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Genotypic correlation and path coefficient analysis in sesame (*Sesamum indicum* L.)

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ABSTRACT

A 7×5 line x tester analysis was carried out at the agricultural college and research Institute, Madurai in 2002 to study the genotypic correlations and path coefficient analysis in sesame. Ten characters were investigated *viz.*, days to 50% flowering, plant height, number of branches per plant, number of capsules on main stem, number of capsules on branches, number of capsules per plant, 1000 seed weight, oil content and single plant yield. The results showed that an intensive selection in the positive side for number of capsules on main stem, number of capsules on branches will improve the seed yield since these traits expressed significantly positive correlation with seed yield and among themselves.

KEYWORDS

Sesame;
Genotypic correlation;
Path coefficient analysis.

INTRODUCTION

Sesame (*Sesamum indicum L.)* is an ancient oil-seed crop in India. It is rich in oil (53.53 %) and protein (26.25 %). Sesame oil is characterized for its stability and quality. Yield being the final product of many contribution characters, the efficiency of selection for yield mainly depends on the direction and magnitude of association between seed yield and its components themselves. Hence an attempt was made to study correlation coefficients along with path analysis for isolation of desirable genotypes for the improvement of *sesamum* crop.

MATERIALS AND METHODS

The materials for the present study, including 35 genotypes along with their parents were raised at the Agricultural College and Research Institute, Madurai in 2001. The trial was arranged in a Randomized Block Design with three replications and three rows of 3m long. The row spacing was 30 cm and plant spacing in a row of 30 cm. Days to 50% flowering were recorded and ten randomly plants were selected from each plot at maturity for measuring plant height, number of branches per plant, number of capsules on main stem, number of capsules on branches, number of capsules on main stem, 1000 seed weight, oil content and single plant yield. The genotypic correlations and path coefficient analysis were carried out based on the methods developed by Dewey and Lu(1959)[2].

RESULTS AND DISCUSSION

Genotypic correlation

Yield is a dependable complex entity associated with a number of component characters as a result of

Regular Paper

TABLE 1: Genotypic and phenotypic correlations for yield and yield components

Character		Plant height	Number of branches per plant	Number of capsules on main stem	Number of capsules on branches	Number of capsules per plant	Number of seeds per capsule	1000 seed weight	Oil per cent	Single plant yield
Days to 50	P	-0.292	-0.029	-0.591	-0.623	-0.684	-0.129	-0.460	0.115	-0.582
Percent flowering	G	-0.294	-0.032	-0.626	-0.629	-0.693	-0.130	-0.504	0.119	-0.598
Plant height	P		0.281*	0.341*	0.580*	0.555*	0.599*	0.144	0.466*	0.425*
	G		0.294	0.361*	0.583*	0.561*	0.560*	0.155	0.474*	0.433*
Number of branches per plant	P			0.435*	0.209*	0.306*	0.546*	-0.202	0.250*	0.210*
	G			0.478*	0.210*	0.320*	0.570*	-0.227	0.263*	0.222*
Number of capsules on main stem	P				0.560*	0.797*	0.354*	0.179	0.127	0.500*
	G				0.599*	0.810*	0.375*	0.208*	0.132	0.509*
Number of capusules on branches	P					0.946*	0.373*	0.511*	0.148	0.732*
	G					0.955*	0.375*	0.545*	0.150	0.747*
Number of capsules per plant	P						0.410*	0.442*	0.157	0.728*
	G						0.414	0.476*	0.159	0.736*
Number of seed per capsule	P							-0.066	0.333*	0.386*
	G							-0.068	0.339*	0.394*
1000 seed weight	P								-0.091	0.833*
	G								-0.103	0.870*
Oil per cent	P									0.033
	G									0.037
Single plant yield	P									
	G									

* **Significant at 5% level**

TABLE 2: Direct and indirect effects of different yield attributes on seed yield

S. no.	Character	Days of 50 per cent flowering	Plant height	Number of branches per plant	Number of capsules on main stem	Number of capsules on branches	Number of capsules per plant	Number of seeds per capsule	1000 seed weight	Oil per cent	Single plant yield
1.	Days to 50 Percent flowering	-0.02	-0.011	-0.007	-0.53	-0.89	-0.29	-0.04	-0.42	-0.007	-0.598
2.	Plant height	-0.006	0.042	0.017	0.30	0.53	-0.04	0.19	0.13	-0.03	0.433*
3.	Number of branches per plant	-0.007	0.012	0.057	0.40	0.28	-0.59	0.19	-0.19	-0.01	0.222*
4.	Number of capsules on main stem	-0.014	0.015	0.03	0.84	0.85	-0.581	0.13	0.18	0.06	0.509*
5.	Number of capusules on branches	-0.013	0.025	0.011	0.50	1.04	-0.77	0.13	0.45	-0.009	0.747*
6.	Number of capsules per plant	-0.015	0.024	0.018	0.68	0.66	-0.87	0.14	0.40	-0.019	0.736*
7.	Number of seed per capsule	-0.003	0.024	0.032	0.315	0.53	-0.61	0.34	-0.06	-0.02	0.394*
8.	1000 seed weight	-0.011	0.007	-0.013	0.18	0.67	-0.88	-0.02	0.73	0.006	0.870*
9.	Oil per cent	0.003	0.020	0.015	0.111	0.21	-0.29	0.12	-0.08	-0.06	0.037

***Residual effect: - 0.05; Direct effects are darkened**

interaction of several contributing factors that may be related or unrelated. The genotypic and phenotypic correlations of the investigated characters are shown in (TABLE 1). The genotypic correlations were higher than the phenotypic correlations indicating association between the characters genetically, but the phenotypic value is lessened by the significant interaction of environment and genotype x environment interaction. Seed yield per plant was positively and significantly correlated with, plant height (0.425 and 0.433), number of branches per plant (0.210 and 0.222), number of capsules on main stem (0.500 and 0.509) number of capsules on branches (0.732 and 0.747), number of capsules per plant (0.728 and 0.736), number of seeds per capsule (0.386 and 0.394), 1000 seed weight (0.833 and 0.870) and was observed at both phenotypic and genotypic levels. Similar results were observed by Manivannan(1998)[3]. However the character oil content showed non significant association with seed yield per plant. Plant height had significantly positive

correlations with all other yield attributes except 1000 seed weight at both phenotypic and genotypic levels.

The association of different component characters among themselves and with yield is important for devising a selection for yield, hence splitting the total correlation in to direct and indirect effects of cause as devised by Wright (1921) would give interpretation to the cause of association between the dependent variable like yield and independent variables like, yield components this kind of information will help in selection for breeding programme.

Path co-efficient analysis

Path analysis can provide an effective means of partitioning the correlation coefficient in to direct and indirect coefficients (TABLE 2) of nine independent characters on seed yield. Among the effects of the investigated characters on seed yield per plant, number of capsules on branches showed the highest direct effect (1.04), number of capsules on main stem also had a considerable direct coefficient (0.84), followed by 1000 seed weight (0.73), while plant height, number of branches per plant and number of seeds per capsule displayed low positive direct effects on seed yield. On contrary, low negative direct effects were displayed on seed yield through days to 50% flowering, number of capsules per plant and oil content. Previous results also indicated the number of capsules on main stem, number of capsules on branches[1] and 1000 seed weight[4]on seed yield per plant in sesame. However negative direct effects of number of capsules per plant were also reported.

The forgoing discussion from the analysis of pathways would indicate that number of capsules on branches had very high direct effect on yield. The other yield attributes viz., number of capsules on main stem, seed weight, number of capsules per plant, plant height, number of seeds per capsule had high indirect effect through number of capsules on branches. Therefore, number of capsules on branches is the major character on which selection pressure is to be applied for increasing the yield.

On the outset comprehensive results obtained from the present study clearly indicated that more number of capsules on branches with more seed weight and number of seeds per capsule are outstanding contributions made by the parents for yield per plant in their F_1s.

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