran *et al.* 2000 and Kadir *et al.* 2008). The researchers have also evaluated linseed germplasm based on these genetic parameters. It has been accentuated that heritability alone has no practical importance without genetic advance. Genetic advance shows the degree of gain obtained in a character under a particular selection pressure. High genetic advance coupled with high heritability estimates offers the most suitable condition for selection. The present study was conducted to assess genetic variability, heritability and genetic advance for grain yield and its component characters.

The material for the present study consist of 100 linseed germplasm accessions and five checks viz. NL-97, JLS-9, T-397, Indira Alsi-32 and Padmini obtained from AICRP on linseed, Kanpur. The experiment was laid out in an augmented design consisting of five blocks. Each genotype was sown in single plot of 3 m length with a spacing of 30 x 05 cm between and within rows respectively. All the five checks were repeated in all the blocks. The experiment was conducted in medium black soil under rainfed condition during rabi season of 2012 at Oilseeds Research Station, Latur (M.S.). All recommended agronomic package of practices were followed during the crop growth period for raising good crop. The data was recorded on five randomly selected plants from each lines for 10 quantitative traits viz. days to 50 % flowering, days to maturity, plant height at maturity, number of primary branches per plant, number of secondary branches per plant, number of capsules per plant, number of seeds per capsules, 1000 seed weight, oil content and seed yield per plant. The values of phenotypic coefficient of variation (PCV), genotypic coefficient (GCV), heritability in broad sense (Hs) and genetic advance as percentage of mean (GCA % M) at 5 % selection intensity were estimated following standard biometrical methods. Phenotypic and genotypic correlation coefficients were estimated from the respective variances and covariation components (Burton, 1952 and Searle, 1961). Path coefficient analysis was done as described by Dewey and Lu (1959).

Table: 1 Analysis of variance for yield and yield contributing characters in linseed.

Source of variation	d. f.	Mean sum of squares									
		Days to 50% flowering	Days to maturity	Branches /plant		Plant height (cm)	Capsules /plant	Seeds / capsule	1000-seed weight (g)	Seed yield/ plant (g)	Oil content (%)
				Primary	Secondary						
Block	4	1.64	4.54**	0.08	0.98	0.34	2.32*	0.40	0.15	1.82	7.34*
Treatment	104	35.85**	28.82**	1.12	14.26**	42.90**	55.81**	1.63*	2.59**	7.76**	3.82**
Error	416	2.89	10.66	0.08	0.83	2.96	2.07	0.45	0.16	1.07	0.16

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Analysis of variance revealed highly significant difference among the genotypes for all the characters (Table 1) except number of secondary branches per plant, plant height and number of seeds per capsule. The reliability of a parameter to be selected for breeding programme among other factors is dependent on the magnitude of its coefficient of variations (CV) especially the GCV. The genotypic and phenotypic variances for days to 50% flowering, plant height and number of capsules per plant are almost equal suggesting the least influence of environment in the expression of these characters. The differences between genotypic and phenotypic coefficient of variability indicate the environmental influence. While a lower value of CV generally depicts low variability among the tested sample. These results are in agreement with earlier reports of Ahmad *et al.* (2014).

The phenotypic coefficient of variation were of high magnitude for number of primary branches per plant (11.79), number of secondary branches per plant (17.67), number of capsule per plant (17.29) and 1000 seed weight (11.19) (Table 2). Comparison of relative magnitude of genetic coefficient of variation among germplasm lines revealed that maximum amount of genetic variability was observed for seed yield per plant (12.09%), number of capsule per plant (17.29%), number of primary branches per plant(11.79%), secondary branches per plant(17.67%) and 1000 seed weight (11.19%). The high values of GCV and PCV of these characters suggested that there was a possibility of improvement of yield through direct selection. Similar results were reported by Kumar *et al.* (2012).

Table 2: Parameters of genetic variability for yield and yield contributing characters in linseed

Character	Range	Mean	Genotypic variance ($\sigma^2 g$)	Phenotypic variance ($\sigma^2 p$)	GCV	PCV	Heritability (Hs) (%)	GA	EGA
Days to 50% Flowering	42-67	55.06	6.59	9.48	4.66	5.59	69.5	4.41	8.00
Days to maturity	85-113	98.59	3.63	14.29	1.93	3.83	25.4	1.97	2.00
Plant height (cm)	28-53	40.44	7.98	10.95	6.98	8.18	72.9	4.97	12.29
Primary branches/pt	2-7	3.99	0.22	0.23	11.79	12.17	93.9	0.93	23.53
Secondary branches/pt	3-20	9.27	2.68	3.51	17.67	20.22	76.4	2.95	31.82
Capsules/ pt	10-34.10	18.95	10.74	12.82	17.29	18.89	83.8	6.18	32.62
Seeds/ cap.	5.60-9.20	7.74	0.15	0.60	5.11	10.06	25.9	0.41	5.36
1000 seed wt (g)	4.16-8	6.22	0.48	0.65	11.19	12.94	74.8	1.24	19.94
Oil content (%)	33.20-41.66	38.03	0.45	1.98	1.78	3.70	23.1	0.67	1.76
seed yield/ plant(g)	4.70-15.30	9.20	1.23	2.31	12.09	16.53	53.5	1.67	18.23

The estimate of GCV and PCV alone was not much helpful in determining the heritable portion. The amount of advance to be expected from selection can be achieved by estimating heritability along with coefficient of variability. Burton (1952) also suggested that GCV and heritability estimate would give better information about the efficiency of selection.

High heritability was observed for days to 50 percent flowering (69.50%), plant height (72.9%), number of primary branches per plant (93.9%), number of secondary branches per plant (76.4%), number of capsule per plant (83.8%), 1000 seed weight (74.8%) and seed yield per plant (53.5%). The high degree of heritability estimates for these traits suggested that the characters were under genotypic control.

High heritability coupled with high genetic advance as a percent of means observed for number of primary branches per plant (93.9%, 23.53%), number of secondary branches per plant (76.4%, 31.82%), number of capsule per plant (83.8%, 32.62%) respectively and seed yield per plant (53.5%, 18.23%) indicating prevalence of fixable type of genetic variation for these characters. Earlier findings of Samadia (2005) were in agreement with present study indicating that these characters are controlled by additive gene action and phenotypic selection for these characters will be effective. These characters could be improved through pure line selection effectively.

High heritability with low genetic advance observed for days to 50 % flowering (69.5%, 8.0%), plant height (72.9%, 12.29%), 1000 seed weight (74.8%, 19.9%) indicating importance of non additive gene action and therefore direct selection for these traits may not be effective. For improving these characters heterosis breeding may be followed.

REFERENCES

Ahmad, R., Ibrar, D., Mirza, M.Y., Talat Mahmood, T., Khan, M. A., Iqbal, M. S. and Ahmad, M. (2014) Genetic variability, heritability and genetic advance in some genotypes of linseed (*Linum usitatissimum* L.). *Journal of Agricutural Research* 52(1): 43-52.

Burton, G.W. (1952) Quantitative inheritance in grasses. Proceeding of 6th International Grassland congress **1**:227-228.

Dewey, D.R. and Lu, K.H. (1959) A correlation and path coefficient analysis of components of crested wheat grass seed production. *Agronomy Journal* **51**: 515-518.

Kadir, M., Biswas, B. K., Podder, P., Alam, M. S. and S.K. Adhikary. (2008) Genetic parameters, character association and path analysis in sesame. *Bangladesh Journal of Agriculture Research* **21**(1): 37-43.

Kumar, S., Kerkhi, S.A., Gangwar, L.K., Chand, P.and Kumar, M. (2012) Improvement in the genetic architecture through study of variability, heritability and genetic advance in linseed crop (*Linum usitatissimum* L.). *International Journal of Research in Enginering, and Social Sciences* **2**(9): 58-65.

Rajaravindran, G., Kingshlin, M. and Shunmagavalli, N. (2000) Heritability and genetic advance in sesame (*Sesamum indicum* L.). *Sesame and Safflower News Letter* **15**:23-25.

Samadia, D.K. (2005) Genetic variability studies in Lasora (*Cordia myxa* Roxb.). *Indian Journal of Plant Genetic Research* **18**(3): 236- 240.

Searle, S.R. (1961) Phenotypic, genetic and environmental correlations. *Biometrics* **17**: 474-480.