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Genotypic, Phenotypic Correlations and Path An[illegible]ield Quantitative Characters in Sesamum

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To assess the information on genotypic and phenotypic correlations of five quantitative characters viz., (1) plant height, (2) height at which first capsule formed, (3) total number of capsules per plant, (4) number of primary branches and (5) number of secondary branches towards grain yield in sesamum, investigations were carried out on 30 sesamum varieties during summer 1976 and monsoon 1976 at Tamil Nadu Agricultural University Farm, Coimbatore. It was found that significant positive genotypic and phenotypic correlation existed between grain yield and total number of capsules per plant, number of primary branches per plant and number of secondary branches per plant during summer 1976. During monsoon 1976 grain yield had significant positive genotypic correlation with all the five characters under study. With respect to phenotypic correlations during monsoon 1976 plant yield had significant positive correlation with all the characters except height at which first capsule is formed. Path analysis revealed that in summer 1976, primary branches per plant had the highest direct effect; during monsoon 1976 height at which first capsule formed had the highest direct effect. The above results indicated Genotype x Environment interaction.

Selection of plants for yield is based on many of its components related to each other. The study of association of various components with yield is neccessary, if selection for improvement of these components is to be effective. The path analysis provides an effective means of finding out direct and indirect effects of association between variable (Wright, 1921). In the present study, genotypic and phenotypic correlations were worked out to assess the information on the genetic association of the five plant characters :- (1) plant height, (2) height at which first capsule is formed, (3) total number of capsule per plant, (4) number of primary branches and (5) number of secondary branches with seed yield. Also, path analysis was carried out to study the causal direct system of different plant characters towards yield.

MATERIAL AND METHODS

Field experiment was carried out during Monsoon 1976 and Summer 1976 at Tamil Nadu Agricultural University Farm to study the biometrical aspects of sesamum. The experiment was carried out by adopting Randomised Block Design. The following thirty varieties were sown in both seasons :

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Such negative res		2141	2575	2582
because enzy	50-1-6-10		1074	2182
manife	933	TMV3	1006	968
951	NP 6		2602	2554	3047
TMV2	SelR		2789	2579	3049
2795	KRR2	M-3-2	KRRI	1075

Each variety was sown in 4 rows, the length of each row being 3.3 m. Row spacing was 30 cm and the plant spacing was 30 cm. Five plants were selected at random from the middle two rows of each experimental plot and observations were taken on the five characters under study. Genotypic and phenotypic correlation coefficients were worked out according to Miller, *et al.* (1958).

Genotypic correlations were further partitioned into direct and indirect effects by path analysis as suggested by Dewey and Lu (1959) to study causal system of the five characters.

RESULTS AND DISCUSSION

Significant positive genotypic and phenotypic correlation existed between seed yield and the following three characters viz., total number of capsules per plant, number of primary branches per plant, number of secondary branches per plant during summer 1976. During monsoon 1976, grain yield had significant positive genotypic correlation with all the five characters under study. With respect to phenotypic correlations during monsoon 1976, plant yield had significant positive correlation with all the characters except heignt at which first capsule is formed (Table I)

The results of path analysis (Table II) further revealed that plant character, number of primary branches per plant had the highest direct effect (-3.0910) on seed yield followed by nmmber of secondary branches (2.0642). The character plant height had minimum direct effect (-0.1706) on seed yield during summer 1976. But the path analysis of Summer 1976 data provided a very low and non-significant R^2 value of 0.3130.

The path analysis of monsoon 1976 data revealed that the plant character

TABLE I. Genotypic and phenotypic correlation coefficients of different characters with seed yield

Variable	Genotypic correlation coefficients		Phenotypic correlation coefficients	
	Summer 1976	Monsoon 1976	Summer 1976	Monsoon 1976
Plant height	0.1698	0.5943**	0.2283	0.5468**
Height at which first capsule is formed	0.2680	0.4113**	0.2531	0.3533
Total number of capsules per plant	0.6134**	0.5180**	0.6004**	0.5197**
Number of primary branches per plant	0.5814**	0.4181*	0.4950**	0.3913*
Number of secondary brancnes per plant	0.5517**	0.4139*	0.5268**	0.4243*

* Significant at P = 0.05 ** Significant at P = 0.01

TABLE II. Direct and indirect effects of five characters towards yield

Summer 1976 Characters ($R^2 = 0.3130$)		X_1	X_2	X_3	X_4	X_5	Total correlation with yield
Plant height	(X_1)	**-0.1706**	0.8852	0.5709	-1.5665	0.4508	0.1698
Height at which 1st capsule is formed	(X_2)	-0.1414	**1.0684**	0.6902	-2.6208	1.2716	0.2680
Total Number of capsules per plant	(X_3)	-0.0837	0.6337	**1.1637**	-2.4468	1.3465	0.6134
Number of primary branches per plant	(X_4)	-0.0865	0.9060	0.9212	**-3.0910**	1.9317	0.5814
No. of secondary branches per plant	(X_5)	-0.0373	0.6582	0.7591	-2.8925	**2.0642**	0.5517
Monsoon 1976 ($R^2 = 0.5895$)							
Plant height	(X_1)	**1.1179**	-1.0357	0.0874	0.3692	0.0555	0.5943
Height at which first capsule is formed	(X_2)	0.8515	**-1.3597**	0.1161	0.6879	0.1156	0.4113
Total Number of capsules per plant	(X_3)	0.6049	-0.9772	**0.1614**	0.6161	0.1128	0.5180
Number of primary branches per plant	(X_4)	0.5159	-1.1690	0.1243	**0.8001**	0.1468	0.4181
No. of secondary branches per plant	(X_5)	0.3876	-0.9812	0.1138	0.7338	**0.1601**	0.4139

Bold figures indicate direct effects

height at which first capsule was formed had the highest direct effect (−1.3597) on grain yield followed by plant height (1.1179). The characters, total number of capsules per plant (0.1615) and number of secondary branches per plant (0.1601) had very low direct effects on grain yield. The significant R^2 value (0.5859) obtained from the monsoon 1976 data indicates that 59 per cent of the variations in yield is due to the five plant characters taken up for the study. Indirect effects of the characters plant height, total number of capsules per plant, number of primary branches per plant, number of secondary branches per plant towards grain yield were high through height at which first capsule was formed.

Kaushal *et al*. (1974) reported that capsule number per plant and plant height had a positive direct effect on yield in erect types of sesamum.

An overall consideration of the results would reveal, (1) there are strong genotypic x environment interactions, (2) the genotypic correlations are highly significant in respect of number of primary and secondary branches in summer while in monsoon only the plant height, height at which first capsule is formed alone are highly significant. It is therefore evident that the same set of genotypes react differently during summer and monsoon, by way of restructuring themselves, with greater contributory role for main stem (plant height) during

monsoon months and for primary and secondary branches during summer months. The same trend was further confirmed in path analysis which brought out greater direct effects of height at which first capsule is formed, main stem (plant height) and total number of capsules during Monsoon whereas in summer, only the primary and secondary branches had greater direct effects on yield than rest.

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