Yield attributes and yield

The data on yield parameters revealed that the application of 25 kg P_2O_5/ha as MRP + phosphobacteria inoculation recorded significantly higher number of pods/plant, pod length and number of seeds/pod over other treatments (Table 2). The highest grain yield with increased net returns was also recorded under MRP at 25 kg/ha + phosphobacteria, which was closely followed by enriched BDS. The increase in grain yield might be due to better yield attributing parameters and better availability of P for higher production. P fertilization through MRP along with seed inoculation of phosphobacteria increased the grain yield which might to due to ability of phosphobacteria to dissolve the insoluble P in the soil and make it easily available to the plant which in turn helps to putforth profused growth and produced more yield attributes. Where as in other treatments (T_5 - T_9) the yields were low because most of the applied 'P' in the soil get fixed as iron and alumina complex by which the roots are not capable of absorbing Phosphorus from the soil pool-due to strongly acidic reaction of the soil (pH 5.4).

RAE was higher in 25 kg P_2O_5/ha as MRP + phosphobacteria seed inoculation. This was followed by enriched BDS alone. This suggests that green gram was benefited much by these treatments than other treatments. Generally, RAE was improved in MRP treatments with application of organic sources in soybean-sunflower system (Gopalakrishnan and Palaniappan, 1991). Individual application of either single super phosphate or FYM of Phosphobacteria seed inoculation were not economical, whereas enriched BDS alone recorded equally higher production due to its easily available nature to the crop plants.

Thus, for higher productivity of green gram, application of Mussoorie rock phosphate at 25 kg P_2O_5/ha along with seed inoculation of Phosphobacteria @ 400g/ha seed rate is economical in acid red lateritic soils under rainfed conditions.

REFERENCES

GOPALAKRISHNAN, B. and PALANIAPPAN, SP. (1991). Agronomic effectiveness of Mussoorie rock phosphate in Soybean-Sunflower cropping system. **India, J. Agron., 36**: 450-453.

MATHUR, B.S., JHA, K.K., LAL, S. and SRIVASTAVA, B.P. (1979). Utilization of rock phosphate deposits in acid soils of Chhota Nagpur Plateau in Bihar. **J. Indian Soc. Soil Sci., 35** : 249 - 252.

PATHAK, A.N. and TIWARI, K.N. (1984). **Fertilizer Use Efficiency Report on Wheat Research,** C.S. Azad Univ. Agric) Tech., Kanpur., 13pp.

VERMA, V.L. and SHARMA, N.L. (1991). Agronomic effectiveness of Mussoorie rock phosphate as a source of Phosphorus for wheat (*Triticum aestivum*). **Indian J. Agron., 36** : 329-332.

(Received : October 1996 Revised : March 1997).

Madras Agric. J., 84(10): 595 - 597 October 1997
https://doi.org/10.29321/MAJ.10.A00921

GENETIC ANALYSIS IN LINSEED

J.A. PATEL, Y.K. GUPTA, J.N. PATEL and S.B. PATEL
Department of Plant Breeding
Gujarat Agricultural University
Anand Campus, Anand 388110

ABSTRACT

Genetic analysis of components of variation for seed yield, oil yield and yield components revealed the importance of both additive and non additive type of gene action in the inheritance of all the characters studied. However, preponderance of additive components was observed for phenological traits, *viz.*, days to flower and days to maturity, equal importance of both additive and dominance components for plant height, primary branches per plant, 500-seeds weight and seed oil content, whereas preponderance of dominance component was revealed for number of capsules per plant, seeds per capsule, seed yield per plant, biological yield per plant, harvest index and oil yield per plant. The biparental mating or diallel selective mating is suggested to exploit the genetic components for improvement of the characters studied.

KEY WORDS : Additive, genetic variance, biparental mating, diallel.

The breakthrough in boosting yield has not occurred in oil seed crops in general and linseed in particular. The yield being a complex character, the information regarding nature of gene action and relative magnitude of components of genetic variance is useful in the choice of appropriate and effective breeding methodology for improving seed yield and oil content. Technique of diallel analysis provides genetic information on the inheritance and behaviour of quantitative characters associated with yield and yield components, such information is more reliable when drawn pooled over more than one environments. The present study of 10 x 10 diallel over three environments was therfore made to understand the genetic architecture of twelve quantitative characters in linseed.

MATERIALS AND METHOD

All possible crosses, excluding reciprocals were made using 10 genotypes *viz.*, LC 1048, LCK 88062, LCK 88511, LW 28-9, LCK 8605, AKL 79, RLC 29, RLC 35, Chambal and Triveni. All the 45 F_1S alongwith their parents were raised in complete randomized block design having three replications with a 25 x 10 cm inter and intra row spacing. The experiment was conducted in unirrigated (1 October 1994) and irrigated (21 October 1994) conditions at Udaipur and in irrigated condition (10 October 1994) at Anand during *rabi* 1994-95. Data recorded on ten randomly selected competiti[illegible] plants (Table 1) except phenological traits *i.e.* da[illegible] to flower and days to maturity. These t[illegible] characters were recorded on population basis a[illegible] used for statistical analysis of the genet[illegible] components of variance (Hayman, 1954).

RESULTS AND DISCUSSION

The mean squares due to genotypes in t[illegible] analysis of variance were highly significant for [illegible] the characters under study indicating presence [illegible] considerable genotypic differences among t[illegible] material studied. The t^2 test was applied to confir[illegible] the validity of the assumptions underlying diall[illegible] analysis, which confirmed the homogeneity [illegible] Wr-Vr over the arrays for all twelve attribut[illegible] (Table 1). Significant regression coefficien[illegible] deviating from unity and from zero revealed t[illegible] existence of large quantity of linkage and epistas[illegible] except for number of capsules per plant, 500-see[illegible] weight, seed yield per plant, biological yield and o[illegible] yield per plant.

Components of variance analysis showe[illegible] importance of both additive (D) as well [illegible] dominance (H_1 and H_2) genetic variance f[illegible]

Table 1. Estimates of components of variance for different characters in linseed

Component of variance	Days to flower	Days to maturity	Plant height	Primary branches/ plant	No.of caps./ plant	No.of seeds/ capsule	500-seeds weight	Seed yield/ plant	Biological yield/ plant	Harvest index	Seed oil content	Oil/yield plant
E	0.32	0.40	0.38	0.04*	14.73	0.03	0.00	0.06	0.35	4.38	0.01	0.01
	1.94	0.65	0.51	0.01	30.65	0.03	0.01	0.11	0.31	3.44	0.04	0.02
D	110.98**	49.36**	21.30**	0.55	322.00*	0.31*	0.20*	1.68*	4.22*	47.74*	2.70**	0.40**
	6.44	2.17	1.68	0.04	101.65	0.11	0.02	0.36	1.02	11.41	0.12	0.06
F	73.38*	22.98*	6.14*	0.01	445.99	0.23	-0.07	2.08*	2.77	71.52*	1.88**	0.45*
	14.87	5.01	3.89	0.10	234.54	0.26	0.04	0.83	2.36	26.34	0.28	0.13
H_1	52.18*	24.17*	25.86*	0.51*	1631.89*	1.22**	0.26*	5.69*	20.15**	144.10**	2.50**	1.01**
	13.72	4.62	3.59	0.10	216.37	0.24	0.05	0.77	2.17	24.38	0.26	0.12
H_2	35.43*	18.63	21.90**	0.40*	1264.94*	0.88*	0.21*	4.33*	17.29**	107.66**	2.00**	0.75**
	11.66	3.93	3.05	0.08	183.89	0.21	0.04	0.65	1.84	20.65	0.22	0.10
h^2	67.93**	5.68**	26.85**	0.08	2180.78	-0.009	0.44*	8.14*	53.23**	46.40*	0.05	1.37**
	7.80	2.63	2.04	0.05	123.09	0.14	0.03	0.44	1.23	13.82	0.15	0.07
$[H1/D]^{1/2}$	0.69	0.70	1.09	0.97	2.25	1.99	1.14	1.84	2.19	1.74	0.96	1.58
H2/4H1	0.17	0.19	0.21	0.19	0.19	0.18	0.20	0.19	0.21	0.20	0.18	
K_D/K_R	2.86	2.00	-	-	-	-	-	2.01	-	2.52	2.13	2.10
H_2h^2	1.92	0.30	1.23	-	-	-	2.11	1.88	3.08	0.43	-	1.83
t^2	1.59	0.47	0.11	2.35	0.37	1.05	0.005	0.05	0.17	2.14	0.001	0.02
t for b-0	3.10*	6.43**	3.44**	5.17	1.85	1.62	2.29	1.18	2.00	4.13**	8.01	1.67
t for b-1	-2.54*	0.06	-0.69	-2.45*	-2.20	-2.82	-1.42	-2.10	-1.90	0.38	-0.51	-1.48

*, ** Significant at 5 and 1 per cent probability level, respectively

inheritance of all the characters studied. However, preponderance of additive component was revealed for days to flower and days to maturity. Equal importance of both additive and dominance components was observed for plant height, primary branches, 500-seeds weight and oil content whereas dominance genetic variance was of greater magnitude for rest of the characters. Similar results have also been reported earlier for days to flower. and maturity (Murty and Anand, 1966 ; Kalia, 1972), plant height, primary branches, test weight, and oil content (Rao and Singh, 1987 ; Nie *et al.* 1991) number of capsules per plant, number of seeds per capsule, seed yield per plant, biological yield per plant, harvest index and oil yield per plant (Tak and Gupta 1989 ; Dhakar, 1994).

F values were positive and significant for days to flower, days to maturity, seed yield, harvest index, oil content and oil yield indicating that dominant alleles were more frequent than recessive ones, which was confirmed by the higher values of K_D/K_R for all these attributes. All the characters except primary branches, capsules per plant, seeds per capsule and oil content exhibited dominance effect as indicated by significant and positive h^2 value. The values of average degree of dominance $(H_1/D)^{1/2}$ were less than unity for days to flower and days to maturity indicating the operation of partial dominance as reported earlier by Murty and Anand (1966) and Kalia (1972). However, for plant height, primary branches per plant, 500-seeds weight and oil content complete dominance was in accordance with Rao and Singh (1987) as well as Nie *et al.* (1991), whereas over dominance was noticed for number of capsules per plant seeds per capsule, seed yield, biological yield, harvest index and oil yield per plant, which was in akin with findings of Tak and Gupta (1989) and Dhakar (1994). The H_2 component was smaller than the H_1 for all the characters except plant height and biological yield per plant indicating the unequal proposition of positive and negative alleles in the loci governing the characters. The asymmetrical distribution of genes in the parents was evidenced by the value of $H_2/4H_1$, which was quite below 0.25 in all the cases except plant height and biological yield per plant. The number of blocks of genes influencing the character was less than one, for day to maturity and harvest index, whereas it was more than one for rest of the traits. However, it was not computed for trais which had non significant h^2 component.

Both additive and non-additive genetic components were important in governing the seed yield, oil yield and yield components, biparental mating in early generation among the selected lines or diallel selective mating can be adopted in breeding programmes for improvement of the characters studied, as suggested by Jensen (1970).

REFERENCES

DHAKAR, J.M. (1994). **Studies on Heterosis, Combining Ability and Stability Parameters in Linseed, (*Linum usitatissimum* L.). Unpublished Ph.D. Thesis, R.C.A., R.A.U., Udaipur.**

HAYMAN, B.I. (1954). The theory and analysis of diallel corsses. *Gentics* 39 : 789-809.

JENSEN, N.F. 1990. A diallel selective mating system for cereal breeding *Crop Sci. 10 : 629-635.*

KALIA, M.R. (1972). **Combining Ability, Graphical Analysis and Heterosis in Linseed (*Linum usitatissimum* L.). Unpublished M.Sc. Thesis, P.A.U., Ludhiana.**

MURTY, B.R. and ANAND, I.J. (1966). Combining ability and genetic diversity in some varieties of *Linum usitatissimum* (L.) **Indian J. Genet., 26** : 21-36.

NIE, Z., GUO, B.C., CHEM, F.T. and LIANG, A.O. (1991). Study on the combining ability of the principle agronomic characters in flax (*Linum usitatissimum* L.) **Nigria J. Agro Forestry Sci. Tecnol., 4** : 7-11.

RAO, S.K. and SINGH, S.P. (1987). Additive dominance and epistatic effect in linseed. **Indian J. Agric. Sci., 57** : 208-221.

TAK, G.M. and GUPTA, V.P. (1989). Genetic variance studies in linseed. **J. Oilseeds Res., 6** : 139-141.

(Received : November 1996 Revised : March 1997)