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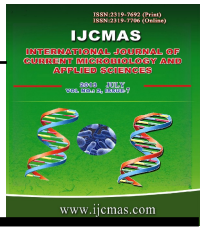

Original Research Article

Character Association and Path Coefficient Studies in Linseed

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Keywords

Association; Correlation; Path Coefficient; Linseed.

A B S T R A C T

Morphological and yield related traits of 23 genotypes were studied to ascertain the genetic and phenotypic correlation and contribution of these traits towards the yield directly and indirectly in linseed. The genotypic and phenotypic correlation coefficients obtained between different traits was similar in direction, while in magnitude, genotypic correlation higher than the corresponding phenotypic correlations. The results indicated that seed yield had significant positive correlation with plant height (r_g= 0.492*; r_p= 0.455**), number of capsules per plant (r_g= 0.915**; r_p= 0.877**) number of branches per plant (r_g= 0.450*; r_p= 0.449*) and days to physiological maturity (r_g= 0.729**; r_p= 0.578**) showed positively and significantly correlated with seed yield per plant both at phenotypic and genotypic levels. Path coefficient analysis revealed that direct and indirect effects of genotypic path coefficients were higher in magnitude than the corresponding phenotypic path coefficients. Number of capsules per plant showed the higher and positive direct effect on seed yield.

Introduction

Linseed (*Linum usitatissimum*) is an important oil and fibre crop with multiple uses. Its seed is used in treatment of some provocative human and animal diseases. In India, the crop is mainly cultivated in the states like Rajasthan, West Bengal, Karnataka, Orissa and Bihar, Chhattisgarh Madhya Pradesh, Uttar Pradesh and Maharashtra is one of the important linseed growing states of India, which account 112.52 thousand hectare area and 34.20 thousand metric tonnes production. preparation of paints, printing ink, varnish, resins and several by-products. The oil cake is the most valuable feeding cake for animals. Linseed also has great medicinal values including anti-hyper cholesterolemic and anti-carcinogenic effects and is also beneficial for development of brain and retinal tissues of infants (. Payne, 2000).

Though linseed is important oilseed crop in Indian economy due to its wide

industrial utility, the average productivity is quite low as compared to other countries. Since yield is a complex quantitative character and is governed by a number of other characters, the exact association between these characters with yield must be known for effective selection. Therefore, the present investigation was carried out to determine the effect of direct and indirect relationship between seed yield and yield components and to determine the best relation criteria for increasing seed yield of flax varieties.

Materials and Methods

Twenty three (A-95-B, EC-1392, EC-1424, GS-234, PKDL-18, Ayogi, ES-44, EC 544, Eita, GS-15, A-125, LCK- 8605, LCK-88062, JRF-5, EC-4168, EC-9825, KL-178, BR-1, ACC NO- 4/47, Neelum, Kartika, Padmini and PKVNL-260) linseed genotypes were grown during *rabi* 2010-2011 at Research Farm, Department of Genetics and Plant Breeding, College of Agriculture, AICRP on Linseed, Nagpur, situated at 305 meters msl and 21° 09′ N latitude and 79° 09′ E longitude, India; in randomized complete block design in two replications. These 23 genotypes were diverse collection of varieties of indigenous as well as exotic origin and advanced lines developed with involvement of diverse parents at AICRP on Linseed. Each genotype was grown in 3 meter row length. The row-to-row distance was 30 cm. Recommended cultural practices and plant protection measures were followed to raise the crop. Data were recorded on days to 50% flowering, days to Physiological maturity, plant height, number of primary branches per plant, number of capsules per plant, 1000-seed weight and seed yield per plant. These observations were recorded on five randomly selected plant of each genotype from two replications.

The data were subjected to statistical analysis. Coefficients of correlation were estimated by using formula suggested by (Miller *et al.,* 1958). Path analysis was carried out according to the method developed by (Wright, 1921) and elaborated by (Dewey and Lu, 1959)

Results and Discussion

Correlation coefficient estimates degree of association of different component characters of yield among themselves and with the yield. The correlation studies between various yield attributes with yield, provides a basis for further breeding programmes. Path analysis measures direct and indirect contribution of individual attributes towards seed yield. Correlation coefficients (Table 1) indicated that genotypic correlation coefficients were greater than phenotypic correlation coefficients for most of the parameters indicating strong inherent association between the various characters. Similar findings were reported (Sohan *et al.,* 2004; Joshi, 2004). The results indicated that seed yield had significant positive correlation with plant height (r_g= 0.492*; r_p= 0.455**), number of capsules per plant (r_g= 0.915**; r_p= 0.877**) number of branches per plant (r_g= 0.450*; r_p= 0.449*) and days to physiological maturity (r_g= 0.729**; r_p= 0.578**). On the other hand days to 50% flowering is positively and significantly correlated with number of capsules per plant (r_g= 0.356*; r_p= 0.311), number of branches per plant (r_g= 0.566**; r_p= 0.472) and days to physiological maturity (r_g= 0.593**; r_p= 0.417*). Plant height is positively and significantly correlated with number of capsules per plant (r_g= 0.469*; r_p= 0.452*) and days to physiological maturity (r_g= 0.383**; r_p= 0.326). Number of capsules per plant is positively and significantly

Table.1 Genotypic and Phenotypic correlation coefficients between different traits in linseed
Note: X_1- Days to flowering X_2-Plant height (cm) X_3-Number of capsules per plant X_4-Branches per plant X_5-Days to physiological maturity X_6-1000 seed weight X_7-Yield per plant

No of characters		X_1	X_2	X_3	X_4	X_5	X_6	X_7
X_1	r_p	**1.000**	0.270	0.311	0.472	0.417*	-0.128	0.148
	r_g		0.338	0.356*	0.566**	0.593**	-0.169	0.157
X_2	r_p		**1.000**	0.452*	0.093	0.326	0.001	0.455*
	r_p		**1.000**	0.469*	0.083	0.383**	0.028	0.492**
X_3	r_p			**1.000**	0.606**	0.695**	-0.129	0.877**
	r_g			**1.000**	0.616**	0.838**	-0.135	0.915**
X_4	r_p				**1.000**	0.571**	-0.200	0.449*
	r_g				**1.000**	0.760**	-0.212	0.450*
X_5	r_p					**1.000**	-0.194	0.578**
	r_g					**1.000**	-0.239	0.729**
X_6	r_p						**1.000**	0.031
	r_g						**1.000**	0.055
X_7	r_p							**1.000**
	r_g							**1.000**

Table.2 Direct (diagonal) and indirect effects of yield components on seed yield per plant at genotypic and phenotypic level

No of characters		X_1	X_2	X_3	X_4	X_5	X_6	Correlation values
X_1	PP	**-0.131**	-0.035	-0.041	-0.062	-0.054	0.016	0.148
	GP	**-0.240**	-0.081	-0.085	-0.136	-0.142	0.040	0.157
X_2	PP	0.021	**-0.077**	0.035	0.007	0.025	0.001	0.455*
	GP	0.032	**0.094**	0.044	0.007	0.036	0.002	0.492**
X_3	PP	0.281	0.408	**0.903**	0.547	0.628	-0.116	0.877**
	GP	0.292	0.385	**0.820**	0.506	0.687	-0.110	0.915**
X_4	PP	-0.014	-0.002	-0.081	**-0.030**	-0.017	0.004	0.449*
	GP	-0.045	-0.006	-0.049	**-0.080**	-0.061	0.017	0.450*
X_5	PP	0.009	0.007	0.015	0.001	**0.022**	-0.004	0.578**
	GP	0.147	0.095	0.208	0.189	**0.248**	-0.059	0.729**
X_6	PP	-0.016	0.00	-0.016	-0.025	-0.025	0.129	0.031
	GP	-0.028	0.004	-0.022	-0.035	-0.039	0.164	0.055
R square: 0.8122; Residual effect: 0.4334								

Note: X_1- Days to flowering; X_2-Plant height (cm); X_3-Number of capsules per plant; X_4-Branches per plant; X_5-Days to physiological maturity; X_6-1000 seed weight; X_7-Yield per plant. Figure in bold letter indicates direct effects. * Significant at 5% probability level, ** Significant at 1% probability level. GP and PP indicates genotypic path and phenotypic path respectively.

correlated with number of branches per plant (r_g= o.616**; r_p= 0.606**) and days to physiological maturity (r_g= 0.838**; r_p= 0.695**). Number of branches per plant is positively and significantly correlated with days to physiological maturity (r_g= 0.760**; r_p= 0.571**). Hence, seed yield per plant can be increased by increasing plant height, number of capsules per plant, number of branches per plant and days to physiological maturity. The results are in agreement with (Pal *et al.,* 2000; Naik and Satapathy. 2002; Vardhan and Rao. 2006; Deepak and Rao, 2011; Vikas and Nandan, 2013).

Yield is the resultant product of various morphological, physiological and biological components. Phenotypic and genotypic correlation coefficients between yield and the yield components provide information on their relative importance in determining the yield. Path coefficient analysis measures the direct effect of variable upon another and permits the separation of the correlation coefficients into components of direct and indirect effects. Information on the variability and correlation studies among the economic traits of the crop is of great value to plant breeders. It will not only, help to understand the desirable and undesirable relationship of economic traits but also help in assessing the scope of simultaneous improvement of two or more attributes. Association of various traits with seed yield per plant was partitioned in to direct and indirect effects (Table 2) as suggested by Dewey and Lu (1959) and Wright (1921). Number of capsuls per plant had high direct effect (>0.3) on seed yield per plant (r_g= 0.820; r_p= 0.903) indicating that it had a high association with seed yield per plant and selection for these characters would lead to increase the yield. Number of capsules per plant also exhibited high (>0.3) indirect effects on seed yield per plant via plant height (r_g= 0.385; r_p= 0.408), days to physiological maturity (r_g= 0.687; r_p= 0.628) and number of branches per plant (r_g= 0.506; r_p= 0.547) indicating that number of capsules per plant can be increased by increasing these characters which indirectly increases the seed yield per plant. These findings are in agreement with (Pal *et al.,* 2000; Deepak and Rao, 2011; Vikas and Nandan, 2013; Yadav, 2001; Chimurkar *et al.,* 2001).

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