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Short Communication

Selection parameters for yield and it's components in linseed (*Linum usitatissimum* L.)

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Linseed (*Linum usitatissimum* L.) is an important *rabi* oilseed crop. Every part of linseed plant is utilized commercially either directly or after processing. It is grown mostly in sub-marginal lands under unirrigated and *utera* conditions in different states of our country. Chhattisgarh is one of the important linseed growing states of India. This accounts for nearly 19.05% area and 16.21% production of country. In Chhattisgarh linseed has 132.2 thousand-hectare area with a productivity of 260 kg/ha. Average productivity of Linseed in India is 294 kg/ha. So there is a scope of enhancing the productivity of linseed in Chhattisgarh State.

The present investigation was conducted at oilseed area of Research Farm, I.G.A.U. Raipur during *rabi* season of 2001-2002. The experimental material comprised of 21 cross combinations of 13 divergent genotypes of Linseed *viz.*, H-12, R-552, Kiran, Sheetal, Tikamgarh Trans Local, NP(RR)196, LCK-88062, JRF-3, Chambal, R-7, NDL-21, RLC-32, LCK-9313. The crosses were selected by adopting the mating system of diallel/Line × Tester in earlier years. Parents P_1, P_2 and F_2, F_3 generations were grown in Randomized Complete Block Design with three replications. In each replication twenty one plots of each combination were randomly allotted. In each plot of 5 × 3 meter, one row each of P_1 and P_2 and 6 rows each of F_2 and F_3 were randomly allotted with inter - row spacing of 25 cm. The sowing date of the crop was December 2, 2001. Recommended cultural practices and plant protection measures were adopted as and when needed. The observations were recorded on five randomly selected competitive plants in each plot and also from each replication for the following 10 characters *viz.*, Days to 50% flowering, Days to maturity, Plant height, Number of primary branches per plant, Number of Secondary branches per plant, Number of capsules per plant, Number of seeds per capsule, Number of seeds per plant, 100-Seed weight, Seed Yield per plant. The statistical analysis for Variability, Heritability and genetic advance, Correlation and path analysis were performed for Parental population only.

The genotypic variance was smaller than phenotypic variance (Table 1) which showed that environment did exert masking influence on the expression of genetic variability. Comparison of relative magnitude of genotypic coefficient of variation for parental population revealed that maximum amount of genetic variability was present for number of seeds per plant (40.69%). High amount of genotypic coefficient of variation was possessed by number of primary branches per plant (21.32%), number of secondary branches per plant (25.53%), number of capsules per plant (28.46%) and seed yield per plant (30.09%).Similar findings were also reported [1-5]. This indicates good scope for the genetic improvement of these traits.

High heritability coupled with high genetic advance was observed for number of seeds per plant (99.8%, 83.7%), number of capsules per plant (95.7%, 57.3%), number of seeds per capsule (93.6%, 35.8%), number of secondary branches per plant (86.9%, 49.0%) and 100 seed weight (74.3%, 33.3%).The major character seed yield per plant (g) expressed high heritability with high genetic advance (86.3%, 58.1%), indicating prevalence of fixable type of genetic variation for the expression of this trait. Earlier findings [5-7] were in agreement with present study (Table 1).

Correlation studies (Table 2) revealed that highly significant positive correlation of seed yield per plant existed with number of capsules per plant (0.639), number of seeds per capsule (0.733) and number of seeds per plant (0.791) whereas, it was negative with plant height (-0.659) which allow for short stature. These results are in confirmation with [5 & 7-9]. These results also signify that improvement in grain yield per plant can be achieved by improving the characters like number of capsules per plant, number of seeds per capsule and number of seeds per plant.

The results (Table 2) also revealed that yield contributing characters like number of seeds per plant (3.079) and 100 seed weight (0.663) had highest direct positive effect on seed yield and growth characters like number of primary branches (0.248) and number of secondary branches per plant (0.131) followed them for direct positive effect. [5, 6 & 10-12] obtained similar results.

The negative direct effect on seed yield was observed in number of capsules per plant and number of seeds per capsule, followed by plant height, days

Table 1. Genetic parameters of variation for yield and its components in 13 parents of linseed

Characters	Mean	Range		PCV	GCV	h^2b	GA	GA as % of mean
		Minimum	Maximum					
Days to 50% flowering	54.94	52.13	58.93	4.34	3.58	0.681	3.34	6.08
Days to maturity	96.12	91.37	99.53	2.54	2.05	0.653	3.28	3.28
Plant height (cm)	52.84	43.20	60.93	13.74	12.50	0.827	12.37	23.41
No. of primary branches/plant	2.52	1.87	3.80	28.81	21.32	0.547	0.82	32.54
No. of secondary branches/plant	7.67	5.53	11.37	27.38	25.53	0.869	3.76	49.02
No. of capsules/plant	18.12	10.87	27.33	29.09	28.46	0.957	10.40	57.39
No. of seeds/capsule	5.39	3.60	6.76	17.64	17.51	0.936	1.93	35.80
No. of seeds/plant	100.00	47.33	184.52	40.73	40.69	0.998	83.75	83.75
100 seed weight (g)	0.87	0.71	1.20	21.75	18.81	0.743	0.29	33.33
Seed yield (g)	0.86	0.44	1.25	32.39	30.09	0.863	0.50	58.13

Table 2. Path coefficients of genotypes based on phenotypic and genotypic correlation in linseed

Characters		Days to 50% flowering	Days to maturity	Plant height (cm)	No. of prim.br./ plant	No. of sec. br./plant	No. of capsules/ plant	No. of seeds/ capsule	No. of seeds/ plant	100 seed wt. (g)	Seed yield (g)/ plant
Days to 50% flowering	P	**-0.013**	-0.007	-0.016	0.032	-0.003	0.232	-0.022	0.053	-0.093	0.205
	G	**-0.008**	-0.208	0.025	0.195	0.103	-1.129	0.089	1.468	-0.268	0.268
Days to maturity	P	-0.004	**-0.020**	-0.040	0.016	-0.001	-0.008	-0.208	-0.032	-0.021	-0.319
	G	-0.003	**-0.495**	-0.061	0.061	0.038	0.090	0.823	-0.908	-0.013	-0.469
Plant height (cm)	P	0.002	-0.005	**-0.159**	-0.019	0.001	-0.225	-0.206	0.083	0.034	-0.659*
	G	0.001	-0.149	**-0.202**	-0.128	-0.051	0.994	0.708	-2.043	0.074	-0.797
No. of prim. br./plant	P	-0.007	-0.006	0.053	**0.057**	-0.003	0.236	0.113	0.078	-0.132	0.390
	G	-0.006	-0.121	0.104	**0.248**	0.140	-1.344	-0.462	2.346	-0.404	0.500
No. of sec. br./plant	P	-0.009	-0.004	0.049	0.045	**-0.004**	0.286	0.078	0.083	-0.103	0.421
	G	-0.006	-0.143	0.078	0.264	**0.131**	-1.266	-0.260	2.001	-0.317	0.482
No. of capsules/plant	P	-0.007	0.000	0.086	0.032	-0.003	**0.416**	0.163	0.121	-0.169	0.639*
	G	-0.005	0.027	0.123	0.205	0.102	**-1.626**	-0.534	2.801	-0.357	0.737
No. of seeds/capsule	P	0.001	0.010	0.080	0.016	-0.001	0.165	**0.411**	0.102	-0.051	0.733**
	G	0.001	0.316	0.111	0.089	0.026	-0.673	**-1.290**	2.321	-0.117	0.784
No. of seeds/plant	P	-0.005	0.005	0.093	0.033	-0.002	0.369	0.307	**0.137**	-0.147	0.791**
	G	-0.004	0.146	0.134	0.189	0.085	-1.479	-0.972	**3.079**	-0.326	0.852
100 seed weight (g)	P	0.004	0.001	-0.015	-0.022	0.001	-0.202	-0.060	-0.058	**0.349**	-0.001
	G	0.003	0.010	-0.022	-0.151	-0.063	0.874	0.227	-1.514	**0.633**	0.028

The values in bold are direct effect, Phenotypic residual effect = 0.1959; Genotypic residual effect = -0.0118; *,** Significant at 5 and 1 per cent levels, respectively

to maturity and days to 50% flowering [12 & 13] also reported similar effects. Thus, in order to increase seed yield, attributes like number of seeds per plant, 100 seed weight, number of primary branches per plant and number of secondary branches per plant seem to be more important. Emphasis must also be given for traits having negative direct association like number of capsules per plant, number of seeds per capsule, days to maturity, plant height and days to 50% flowering.

Parameters of heritability, genetic advance, correlation and path analysis revealed that number of seeds per plant, number of capsules per plant, number of secondary branches per plant and number of seeds per capsule found to be important yield attributing characters in linseed for enhancing seed yield.

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