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CORRELATION AND PATH ANALYSIS STUDIES IN LINSEED

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ABSTRACT

The present investigation was carried out to evaluate the promising germplasm lines for correlation and path analysis for yield and yield contributing characters in linseed in randomized block design with three replications under rainfed condition during rabi 2012-13 at Oilseeds Research Station, Latur (M.S.). The data was recorded from each lines for. days to 50 % flowering, days to maturity, plant height (cm) at maturity, number of primary branches /plant, number of secondary branches /plant, number of capsules /plant, number of seeds /capsules, 1000 seed weight (g), oil content (%) and seed yield /plant (g). Results revealed that significant positive correlation of seed yield /plant existed with number of primary branches /plant, secondary branches /plant, number of seed /capsule, 1000seed weight and negative association with days to maturity allowed selection of the material for the same. Yield contributing characters like number of seeds /capsule, capsules /plant, 1000 seed weight had highest direct positive effect on seed yield. The traits number of capsules /plant, 1000 seed weight, secondary branches /plant, seeds /capsule and plant height are the major determinants of seed yield. The germplasm accession ES-1444, Flate-C-16, ES-1474 may be used as parent's in future breeding programme for improving seed yield in linseed.

Keywords: Correlation, path analysis, yield, yield contributing characters, linseed.

INTRODUCTION

Linseed (*Linum ustiatissimum* L.) is an important rabi oilseed crop occupies the prime position in area and production next to rapeseed and mustard. Grain yield is a complex trait and its expression depends upon the interplay of number of component attributes. A clear picture of contribution of each component is final expression of complex character would emerge through the study of correlation and path coefficient analysis revealing different ways in which component attributes influence the complex trait. In the integrated structure of a plant, most ofthe characters are interrelated. The direct selection based on yield alone is not very effective and it would be more meaningful if the structure of yield is probed through its components rather than directly. Hence, it is necessary to study these yield components, their inter-relationship with yield and their contribution. Correlation coefficient helps in determining the direction of selection and number of characters to be considered in improving the grain yield. Estimates of correlations alone may be often misleading due to mutual cancellation of component traits. So, it becomes necessary to study path coefficient analysis, which takes in to account the casual relationship in addition to degree of relationship. Many researchers studied correlation and path analysis in linseed (Savita, *et al.,* 2011 and Muhammad Azeem Tariq *et al.* 2014) where a significant association was found between seed yield and some of the yield contributing characters. Accordingly, the present investigation was carried out to study the association of seed yield and its component traits in the germplasm collection of linseed.

MATERIALS AND METHODS

The experimental material comprised 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 in medium black soil under rainfed condition during Rabi 2012 at Oilseeds Research Station, Latur (M.S.). Each genotype was sown in single row of 3 m length following a spacing of 30 cm between rows and 5 cm between plants. All the five checks were repeated in all the blocks. All recommended agronomic package of practices were followed for raising normal healthy crop. The data was recorded on five randomly selected plants from each lines for 10 quantitive traits *viz.* days to 50 % flowering, days to maturity, plant height at maturity, number of primary branches /plant, number of secondary branches /plant, number of capsules /plant,

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number of seeds /capsules, 1000 seed weight (g), oil content (%) and seed yield /plant (g). The statistical procedure as suggested by Wright (1921, 1960) and elaborated by Dewey and Lu (1959) was adopted for the estimation of direct and indirect contribution of various characteristics to seed yield calculated through path coefficient analysis.

RESULTS AND DISCUSSION

Highly significant and positive correlations with seed yield were found for primary branches (0.363), secondary branches (0.317) and 1000 seed weight (0.319), while seeds /capsule (0.235) showed significant and positive correlation (Table 1). Whereas, correlation between seed yield and days to 50% flowering was significant and negative indicating early genotypes had higher yield potential than late. These results are in conformation with Muhammad Akbar *et al.* (2001), Savita *et al.* (2011), Tadele *et al.* (2009) and Gaurah and Rao (2011).

Table 1: Correlation coefficient of yield with yield contributing characters

Characters	Days to 50% Flowering	Days to maturity	Plant height (cm)	Primary branches/ plant	Secondary Branches/ plant	Capsules /plant	Seeds / cap.	1000 seed wt (g)	Oil content (%)	Seed yield/ plant (g)
Days to 50% Flowering	1.000	0.576**	0.252*	-0.195	-0.246*	0.024	-0.051	-0.367**	-0.173	-0.231*
Days to maturity		1.000	0.033	-0.091	-0.071	0.005	-0.097	-0.311**	-0.044	-0.121
Plant height			1.000	-0.004	0.011	0.323**	0.114	-0.061	-0.024	0.117
Primary branches/pt				1.000	0.715**	-0.029	-0.004	0.174	-0.010	0.363**
Secondary branches/pt					1.000	-0.007	0.109	0.114	-0.010	0.317**
capsules/ pt						1.000	0.578**	-0.094	0.024	0.197
Seeds/ cap.							1.000	-0.115	0.145	0.235*
Test wt(gm)								1.000	0.055	0.319**
Oil content									1.000	0.129
Seed yield / plant										1.000

**, ** significant at 5% and 1% level of significance*

Among the yield components, days to 50% flowering showed significant and positive correlation with maturity (0.576) and plant height (0.252) indicating late maturing genotypes are taller as compared to early maturing. On the other hand, it was significant and negative with 1000 seed weight (-0.367). Significant and positive correlation was found between plant height and capsules /plant which suggest that taller genotypes produced more number of capsules. Further number of primary branches per plant was positively and significantly associated with number of secondary branches per plant. Number of capsule /plant exhibited positive and highly significant association with number of seeds /capsule. These results are in confirmation with those obtained by Savita *et al.* (2011). Plant height had positive but non significant correlation with secondary branches /plant, seeds /capsule and seed yield /plant. Similar results were also reported by Muhammad Akbar *et al.* (2001). Number of capsule /plant had positive significant association with number of seeds /capsule and positive non significant with oil content. Test weight was positively and highly significantly associated with seed yield /plant. Number of seeds /capsule was positively and significantly associated with seed yield /plant. Oil content had positive but non significant relationship with seed yield per plant. Similar results were reported by Muhammad Akbar *et al.* (2001)

Correlation was analyzed further by path coefficient technique, which involves partitioning correlation coefficient into direct and indirect effects via other traits. The results of

path coefficient analysis (Table 2) revealed that the plant height (0.114), primary branches /plant (0.267), number of seeds /capsule (0.193) and test weight (0.282) had highest direct effect on seed yield followed by secondary branches /plant (0.050), capsules /plant (0.084) and oil content (0.072) confirming the positive association and are the major determinants of seed yield. The results confirmed the finding of Gauraha and Rao (2011) and Yadav (2001).

Table 2: Path analysis of direct and indirect effects of different quantitative characters

Characters	Days to 50% Flowering	Days to maturity	Plant height (cm)	Primary Branch /pt	Secondary Branch /pt	Capsule / pt	Seed / cap.	1000 seed wt (gm)	Oil content (%)	Corr with seed yield/plant
Days to 50% Flowering	-0.116	0.045	0.029	-0.052	-0.012	0.002	-0.010	-0.104	-0.013	-0.231*
Days to maturity	-0.067	0.079	0.004	-0.024	-0.004	0.000	-0.019	-0.088	-0.003	-0.121
Plant height	-0.029	0.003	0.114	-0.001	0.001	0.027	0.022	-0.017	-0.002	0.117
Primary Branch/pt	0.023	-0.007	0.000	0.267	0.035	-0.002	-0.001	0.049	-0.001	0.363**
Secondary Branch/pt	0.029	-0.006	0.001	0.191	0.050	-0.001	0.021	0.032	-0.001	0.317**
Capsule /pt	-0.003	0.000	0.037	-0.008	0.000	0.084	0.112	-0.026	0.002	0.197
Seed / cap.	0.006	-0.008	0.013	-0.001	0.005	0.048	0.193	-0.032	0.010	0.235*
1000 seed wt	0.043	-0.025	-0.007	0.046	0.006	-0.008	-0.022	0.282	0.004	0.319**
Oil content	0.020	-0.003	-0.003	-0.003	-0.001	0.002	0.028	0.015	0.072	0.129

Residual effect = 0.834, R^2 = 0.304558

The plant height had positive direct effect on seed yield as well as positive association with seed yield. Their indirect effect via days to 50 percent flowering, number of primary branches /plant, 1000 seed weight and oil content. The similar results were reported by Tadele (2009), Gaurah and Rao (2011). The negative direct effect of days to 50 percent flowering was observed on seed yield per plant (-0.116) confirming the negative correlation with seed yield and positive indirect effect on days to maturity, plant height, number of capsule per plant. Days to maturity had positive direct effect on seed yield as well as plant height and number of capsules per plant and negatively correlated with seed yield, and negative indirect effect on days to 50 percent flowering, primary branches /plant, secondary branches /plant, number of seed per capsule, test weight and oil content.

Thus, in order to increase seed yield, attributes like primary and secondary branches, seeds /capsule, 1000 seed weight and maturity seem to be most effective selection criteria for seed yield in linseed traits.

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