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GENETIC VARIABILITY, CHARACTER ASSOCIATION AND PATH ANALYSIS BETWEEN SEED YIELD AND ITS COMPONENTS IN INDIAN MUSTARD (*Brassica juncea* L. CZERN AND COSS)

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ABSTRACT

Correlation and Path coefficient analysis carried out using 35 varieties of Indian mustard were evaluated for ten quantitative was qualitative characters. The highest genotypic coefficient of variation was observed for number of secondary branches, seed yields, harvest index and number of member of primary branches. The moderate estimate of GCV were observed for length of main receme, length siliquae and 1000 seed weight low estimates of GCV were oil content and plant height. The seed yield per plant was found to be positively and significantly correlated with number of primary and secondary branches. Member of siliquae and main branch and 1000 seed weight. Plant height positive and highly significant association with number of siliquae on main branch and number of primary branch.

Key Word : *Correlation, path analysis, seed yield, yield components, indian mustard.*

Brassica family crucifereae and mustard are mostly grown for their oilseed. The meal cake after extraction of the oil from the seed contains 40-45 percent protein which could be exploited as raw material for the manufacture of protein rich products intended for both animal and human consumption. Breeding for high seed yield and other economic characters is a very important object in crop improvement programme. Yield is a complex character depended on a number of other characters. Improvement of plants depends upon the magnitude of genetic variability of different quantitative characters therefore, the measurement evaluation and manipulation as genetic variability in desired direction becomes extremely important in any yield improvement programme. The correlation coefficient gives an idea about the association exist between yield and its component. However, it is a well known fact correction mainly does not fulfill the purpose because it does nit detect the character having indirect effects on seed yield.

MATERIALS AND METHODS

The experimental material for the present investigation consisted 35 prominent genotypes of Indian mustard (*Brassica Juncea* L. Czern and Coss) which were collected from different places of the country. The material was shown in RBD at research form Institute of Agricultural Sciences B.U. Campus Jhansi. The length of rows was kept 2.5 meters and spacing between the rows 45 cm and between plants 26 cm observation were recorded five randomly tagged plants of each genotype in each replication for ten characters.

RESULTS AND DISCSUSSION

The maximum (34.39) and minimum (6.33) GCV was recorded for characters number of secondary branches and plant height. Result also indicted indicated that phenotypic coefficient of variation for all the characters were higher than their corresponding genotypic coefficient of variation (Table-1). A perusal of data on genotypic correlation coefficient (Table-2) showed that the highest positive correlation was observed between number of siliquae on main receme (0.854) and negative significant correlation between harvest index with plant height (–0.551). Plant height exhibited positive and highly significant correlation with number of primary braches (0.480), number of secondary branches (0.387) and number of siliquae on main recame (0.48) while negative and highly significant association with harvest index (-0.551). Length of main receme exhibited position and significant association with number of siliuae on main axes. A negative and significant association was expressed by harvest index with length of main receme (0.312). Highly significant and positive association was observed by number of primary branches with number of secondary branches (0.626) and seed yield (0.457). Number of secondary branches exhibited positive and significant correlation with seed yield (0.520) and siliquae on main receme

Table-1: Estimate of genetic parameters for different characters and Indian mustard.

Character	Mean	Range Mini. - Max.	SE	Coefficient of variation
Plant Height	189.53	158.10 - 208.33	2.26	06.33
Length of main receme	69.43	59.30 - 83.03	1.49	08.16
No. of primary branches	08.32	05.43 - 11.13	0.27	17.34
No. of secondary branches	28.09	11.90 - 53.30	1.28	34.39
No. of siliqua on main receme	50.37	37.97 - 67.23	1.41	13.18
Length of siliqua	04.85	03.87 - 06.00	0.14	08.64
Harvest index	06.24	04.50-09.87	0.25	20.16
1000-seed weight	05.82	04.60 - 06.53	0.14	07.42
Oil content	39.54	35.50 - 43.20	0.56	04.96
Seed yield /plant	29.75	11.53 - 60.47	1.27	33.44

Table-2: Genotypic correlation coefficient for seed yield and its components in India Mustard.

Genotypes	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Plant height (cm)	-	0.175	0.480**	0.387**	0.489**	0.168	-0.551**	-0.390**	-0.114	0.109
Length of main receme		-	-0.101	-0.070	0.355**	0.189	-0.312*	0.113	0.023	0.012
No. of Primary branches			-	0.626**	0.300	0.349**	-0.438**	-0.494**	-0.164	0.457**
No. of secondary branches				-	0.505**	0.046	-0.504**	-0.505**	-0.264	0.520**
No. of siliqua on main receme					-	0.018	-0.142	0.368**	-0.154	0.854**
Length of siliquae						-	-0.157	-0.030	-0.134	-0.004
Harvest index (%)							-	0.384**	0.290	0.426**
1000 seed weight (g)								-	0.030	0.665
Oil content (%)									-	0.180
Seed yield (5)										-

*, **Significant at 5 and 1% levels, respectively.

(1) Plant height (cm) (2) Length of main receme (3) No. of primary branches (4) No. of secondary branches (5) No. of siliqua on main receme (6) Length of siliquae (7) Harvest index (%) (8) 1000 seed weight (g) (9) Oil conent (%) (10) Seed yield (%)

Table-3: Genotypic path coefficient s for direct and indirect effect of various traits on seed yield on India Mustard.

Genotypes	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Plant height (cm)	0.077	0.013	0.022	0.014	0.030	0.013	-0.012	-0.030	-0.009	0.109
Length of main receme	-0.020	-0.116	0.012	0.008	-0.041	-0.022	0.025	-0.013	-0.003	0.012
No. of Primary branches	-0.146	0.052	-0.519	-0.325	-0.156	-0.181	0.228	0.257	0.085	0.457
No. of secondary branches	0.160	-0.06	0.533	0.851	0.089	0.039	-0.429	-0.430	-0.224	0.520**
No. of siliqua on main receme	0.153	0.140	0.118	0.041	0.394	0.007	-0.056	-0.145	-0.061	0.854**
Length of siliquae	0.044	0.050	0.092	0.012	0.005	0.264	-0.042	-0.008	-0.036	-0.004
Harvest index (%)	-0.064	-0.091	-0.187	-0.215	-0.061	-0.067	0.427	0.164	0.039	0.426**
1000 seed weight (g)	-0.050	0.015	-0.064	-0.065	0.047	-0.004	0.049	0.129	0.004	0.665
Oil content (%)	-0.044	0.009	-0.063	-0.101	-0.059	-0.052	0.035	0.011	0.384	0.180

Residual = 0.5595 *, **Significant at 5 and 1% levels, respetively.

(1) Plant height (cm) (2) Length of main receme (3) No. of primary branches (4) No. of secondary branches (5) No. of siliqua on main receme (6) Length of siliquae (7) Harvest index (%) (8) 1000 seed weight (g) (9) Oil conent (%) (10) 'r' value with seed yield

(0.505), whereas it had negative and significant association with harvest index (–0.505) and 1000 seed weight (–0.505).Number of siliquae on main receme had significant and positive correlation with 1000-seed weight (0.368) and seed yield per plant (0.854). However, this character had negative association with oil content (–0.154). A positive and significant association was observed by 1000-seed weight with seed yield (0.426), harvest index (0.384) and oil content (0.290). Oil content had positive association with seed yield (0.180).

Data presented in Table.3 showed highest positive direct effects towards seed yield per plant for number of secondary branches (0.551). Followed by harvest index (0.427), number of siliquae on main receme (0.427) and oil content (0.384). Highest negative direct effect was noted for number of primary branches (–0.519) and length of main receme (–0.116). A perusal of data reveals that plant height showed positive indirect effect via number of siliquae, (0.030), number of primary branch (0.022), number of secondary branch (0.0147), while negative contribution through harvest index (–0.012) and 1000 seed weight (–0.030), Length of main receme showed positive indirect effect via harvest index (0.025) and number of branches. Number of primary branches showed high positive indirect effect through 1000-seed weight (0.257), harvest index (0.228) and oil content while negative indirect effect through number of secondary branches (–0.525), number of siliquae (–0.156) and length of siliquae (–0.181). Number of secondary branches exhibited high positive index effect via number of primary branches (0.533), plant height (0.160) and negative indirect effect through harvest index (–0.429). 1000 seed weight were observed for number of siliquae on main receme via plant height (0.153), length of main receme) (0.140) and number of primary branches (0.188) where as negative indirect effect through 1000 seed weight (–0.145). Length of siliquae find positive indirect effect through number of primary branches (0.092), length of main receme (0.050) and plant height (0.044) while negative indirect effect through oil content (–0.039)

Harvest index showed negative indirect effect through days plant height (–0.064), number of secondary branch, branches per plant (–0.215), number of primary branches per plant (–0.187) and biological yield (–0.331), but positive indirect effects were observed through oil content (0.037) and 1000 seed weight (0.164). All other characters expressed negligible indirect effects.Oil content showed negative indirect effect though number of primary branches (0.064), number of secondary branches (0.065) and positive through number of siliquae on main receme and harvest index (0.049). The caused system is formed in such a way that it takes care for all the factors effecting the yield, but in practice, it is seldom so. Under such circumstances, those factors, which are left out are taken care of by the residual effects. In this study the residual effects was 0.5595, which showed that some factors had been left out from the caused system.

Success of any breeding programme largely depends on magnitude of variability present in population. Therefore, genetic variability has enough importance for plant breeders engaged in the improvement of crop plants. Considerable amount of variability for the characters namely plant height, length of main shoot, number of primary branches, number of secondary branches, number of siliquae on main axis, Length of siliqua, 1000-seed weight, Seed yield per plant (g), Harvest index (%) and Oil content were available in the experimental material (mustard) indicating considerable scope for improvement through conventional breeding approach (1, 2) repor- ted wide range of such type of variability, which indicate that the extant of variability may indeed be real.

The estimates of genotypic coefficients of variations (GCV), indicating thereby the importance of environmental factors, which are similar to the results of (3) in mustard. The estimates of GCV indicated fairly high degree of variability existing for the characters number of secondary branches, number of primary branches, seed yield per plant and harvest index. Moderate estimates GCV was observed for plant height, length of main receme, length of siliuae and 1000-seed weight and low estimates of GCV were observed oil content. Characters viz., seed yield per plant, number of primary and secondary branches showed high GCV estimates (3) observed similar results.

The estimates of genotypic correlations were higher. Seed yield per plant was found to be positively and significantly correlated with number of primary and secondary branches, number of siliqua and main branch and 1000-seed weight. Plant height showed positive and highly significant association with number of siliqua on main branch and number of primary branch. Number of primary branches had positive and significant with secondary branches. The estimates of direct and indirect contribution characters on seed yield obtained path coefficient analysis suggested improvement in number of siliqua on main receme, harvest index, number of primary and secondary branches and plant height will help in improving seed yield.

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