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RESEARCH PAPER

Correlation and path co-efficient analysis of yield and yield components of Indian mustard [*Brassica juncea* (L.) Czern and Coss]

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SUMMARY

Mustard is an important *Rabi* oilseed crop of India. It occupies about 24.70 per cent of area and 48.28 per cent of production of the total oilseed production in India.Character association among seed yield and its component traits was studied through phenotypic correlation co-efficients and path analysis. Seed yield exhibited positive and significant association with plant height, number of primary branches per plant, number of secondary branches per plant, siliquae per plant, seeds per siliqua and 1000 seed weight. Path analysis revealed that characters *viz.,* seed yield exhibited the highest positive direct effect on siliquae per plant followed by 1000 seed weight, seeds per siliqua, number of primary branches per plant, days to 50 per cent flowering, days to maturity and plant height. Considering both, the correlation co-efficients and path co-efficients together, siliquae per plant, 1000 seed weight, seeds per siliqua, number of primary branches per plant and plant height emerged as important components of seed yield which should be given due importance during indirect selection criteria.

Key Words : Correlation, Path analysis, Indian mustard

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Indian mustard [*Brassica juncea* (L.) Czern and Coss] is an important *Rabi* oilseed crop. Oleiferous *Brassicas,* collectively known as rapeseed-mustard are important oilseed crops of india. Among the four oleiferous *Brassica* species, major area is under *Brassica juncea* which contributes 80 per cent of the total rapeseed-mustard production in the country. Mustard is an important *Rabi* oilseed crop of India. It occupies about 24.70 per cent of area and 48.28 per cent of production of the total oilseed production in India.

Oilseeds together occupy about 27.5 million ha which accounts for 14 per cent of total cropped area in the country with a production of 24.7 million tones, accounting for nearly 5 per cent of the gross national product and 10 per cent of the value of all the agricultural products. The per hectare productivity of crop is low in the country (900 kg/ha) against the world average of 1400 kg/ha in world (Piri and Sharma, 2006).

The success of any breeding programme in general and improvement of specific trait through selection in particular, totally depends upon the variability present in the available germplasm of a particular crop. Main thrust in any crop improvement programme is to enhance yield. As an established fact, yield is a complex trait and is dependent on many other ancillary characters which are mostly inherited quantitatively. The characters which have high and positive correlation with yield can be used in the indirect selection for yield and as an alternate mode of selection for yield improvement.

Use of simple correlation analysis could not fully explains the relationship among the characters. Therefore, the path co-efficient analysis has been used by many researchers for a more and complete determination of impact of independent variable on dependent one. The path co-efficient analysis helps the breeders to explain direct and indirect effects and hence, has

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extensively been used in breeding work in different crop species by various researchers (Green, 1980; Marinkovic, 1992; Shalini *et al.*, 2000 and Ali *et al.*, 2002). The objectives of this study were to estimate the relationship among yield components and best selection criteria for yield improvement in mustard.

MATERIAL AND METHODS

In the present investigation one hundred three diverse genotypes of indian mustard were grown in augumented design during the *Rabi* 2008-09 at regional research Station, Saini, Kaushambi of C.S. Azad university of Agriculture and technology, Kanpur. Each row 5 m long with row to row and plant to plant spacing of 45 cm and 20 cm, respectively. the standard agronomic practices were followed to raise the crop. Data were recorded on days to 50 per cent flowering, days to maturity, plant height (cm), number of primary branches per plant, number of secondary branches per plant, siliquae per plant, seeds per siliqua, 1000 seed weight (g) and seed yield per plant (g). correlation co-efficient were calculated as per the methods suggested by Wright (1921) and path co-efficient was worked out as per the method of Dewey and Lu (1959).

RESULTS AND DISCUSSION

A wide spectrum of variability was observed for all the characters under study indicating that there is ample scope for selection for seed yield as well as its component traits. Seed yield is the result of interaction of several of its component traits influencing directly or indirectly. Therefore, selection is to be based on the exact nature of association of them with seed yield. The phenotypic co-efficient amongst the nine traits including seed yield under the present investigation is presented in Table 1. Seed yield per plant was observed to be positively and significantly correlated with plant height, number of primary branches per plant, number of secondary branches per plant, siliquae per plant, seeds per siliqua and 1000 seed weight. These results are also supported by Singh and Chowdhury (1983) and Sheika *et al.* (1999). Seed yield per plant was negatively and non-significant by correlated with days to 50 per cent flowering and days to maturity. This is supported by Masood *et al.* (1999).

Among the component traits positive significant association was observed between days to 50 per cent flowering and days to maturity. Plant height exhibited positive significant correlation with siliquae per plant and 1000 seed weight. Number of primary branches per plant also exhibited positive significant correlation with number of secondary branches per plant and siliquae per plant. Number of secondary branches per plant exhibited positive significant association with siliquae per plant and 1000 seed weight, siliquae per plant exhibited positive and significant

Table 1 : Phenotypic correlation co-efficients among seed yield and component traits in Indian mustard

Traits	Days to maturity	Plant height	Primary branches per plant	Secondary branches per plant	Siliquae per plant	Seeds per siliqua	1000 seed weight	Seed yield per plant
Days to 50% flowering	0.549**	0.096	-0.100	-0.064	-0.003	-0.001	-0.091	-0.109
Days to maturity		0.037	0.056	-0.106	0.078	-0.007	-0.133	-0.046
Plant height			0.157	0.211	0.455**	0.121	0.349**	0.472**
Primary branches per plant				0.347**	0.250*	0.129	0.170	0.317**
Secondary branches per plant					0.398**	0.074	0.430**	0.457**
Siliquae per plant						0.157	0.278**	0.747**
Seeds per siliqua							0.043	0.359**
1000 seed weight								0.710**

* and ** indicate significance of values at P=0.05 and 0.01, respectively

Table 2 : Direct and indirect effect of seed yield and component traits in Indian mustard

Traits	Days to 50% flowering	Days to maturity	Plant height	Primary branches per plant	Secondary branches per plant	Siliquae per plant	Seeds per siliqua	1000 seed weight	'r' with seed yield
Days to 50% flowering	0.059	0.006	0.000	-0.006	0.003	-0.002	0.000	-0.050	-0.109
Days to maturity	-0.033	0.010	0.000	0.003	0.005	0.043	-0.002	-0.073	-0.046
Plant height	-0.006	0.000	0.003	0.010	-0.009	0.253	0.029	0.191	0.472**
Primary branches per plant	0.006	0.001	0.000	0.061	-0.015	0.139	0.031	0.093	0.317**
Secondary branches per plant	0.004	-0.001	0.001	0.021	-0.043	0.221	0.018	0.236	0.457**
Siliquae per plant	0.000	0.001	0.001	0.015	-0.017	0.556	0.038	0.152	0.747**
Seeds per siliqua	0.000	0.000	0.000	0.008	-0.003	0.087	0.243	0.023	0.359**
1000 seed weight	0.005	-0.001	0.001	0.010	-0.018	0.155	0.010	0.548	0.710**

Residual = 0.1018, ** indicate significance of value at P=0.01

association with 1000 seed weight.

The above *inter se* association amongst the traits indicated that although some of the component traits did not exhibit positive significant association with seed yield, their role in contributing towards seed yield couldn't be overlooked as these component traits exhibited positive significant association with important yield attributes. Thus, these traits may be assumed to indirectly contribute via other traits in governing seed yield. In this regard, it is important to partition out the observed phenotypic association into direct and indirect effects of the component traits towards seed yield.

The data presented in Table 2 revealed that character contributing to seed yield may contribute directly or indirectly. The highest positive direct effect on seed yield was observed for the siliquae per plant followed by 1000 seed weight, seeds per siliqua, number of primary branches per plant, days to 50 per cent flowering, days to maturity and plant height. These results are in conformity with those reported by Singh and Singh (1997) and Masood *et al.* (1999). Number of secondary branches per plant exhibited negative direct effect on seed yield to an appreciable extent. Highest positive but indirect effect was observed for plant height via siliquae per plant followed by number of secondary branches per plant via 1000 seed weight.

The characters *viz.*, siliquae per plant exhibited high positive direct effect and significant positive correlation with seed yield per plant followed by 1000 seed weight indicating that emphasis should be given on these characters.

Considering correlation and path co-efficients together, it can be concluded that the characters siliquae per plant, 1000 seed weight, seeds per siliqua, number of primary branches per plant and plant height were the important yield contributing characters and should be given due importance during selection as these characters had positive direct effects on seed yield and had significant positive association with seed yield.

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