

## Correlation and Path-coefficient Analysis in Sesamum (*Sesamum indicum* L.)\*

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Correlation and path analysis involved 40 diverse genotypes of sesamum indicated plant height, branch number, capsule number, capsule number on main stem, 1000 seed weight, days to full maturity and oil content to be positive association with seed yield per plant. Seed number showed negative non significant association with seed yield per plant. The inter correlations among all the characters except seed number revealed a high association among themselves. Capsule number exhibited maximum positive direct effect on seed yield followed by 1000 seed weight. Plant height, branch number, capsule number on main stem and days to full maturity showed negative direct effect.

Improvement in any crop rests on understanding the influence of the different component characters on yield as well as among themselves. The association may be measured at genotypic, phenotypic and environmental levels. However, the genotypic correlation which provides the association for the heritable part only, shows the real picture for effecting selection. Path coefficient analysis is a standardised tool for splitting the total correlation into direct and indirect effects of the yield components on the yield. The present study was undertaken to determine the association between the yield components and yield at genotypic, phenotypic and environmental levels and their degree of direct and indirect influence on the yield.

### MATERIAL AND METHODS

Forty geographically diverse genotypes of sesamum were selected from the germplasm collections maintained

at College of Agriculture, Bhubaneswar, Orissa and School of Genetics, Tamil Nadu Agricultural University, Coimbatore. They were raised in randomised blocks replicated thrice at Agricultural College and Research Institute, Madurai. Each replication consisted of 40 ridges with a spacing of 45 cm and each ridge was sown with a spacing of 30 cm between plants. Observations pertaining to plant height, branch number, capsule number per plant, capsule number on main stem, seed number per capsule, 1000 seed weight, days to full maturity, oil content of seeds and seed yield per plant were recorded on five randomly selected plants in each genotype. The phenotypic, genotypic and environmental correlation coefficients were worked out utilising variance and covariance components. The genotypic correlation coefficients of the yield components on seed yield were

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partitioned into direct and indirect effects, Dewey and Lu, 1959).

## RESULTS AND DISCUSSION

The estimated phenotypic, genotypic and environmental correlation coefficients are presented in Table I.

In general, the genotypic correlation coefficients were slightly higher than the phenotypic correlation coefficients indicating the masking effect of the environment in the total expression of the genotypes. Such results are in concurrence with the results of Sanjeeviah and Joshi (1974) in sesamum. All the characters studied except seed number showed significant and positive correlation with seed yield at both genotypic and phenotypic levels. Similar reports were reported by Asthana and Raj (1970) for seed yield and capsule number on main stem, Osman Khidir and Osman (1970) for plant height, branch number, capsule number and 1000 seed weight with seed yield, Osman and Osman Khidir (1974) for days to full maturity with seed yield and Trehan *et al.* (1975) for oil content with seed with yield. The positive correlation between days to full maturity and seed yield was poor at phenotypic level (0.3111). The association between seed number and seed yield was negative but non-significant at genotypic and phenotypic levels. This kind of negative association was also noticed by Chauhan and Singh (1977) in mustard.

The inter-correlations among the yield components except seed number

revealed high association among themselves which indicate the possibility of simultaneous improvement of these traits by single selection. Palaniswamy *et al.* (1978) observed highly significant and positive association between pairs of all characters studied. In the present study, the inter-correlations for seed number with all the other traits were negative. Such negative association may occur due to the competition of two developing structures of the plant for limited resources like nutrient and water supply (Adams, 1967). Newell and Eberhart (1961) were of the view that it would be difficult to exercise simultaneous selection for the characters which show negative association among themselves. Hence, the character, seed number acts as a deterrant for the formulation of a comprehensive selection schedule. The environmental correlation coefficients were both in negative and positive directions, but they were all non-significant.

The results of path coefficient analysis based on the genotypic correlation coefficient are furnished in Table II. The maximum direct effect on seed yield was exerted through capsule number (0.926). The indirect effects of other characters *via* capsule number on seed yield was considerable indicating the importance of the character, capsule number in the selection programme. This is in agreement with the results of Tilak Raj Gupta (1976) and Gupta and Gupta (1977) in sesamum. Next to this, the characters, 1000 seed weight (0.237), seed number (0.264) and oil content (0.0633)

exhibited positive direct effects on seed yield.

Similar findings were reported by Gupta and Gupta (1977) in sesamum. The direct effects of plant height, branch number, capsule number on main stem and days to full maturity on seed yield were negative but low in magnitude. Dixit (1975) has also reported negative direct effect of plant height on seed yield. The indirect effects through 1000 seed weight were positive and small. All the indirect effects *via* seed number were negative. Thus, it can be inferred that the characters, capsule number and 1000 seed weight are to be given prime importance, as they recorded significant positive correlation coefficients and higher positive direct and indirect effects on seed yield, compared to other traits.

In the present study, the residual value (0.1592) was low in magnitude which shows that most of the important yield contributing characters have been included.

#### REFERENCES

- ADAMS, M. W. 1927. Basis of compensation in crop plants with special reference to field bean, *Phaseolus vulgaris*. *Crop Sci.* 7: 505-10.
- ASTHANA, K. S. and U. K. RAJ. 1970. Correlation studies in till (*S. indicum* L.). *Allahabad Fmt.*, 44: 385-86.
- CHAUHAN, Y.S., and P. SINGH 1977. Path analysis in Indian mustard *Div. Pl. Br. and Gent., C. S. Azad Univ. and Tech.* Kanpur.
- DEWEY, D. R. and K. H. LU, 1959. A correlation and path coefficient analysis of components of crested wheat grass seed production. *Agron. J.*, 51: 515-18.
- DIXIT, R. K. 1975. Path analysis of some quantitative traits in sesame (*S. orientale* L.). *Plant Sci.* 7: 9-12.
- GUPTA, V. K. and Y. K. 1977. variability, interrelationships and path coefficient analysis for some quantitative characters in sesamum (*S. indicum* L.). *Indian J Hered.* 9: 31-37.
- NEWELL, L. C. and S. A. EBERHART, 1931. Clone and progeny evaluation in the improvement of switch grass, *panicum virgatum*. *L. Crop. Sci.* 1: 117-21.
- OSMAN, E. G. H. and M. OSMAN KHIDIR, 1974. Relations of yield components in sesame. *Expl. Agric.* 10: 97-103.
- OSMAN KHIDIR, M. and E. G. H. OSMAN, 1970. Correlation studies in some agronomic characters in sesame. *Expl. Agric.* 6: 27-31.
- PALANISWAMY, K. M., G GOVINDA DASS and A SHUNMUGA SUBRAMANIAM, 1978. Correlations and Path analysis of yield and yield components in sesame. *Indian J. agric Sci.*, 48: 681-83.
- SANJEEVAIAH, R. S. and M. S. JOSHI, 1974. Correlation and genetic variability in sesame. *Curr. Sci.* 11: 144-45.
- TILAK RAJ GUPTA, 1976. Path coefficient analysis in sesamum. *Oil seeds J.*, 6: 27-29.
- TREHAN, K. B., HIRACHAND, S. K. METHA, S. K. BAIJAL, and S DHAWAN, 1975. Correlation and path coefficient analysis in sesame. *Madras agric. J.*, 62: 7-10.

Table-1 Phenotypic, Genotypic, and environmental correlation coefficients (r) between different pairs of nine characters in sesameum

Characters	Branch number	Capsule number main stem	Capsule number on main stem	Seed number	1000 seed weight	Days to full maturity	Oil content	Seed yield
Plant height	P	0.680**	0.566**	0.246	0.716**	0.178	0.628**	0.764**
	G	0.604**	0.609**	0.349	0.734**	0.252	0.633**	0.771**
	E	-0.106	-0.020	0.129	0.078	-0.091	-0.018	-0.179
Branch number	P	0.887**	0.561**	-0.161	0.502**	0.271	0.565**	0.842**
	G	0.900**	0.608**	-0.238	0.622**	0.377	0.577**	0.858**
	E	0.500	0.015	0.085	-0.029	-0.004	-0.140	-0.137
Capsule number	P	0.732**	0.732**	0.195	0.521	0.317*	0.722**	0.953**
	G	0.783**	0.783**	0.266	0.535**	0.436**	0.727**	0.957
	E	0.097	0.097	-0.048	-0.160	-0.038	-0.166	-0.222
Capsule number on main stem	P	-0.083	0.374*	-0.083	0.374*	0.287	0.640**	0.725**
	G	-0.109	0.419**	-0.109	0.419**	0.409**	0.693**	0.775**
	E	-0.036	0.125	-0.036	0.125	0.031	-0.130	0.103
Seed number	P	-0.323	-0.323	-0.081	-0.323	-0.081	-0.046	-0.075
	G	-0.411	-0.411	-0.163	-0.411	-0.163	-0.049	-0.118
	E	-0.207	-0.207	0.012	-0.207	0.012	-0.149	0.194
1000 seed weight	P	0.260	0.260	0.260	0.260	0.260	0.465**	0.602**
	G	0.357	0.357	0.357	0.357	0.357	0.480**	0.621**
	E	0.090	0.090	0.090	0.090	0.090	-0.107	-0.181
Days to full maturity	P	0.161	0.161	0.161	0.161	0.161	0.161	0.311
	G	0.214	0.214	0.214	0.214	0.214	0.214	0.420**
	E	0.083	0.083	0.083	0.083	0.083	0.083	0.095
Oil content	P	0.772**	0.772**	0.772**	0.772**	0.772**	0.772**	0.772**
	G	0.779**	0.779**	0.779**	0.779**	0.779**	0.779**	0.779**
	E	-0.022	-0.022	-0.022	-0.022	-0.022	-0.022	-0.022

\*Significant at 5% level P = Phenotypic correlation coefficient; G = Genotypic correlation coefficients;

\*\*Significant at 1% level E = Environmental correlation coefficients.

Table-II Path coefficient analysis showing the direct and indirect effects of eight characters on seed yield in sesamum

Characters	Plant height	Branch number	Capsule number	Capsule number on mainstem	Seed number	1000 seed weight	Days to full maturity	Oil content	Genotypic correlation coefficient on seed yield
Plant height	<u>-0.0237</u>	-0.0380	0.7040	-0.0110	-0.0714	0.1744	-0.0039	0.0401	0.7710
Branch number	-0.016	<u>-0.0549</u>	0.8345	-0.0110	-0.0486	0.1241	-1.1159	0.0366	0.8588
Capsule number	-0.0175	-0.0493	<u>0.9267</u>	0.0142	0.0544	0.1272	0.0068	0.0460	0.9576
Capsule number on main stem	0.0141	0.0333	0.6251	<u>0.0187</u>	0.0224	0.0997	0.0063	0.0439	0.7752
Seed number	0.0081	0.0130	-0.2470	0.0019	<u>0.2042</u>	0.0978	-0.0025	0.0031	0.1181
1000 seed weight	0.0170	-0.0286	+0.4962	-0.0076	-0.0841	<u>0.2375</u>	-0.0055	0.0304	0.6213
Days to full maturity	-0.0058	-0.0207	0.4048	-0.0074	-0.0334	0.0848	<u>-0.0156</u>	0.0135	0.4202
Oil content	-0.0146	-0.0316	0.6740	-0.0125	-0.0101	0.1141	-0.0033	<u>0.0633</u>	0.7760

The underlined figures denote direct effects  
Genotypic effect = 0.15907