IJPS INTERNATIONAL JOURNAL OF PLANT SCIENCES
Volume **8** | Issue 2 | July, 2013 | 395-397

RESEARCH ARTICLE

Correlation and path co-efficient analysis of some quantitative traits in linseed (*Linum usitatissimum* L.)

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SUMMARY

Correlation and path co-efficient analysis was studied in 36 genotypes of linseed. The correlation studies indicated that seed yield per plant had significant positive correlation with days to maturity, number of primary branches per plant, number of capsules per plant, number of seeds per capsule and biological yield. Hence, improvement of seed yield per plant can be achieved by improving these characters. Path co-efficient analysis revealed that harvest index, plant height, number of primary branches per plant, number of capsules per plant and biological yield showed high positive direct effect on seed yield per plant and selection for these characters would lead to increase in yield.

Key Words : Correlation, Path co-efficient analysis, Association analysis, Linseed

How to cite this article : Kanwar, Raja R., Saxena, Ritu R. and Ekka, Ruth Elizabeth (2013). Correlation and path co-efficient analysis of some quantitative traits in linseed (*Linum usitatissimum* L.). *Internat. J. Plant Sci.*, **8** (2) : 395-397.

Article chronicle : Received : 11.05.2013; **Accepted :** 17.06.2013

Linseed (*Linum usitatissimum* L.) is an important agro-industrial crop among the various oilseeds crop grown in India. Seed yield is a complex trait as its manifestation is an outcome of interaction of several traits and environment. Therefore, identification of important yield component and information about their association with yield and also with each other is very useful for developing efficient breeding strategy for evolving high yielding variety. In this respect, the correlation co-efficient which provides systematical measurement of degree of association between two variables or character helps us in understanding the nature and magnitude of association among yield and yield components.

Path-co-efficient analysis is a tool to partition the observed correlation co-efficient into direct and indirect effects of yield components on seed yield to provide clearer picture of character associations for formulating efficient selection strategy. Path analysis differs from simple correlations in that it point out the causes and their relative importance whereas, the latter measure simply the mutual association ignoring the causation. In the present study, an attempt was made to understand the association and path analysis of component characters for seed yield in linseed.

MATERIAL AND METHODS

The experimental material for the study comprised of a collection of 36 accessions of linseed including varieties of indigenous as well as exotic origin and advanced lines developed with involvement of diverse parents at AICRP on Linseed, IGKV, Raipur. The experiment was laid out in Randomized Block Design (RBD) with three replications during *Rabi* season of 2007-08. Each genotype was grown in 3.5 meter length and 1.5 meter width size of plot. The row to row distance was 25 cm. All the recommended practices were followed to facilitate good crop growth and development. Observations were recorded on five randomly selected plants

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of each line per replication for 12 traits *viz.*, days to 50 per cent 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, 100-seed weight, seed yield per plant, biological yield, harvest-index and oil content. Correlation co-efficients were calculated for all possible combinations among all the twelve characters at phenotypic and genotypic levels as per the formula given by Searle (1961). The path analysis was originally developed by Wright (1921) and elaborated by Dewey and Lu (1959).

RESULTS AND DISCUSSION

The analysis of variance revealed significant differences within the 36 genotypes for all the traits studied. For most of the characters genotypic correlation was higher in magnitude than the corresponding phenotypic correlation values (Table 1). The

Table 1: Phenotypic and genotypic correlation coefficients of seed yield components in linseed

Characters		DF	DM	PB	SB	PH	CP	SC	BY	SY	HI	HSW	OC
DF	P	1.000	0.600**	0.420*	0.403*	0.272	0.314	-0.061	0.258	0.164	-0.338*	-0.167	-0.331*
	G	1.000	0.669**	0.474**	0.511**	0.336*	0.356	-0.064	0.291	0.208	-0.444**	-0.182	-0.383*
DM	P		1.000	0.590**	0.453**	0.649**	0.512**	0.130	0.398*	0.378*	-0.499**	-0.045	-0.389*
	G		1.000	0.693**	0.546**	0.689**	0.540**	0.259	0.413*	0.411*	-0.559**	-0.051	-0.445*
PB	P			1.000	0.660**	0.479**	0.565**	0.014	0.257	0.282	-0.447**	0.079	-0.136
	G			1.000	0.784**	0.539**	0.648**	0.275	0.338*	0.396*	-0.528**	0.106	-0.217
SB	P				1.000	0.413*	0.305	-0.053	-0.066	0.052	-0.472**	-0.009	-0.075
	G				1.000	0.479**	0.330	-0.229	-0.095	0.016	-0.616**	-0.011	-0.066
PH	P					1.000	0.613**	0.227	0.397*	0.305	-0.586**	0.067	-0.312
	G					1.000	0.655**	0.494**	0.439**	0.324	-0.680**	0.064	-0.400*
CP	P						1.000	0.305	0.677**	0.583**	-0.384*	0.179	-0.115
	G						1.000	0.655**	0.727**	0.642**	-0.423*	0.187	-0.172
SC	P							1.000	0.273	0.373*	0.095	0.067	-0.143
	G							1.000	0.557**	0.872**	0.225	0.239	-0.249
BY	P								1.000	0.731**	-0.228	0.121	-0.006
	G								1.000	0.768**	-0.285	0.138	-0.009
SY	P									1.000	-0.014	0.150	-0.007
	G									1.000	-0.047	0.181	-0.047
HI	P										1.000	0.110	0.165
	G										1.000	0.150	0.223
HSW	P											1.000	0.072
	G											1.000	0.060
OC	P												1.000
	G												1.000

*and ** Indicate significance of value at P=0.05 and 0.01, respectively, DF = Days to 50% flowering; DM = Days to maturity; PH =Plant height; PB = Number of primary branches per plant; SB = Number of secondary branches per plant; CP = Number of capsules per plant; SC = Number of seeds per capsule; SY = Seed yield per plant; BY = Biological yield; HI = Harvest index; HSW = 100 seed weight; OC = Oil content

Table 2: Genotypic path coefficient of seed yield contributing characters in linseed

Characters	DF	DM	PB	SB	PH	CP	SC	BY	HI	HSW	OC
DF	0.097	-0.058	0.553	-0.517	0.443	0.156	0.073	0.128	-0.630	0.022	-0.059
DM	0.065	-0.087	0.809	-0.551	0.908	0.237	-0.293	0.181	-0.795	0.006	-0.068
PB	0.046	-0.061	1.116	-0.793	0.711	0.285	-0.311	0.149	-0.750	-0.013	-0.033
SB	0.049	-0.048	0.915	-1.011	0.631	0.145	0.260	-0.042	-0.875	0.001	-0.010
PH	0.033	-0.060	0.629	-0.484	1.318	0.288	-0.558	0.193	-0.966	-0.008	-0.061
CP	0.034	-0.047	0.755	-0.334	0.863	0.440	-0.741	0.320	-0.600	-0.022	-0.026
SC	-0.006	-0.023	0.321	0.232	0.651	0.288	-1.131	0.245	0.362	-0.028	-0.038
BY	0.028	-0.036	0.394	0.096	0.579	0.320	-0.630	0.440	-0.405	-0.016	-0.001
HI	-0.043	0.049	-0.616	0.622	-0.897	-0.186	-0.288	-0.125	1.420	-0.018	0.034
HSW	-0.018	0.004	0.124	0.011	0.084	0.082	-0.271	0.061	0.213	-0.118	0.009
OC	-0.037	0.039	-0.253	0.067	-0.528	-0.076	0.281	-0.004	0.317	-0.007	0.153

Residual effect = 0.6054, Note: Bold figure are the direct effect and the off diagonals are indirect effects, DF = Days to 50% flowering; DM = Days to maturity; PH =Plant height; PB = Number of primary branches per plant; SB = Number of secondary branches per plant; CP = Number of capsules per plant; SC = Number of seeds per capsule; BY = Biological yield; HI = Harvest index; HSW = 100 seed weight; OC = Oil content

seed yield had highest significant positive correlation with biological yield, and number of capsules per plant at both phenotypic and genotypic levels whereas, days to maturity exhibited significant association with seed yield at both levels, whereas, number of primary branches per plant had significant positive correlation at genotypic level only. However, number of seeds per capsule showed significant association at phenotypic level but at genotypic level it exhibited highly significant association with seed yield. The results indicated that seed yield per plant had significant positive correlation with days to maturity, number of primary branches per plant, number of capsules per plant, number of seeds per capsule and biological yield. Hence, improvement of seed yield per plant can be achieved by improving these characters. The observed positive correlation of seed yield with various traits were supported by earlier workers *viz.*, Tiwari and Agrawal (2001) for biological yield; Muhammad *et al.* (2003), Awasthi and Rao (2005) and Vardhan and Rao (2006) for number of capsules per plant; Bhosle and Rao (2005) and Awasthi and Rao (2005) for number of seeds per capsule; Tiwari and Agrawal (2001), Muhammad *et al.* (2003), Bhosle and Rao (2005) and Vardhan and Rao (2006) for number of primary branches per plant; Bhosle and Rao (2005) for days to maturity.

At genotypic level, harvest index exhibited the highest positive direct effect on seed yield per plant followed by plant height and number of primary branches per plant (Table 2). Characters, number of capsules per plant, biological yield showed high direct effect whereas, oil content exhibited low direct effect on seed yield per plant. These results are in agreement with the findings of Muhammad *et al.* (2003), Vardhan and Rao (2006) and Copur *et al.* (2006) for plant height; Copur *et al.* (2006) for number of primary branches per plant; Vardhan and Rao (2006) for harvest index.

Hence, characters namely, harvest index, plant height, number of primary branches per plant and biological yield possessed very high to high positive direct effects on seed yield. From the results of correlation and path analysis, it was clear that the yield components which were showing significant correlation with the seed yield per plant was mainly due to its direct effect and partially due to indirect effect *via* other characters. The characters namely, harvest index, plant height, number of primary branches per plant and biological yield possessed very high to high and moderate positive direct effects on seed yield. These traits may be rewarding for improving the seed yield.

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