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CHARACTER ASSOCIATION AND PATH COEFFICIENT ANALYSIS IN PARENTS AND F_1 HYBRIDS OF SESAMUM (*Sesamum indicum* L.)*

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The correlation and path coefficient analysis were carried out in a set of parents and their all possible F_1s seperately. In parents plant height, number of branches, capsules/plant, where as in hybrids capsules on the main stem, capsules/plant and oil content was positively correlated with seed yield and oil yield/plant. Positive direct effects of plant height, capsules/plant and negative direct effects of number of branches on seed yield were pronounced in both parents and hybrids. On the other hand, direct and indirect effects of seed yield on oil yield were positive and considerably high but the indirect effects through oil content were negative. Seed yield which is a major component of oil yield per plant can be improved by selecting for high capsule number and plant height and less number of branches.

Study of character associations help the breeder in making judicious selection in the field. Capsules per plant and plant height (Kaushal *et al.*, 1974) and number of branches and plant height (Ramachandran *et al.*, 1972; Sanjeevaiah and Joshi, 1974) are major yield components in sesamum. Among them, capsule number per plant had a maximum direct effect on seed yield (Kaushal *et al.*, 1974; Naphade and Kolte, 1974; Gupta and Gupta, 1977; Chavan and Chopde 1981). Uzo, (1977) found that the number of capsules per plant exhibited heterosis but was not highly correlated with seed yield. However the information on character association with oil, yield per plant and other characters are lacking in hybrids as related to their parents. The associations in the same direction in parents and hybrids are expected to behave similarly in the segregating generations and will be more dependable for selection. These associations will be discussed in the present study to find out common selection criteria.

MATERIAL AND METHODS

Ten diversified and selfed lines of sesamum viz. T-85, N 58-2 (Maharastra), N 86, N 62-38 (Jabalpur), SI 851 (pure line of middle Asian variety), C 50 (Local pure line selection of Kota, Rajasthan), SI 1551 (pure line of an introduction from Sudan), X 91-9-9-9 (Derivative of 89 X SI 1767 cross), SI 1854/1 (pure line from Taskentskiji-122 of USSR) and Anand (Local pure line selection of Gujarat) were utilised

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in crosses. The parents and their 45 hybrids were studied in a randomized complete block design with 3 replications at Andhra Pradesh Agricultural University, Agricultural College Farm, Rajendranagar, Hyderabad during Kharif, 1978. Each entry had a single row of 3 meter length. A spacing of 50 cm between rows and 15 cm within the row was adopted. All the normal agronomic practices were followed in raising the crop. Observations were recorded on five randomly selected plants. The characters studied were days to flower plant height (cm), effective stem length (cm), number of branches, capsules on the mainstem, capsules per plant, ssed yield per plant (g), oil content and oil yield per plant (g). Oil per cent in the uncrushed seed was recorded with NMR spectrophotometer at Sunflower-super elite seed production project, Rajendranagar, Hyderabad, 500 030. Oil yield per plant was calculated based on oil content and seed yield per plant. Correlations were worked out separately in the parents and hybrids. Path coefficients were worked out by utilising the correlation coefficients as per Dewey and Lu (1969).

RESULTS AND DISCUSSIONS

Correlation coefficients for the parents and hybrids are given in Table 1. Correlations of days to flower with plant height and number of branches; number of branches with capsules per plant; capsules per plant with seed and oil yield per plant; seed yield per plant with oil yield per plant were positive and highly significant for hybrids. Oil content showed consistently negative relationship with days to flower, plant height, effective stem length and number of branches both in parents and hybrids. These correlations, being in the same direction in parents and hybrids are expected to behave similarly in the segregating generations.

Days to flower with capsules per plant, days to flower with seed yield, plant height with seed yield and oil yield per plant, number of branches with seed yield and oil yield per plant have shown high positive associations in parents alone. Significant and positive associations of effective stem length with number of branches and capsules per plant, capsules on the main stem with capsules per plant and oil yield per plant, oil content with seed yield and oil yield per plant were observed in F_1 hybrids only. Similarly negative and significant associations in F_1 hybrids were observed between days to flower and capsules on the main stem; days to flower and oil yield per plant; capsules on the main stem and oil content. These associations may be mainly due to the dominance effects as they did not figure out in parents.

Capsules per plant had major direct effect on seed yield in both parents and hybrids (Table 2). In turn seed yield per plant and oil content had high direct effects on oil yield per plant in parents and hybrids (Table 3). Pronounced positive direct effect of number of capsules on oil yield per plant was observed in hybrids.

The indirect effects on seed yield through capsules per plant and plant height were predominant. Capsules per plant had prominent indirect influence on seed yield through plant height and number of branches in both homozygous and heterozygous populations. Thus out of the nine characters studied, it would appear that, selection for capsules per plant, height and fewer number of branches will be useful for improving the seed yield in sesamum.

The positive correlations of yield with capsule number on the main branch and number of branches and between plant height and number of branches were earlier reported by Sanjeevaiah and Joshi (1974). Based on these relationships, they concluded that phenotypic selection be based on capsule number on the main branch and branch number. However, in the present study the relationship of yield with number of branches and number of capsules on the main branch were not consistent in parents and hybrids. Similarly correlation between number of branches and capsules on main stem was not significant. Therefore these components did not emerge as major yield components. The observation that the number of capsules per plant and length of the main fruiting branch are the important characters to be considered for yield improvement Dixit, 1976) can be achieved only when selection is based on more number of capsules and few branches in tall growing plants. The capsules per plant and plant height are stressed to be the major yield components by Dabral (1967) and Phadnis *et al.*, (1970) also. Earliness was reported as advantageous over late types in oil content (Weiss, 1917). In the present study also significant positive association was observed between earliness and oil component. However the direct effect of days to flower on oil content was very low and did not support the earlier contention.

Seed yield and oil content are the important characters which showed major direct and indirect effects on oil yield per plant, though these effects were opposite in direction. The indirect effects of days to flower, plant height effective stem length and number of branches through oil content were negetive both in parents and F_1 hybrids and positive through seed yield atleast in parents. The selection for high capsule number and plant height and less number of branches earlier suggested to improve the seed yield will not directly contribute to oil yield per plant through oil content. But the improvement in oil yield per plant is expected through seed yield. The major emphasis in sesamum improvement should therefore be for seed yield improvement itself through the selection of component characters keeping the present level of soil content constant until the real break through in oil content is encountered.

REFERENCES

CHAVAN, G. V. and P. R. CHOPDE, 1981. Correlation and path analysis of seed yield and its components in sesame. *Indian J. Agri. Sci. 51* : 627-30.

DABRAL, K. C. 1967. Variability and correlation studies in sesame. *JNKVV Res. J* 1 : 135-39.

DEWEY, D. R. and K. H. LU. 1969. A correlation and path analysis of components of crested wheat grass seed production. *Agron. J. 51* : 515-18.

DIXIT, R. K. 1976. Inheritance of yield and its components in sesame. *Indian J. Agric. Sci. 46*(4) : 187-91.

GUPTA, V. K. and Y. K. GUPTA, 1977. Variability inter-relationships and path coefficients analysis for some quantitative characters in sesamum (*Sesamum Indicum* L.). *Indian J. Heredity. 9* (1) : 31-37.

KAUSHAL, P. K., P. S. SHRIVASTAVA S. R. SHRIVAS and U. GOSWAMI, 1974. Study on correlation and path analysis of some yield attributing characters in erect type of sesame. *JNKVV Res. J. 8* (2): 113-17.

NAPHADE, D S and N. N. KOLTE, 1974. Inter-relationships and path analysis for some characters contributing to yield of sesame (*Sesamum Indicum L.*) *Nagpur Agri. Coll. Mag* 47: 32-35.

PHADNIS, B.A., A.P EKBOTE and M.A TAYYAB 1970. Contribution of various plant characters to yield of sesame. *NAGPUR AGRI. COll. MAG. 42*: 16-26.

RAMACHANDRAN, M; T. RAMANATHAN, and C.S. SRIDARAN. 1972. Association of certain morphological characters with yield in *Sesamum Indicum* L. *Mad. Agril. J. 59*: 567-68.

UZO, J. O. 1977. Expressions of hybrid vigour in sesame (*S. indicum L.*) *Diss. Abstr.* in B *27* (8): 3749 B.

WEISS, E. A, 1971. Castor, sesame and safflower. Leonard Hill. London.

Table 1 Correlation coefficients among different characters in parents (P) and hybrids (H)

Character		Plant height	Effective stem length	No. of branches	Capsules on main stem	Capsules per plant	Oil content	Seed yield per plant	Oil yield per plant
Days to flower	P	.939**	.734**	.889**	.090	.755**	—.834**	.679*	.602
	H	.653**	.241	.617**	—.399*	.057	—.619**	—.243	—.396*
Plant height	P		.709**	.898**	.260	.810**	—.711*	.832**	.796**
	H		.767**	.679**	—.156	.391*	—.579**	.021	—.060
Effective Stemlength	P			.616	.133	.567	—.611	.530	.480
	H			.403**	.019	.414**	— 426**	.103	.065
Number of branches	P				.324	.911**	—.889**	.852**	.784**
	H				—.269	.574**	—.506**	.144	.068
Capsules on main stem	P					.606	—.101	.566	.596
	H					.417**	—.326*	.316*	.358*
Capsules per plant	P						—.778**	.937**	.889**
	H						—.048	.695**	.659**
Oil content	P							—.622	—.807
	H							.315**	.467**
Seed yield per plant	P								.990**
	H								.941**

* Significant at 5% ** Sinificant at 1%.

Table values of 'r' for parents (df = 8) are .765 and 632 and for hybrids (df = 43) are .389 and .294 at 1% and 5% respectively.