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Correlation and Factor Wise Contribution of the Characters Related to Yield and Quality of *Brassica juncea* L.

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ABSTRACT

Eight accessions of *Brassica juncea* L. were sown in a Randomized Complete Block Design in four replications. Data were collected and analysed to evaluate various economic characters by correlation and factor-wise contribution for yield improvement. Number of primary branches per plant, plant height, pod length, 1000-seed weight, seed yield per plant and oil content were found the best variables with maximum potential for selection.

Key Words: Correlation; Path coefficient analysis; Yield; Quality; *Brassica juncea* L.

INTRODUCTION

Edible oil is an essential component of human diet. Only 29% of total for edible oil seeds in met through domestic production. Rest is imported that costs huge burden on foreign exchange. The demand for edible oil is still increasing with increase in population and for capital consumption as the standard of living rises. Efforts are being made to cut short the imports and to increase the area and production potential of various oil seeds. There is dire need to develop high yielding varieties of Brassica to further enhance its productivity in the country. The present study was thus undertaken to evaluate various yield components by using correlation and path analysis techniques for *Brassica juncea* L. The information thus obtained could be used for the development of comprehensive breeding programme to evolve high yielding Brassica cultivars.

MATERIALS AND METHODS

The investigations were carried out in the Department of Plant Breeding and Genetics at University Campus on eight accessions of *Brassica juncea* L. viz., UCD-8/4, UCD-83, UCD-323/2, UCD-627, UCD-675, UCD-7/8 and RL-18 as a standard. The experiment was laid out in Randomized Complete Block Design (RCBD) with four replications. A row to row distance of 45 cm and plant to plant distance of 25 cm was maintained and 11 lines of each accession were sown. Ten well guarded plants were randomly selected from five middle rows of each plot in every replication. The data were obtained for plant height, number of primary and secondary branches per plant, number of pods per plant, pod length, 1000-seed weight, oil and protein contents and seed yield per plant. The data recorded for these characters were analysed by analysis of variance technique and correlation coefficient were calculated (Steel & Torrie, 1960) and standard error of genotypic correlation coefficients was calculated (Lothrop *et al.*, 1985). Path analysis was performed according to the techniques given by Dewey and Lu (1959).

RESULTS AND DISCUSSION

Genotypic and phenotypic correlation coefficients among eleven characters of economic importance in eight accessions of *Brassica juncea* L. are presented in Table I. Plant height had positive and significant correlation with number of primary and secondary branches per plant, number of pods per plant, protein content and seed yield per plot at genotypic level. Similar results are also reported by Dhan and Dharma (1974) and Ahmad (1980)

Number of pods per plant had a non-significant and negative correlation with 1000-seed weight and oil content both at genotypic and phenotypic levels. Chowdhry and Chowdhry (1970), and Lebowitz (1989) also reported such results. 1000-seed weight had positive and significant correlation with seed yield per plant at genotypic level but positive and highly significant at phenotypic level. The results are in accordance with Harbir *et al.* (1988). Oil content had positive and non-significant correlation with seed yield per plant at both genotypic and phenotypic levels. The results are not in accordance with Dileep *et al.* (1997).

Data (Table II) revealed that the genotypic correlation between plant height and seed yield per plot was positive (0.21777) and direct effect of plant height on seed yield per plot was negative (-1.1643). The indirect effects of plant height on seed yield per plot via number of primary branches and number of pods per plant was negative while number of seeds per pod, pod length, 1000-seed weight, oil content and protein contents was positive. Jiang and Guan

(1988) also reported indirect effects of plant height on yield through its effect on pods per plant.

The genotypic correlation between seeds per pod, seed yield per plot (Table II) was positive (0.1111) and direct effect of seeds per pod on seed yield per plot was negative (-0.8911). The indirect effect of seeds per pod on seed yield per plot via number of secondary branches per plant and pod length was also negative while via primary branches per plot, number of pods per plant, oil content and seed yield per plant was positive. However, Kumar and Yadava (1980) obtained positive direct effect of seeds per pod on seed yield per plot. A critical data (Table II) further revealed that the oil content contributed the maximum directly (1.45309) to seed yield per plot followed by number of secondary branches per plant (1.15229) and other traits. These two traits were considered to be the most important for selecting good strains in *Brassica juncea* L. species.

CONCLUSIONS

The breeders should concentrate on number of secondary branches per plant, number of pods per plant, number of seeds per pod and oil content (%) to have best genotypes for the improvement of *Brassica juncea* L.

Table I. Genotypic (bold figures) and phenotypic (normal figures) correlation coefficients among 11 plant traits of *Brassica juncea* L.

	PRBR	SECBR	PODP	GRPOD	PODL	TGW	OC	PC	YILDP	YILDPT
PLHT	0.5968*	0.6814*	0.4996*	-0.4398*	-0.0313	-0.4331	0.2148	0.3613*	0.1056	0.2178*
	0.5029**	0.6013**	0.4818**	-0.3833*	-0.0479	-0.3613*	0.2198	0.3419	0.1127	0.2412
PRBR		0.9938*	0.5639*	-0.7340*	0.0166	0.3024	0.3159	-0.1664	0.4668	0.8331*
		0.9072**	0.5278**	-0.684**	0.0510	0.2229	0.2744	-0.1583	0.3871*	0.5887**
SECBR			0.5679*	-0.4728	0.3381	0.1834	0.5106*	-0.1810	0.7004*	0.9526*
			0.5059**	-0.3934*	0.2742	0.1807	0.4545*	-0.1645	0.5709**	0.7424**
PODP				-0.3790*	-0.6105	-0.2234	-0.1110	0.4148*	0.2080	0.0236
				-0.3339	-0.487**	-0.1818	-0.1086	0.4026*	0.1932	0.0595
GRPOD					0.6400	0.1123	0.3981	-0.2610	0.1374	0.1111
					0.4737**	0.1606	0.3839*	-0.2419	0.1283	0.1183
PODL						0.8097	0.9399*	-0.9640*	0.7635*	0.9877*
						0.6193**	0.7359**	-0.787**	0.6302**	0.6908**
TGW							0.5182	-0.8001*	0.6786*	0.7933*
							0.4722**	-0.728**	0.5576**	0.6565**
OC								-0.5565*	0.3560	0.9839*
								-0.546**	0.3142	0.8267**
PC									-0.5927*	0.7456
									-0.549**	0.636**
YILDP										0.6795*
										0.6807**

*, ** = Significant and highly significant, respectively.

PLHT = Plant height, PRBR = Primary branches per plant, SECBR = Secondary branches per plant, PODP = Pods per plant, GRPOD = Grains per pod, PODL = Pod length, TGW = 1000-grain weight, OC = Oil content, PC = Protein content, YILDP = Seed yield per plant, YILDPT= Seed yield per plot.

Table II. Path analysis of seed yield per plot (g) and its component with their direct (diagonal) and indirect (above and below diagonal) effects

	PLHY	PRBR	SECBR	PODP	GRPOD	PODL	TGW	OC	PC	YILDP	r_g*
PLHT	-0.164	-0.371	0.785	-0.115	0.392	0.0006	0.2093	0.3121	0.1187	0.0502	0.2178
PRBR	-0.695	-0.622	1.145	-0.130	0.654	-0.0003	-0.1461	0.4591	-0.0547	0.2221	0.8331
SECBR	-0.793	-0.618	1.152	-0.131	0.421	-0.0064	-0.0886	0.7420	-0.0594	0.3332	0.9526
PODP	-0.582	-0.350	0.654	-0.230	0.338	0.0117	0.1080	-0.1613	0.1363	0.0990	0.0236
GRPOD	0.512	0.456	-0.550	0.087	-0.891	-0.0122	-0.0542	0.5785	-0.0857	0.0654	0.1111
PODL	0.036	-0.010	0.390	0.140	-0.570	-0.019	-0.3912	1.3657	-0.3167	0.3633	0.9877
TGW	0.504	-0.188	0.211	0.051	-0.100	-0.0155	-0.483	0.7529	-0.2629	0.3229	0.7933
OC	-0.250	-0.196	0.588	0.026	-0.355	-0.0179	-0.2503	1.4531	-0.1828	0.1694	0.9840
PC	-0.421	0.103	-0.209	-0.095	0.233	0.0185	0.3866	-0.8097	0.3286	-0.2820	-0.7456
YILDP	-0.123	-0.290	0.807	-0.048	-0.122	-0.0146	-0.3278	0.5173	-0.1947	0.4758	0.6796

*, ** = Significant and highly significant, respectively.

PLHT = Plant height, PRBR = Primary branches per plant, SECBR = Secondary branches per plant, PODP = Pods per plant, GRPOD = Grains per pod, PODL = Pod length, TGW = 1000-grain weight, OC = Oil content, PC = Protein content, YILDP = Seed yield per plant, YILDPT= Seed yield per plot.

breeding programme for enhancing edible oil production in the country. From factor wise contribution of the factors it is clear that oil content has the parental role for the contribution of seed yield followed by secondary branches per plant because oil content is the main part of seed by volume and weight. On the other hand secondary branches per plant contribute to wards the yield of seed because they are the main stay of leaves and pods for photosynthesis pod bearing branches and seed formation at the critical stage of seed formation and maturity so they are more important as compared primary and secondary branches (Habir *et al.*, 1988; Jiang & Guan, 1988).

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