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Trait association and path coefficient analysis for yield and yield attributing traits in sesame *(Sesamum indicum* L).

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Abstract: An experiment was conducted with eighty branched and non branching sesame genotypes to study the association between the yield and yield attributing traits. Observations were recorded on eight traits *viz.*, days to 50 per cent flowering, days to maturity, plant height, number of branches per plant, number of capsules per plant, 100 seed weight, grain yield per plant and oil content. 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. Plant height and number of capsules per plant showed significant and positive correlations with single plant yield at both genotypic and phenotypic levels. The trait plant height and number of capsules per plant showed positive correlation with all the other traits except 100 seed weight where as number of branches per plant showed negative correlation to oil content. The character number of capsules per plant showed high positive direct effects on grain yield per plant. The indirect effect of number of capsules per plant on grain yield through plant height, number of branches per plant, oil content and days to maturity was high.

Key words: Sesame, grain yield, genotypic correlation coefficient and path analysis

Introduction

Sesame *(Sesamum indicum* L.) is one of the important oilseed crops in India. Sesame oil is characterized for its stability and quality. Sesame oil is used as a cooking- oil in southern India. So the production of this important oilseed crop has to be stepped up by evolving a high yielding variety. Yield is a complex quantitative trait, greatly influenced by environmental fluctuations. A study of nature and degree of association of component characters with yield assumes greater importance for fixing up characters that play a decisive role in influencing yield. Correlation coefficient analysis measures the mutual relationship between various characters and is used to determine the component character on which selection can be done for improvement in yield. Path coefficient analysis permits the separation of direct effects from indirect effects and gives more realistic relationship of the characters and helps in effective selection. With this view a study was conducted with eighty branched and non branching sesame genotypes to determine the association between yield and yield components in segregating generation.

Material and Methods

Eighty branched and non branching sesame genotypes were collected from different sources and taken for the study. The crop was raised during *kharif*, 2003 at the Department of Oilseeds, Centre for Plant Breeding and Genetics, TNAU, Coimbatore in a randomized block design with three replications. Each plot consisted of two rows of 4m length spaced at 30 cm between rows and 15 cm between

Table 1. Genotypic (G) and Phenoypic (P) Correlation Coefficients between different characters in sesame

Characters	d	Days to 50% flowering	Plant height (cm)	No.of branches per plant	No.of capsules per plant	100 seed weight (g)	Oil content (%)	Days to maturity	Grain yield per plant (g)
Days to 50% flowering	G	1.000	0.135	0.520	0.116	-0.067	-0.057	0.642*	0.064
	P	1.000	0.125	0.477	0.107	-0.068	-0.055	0.632*	0.062
Plant height (cm)	G		1.000	0.282	0.903**	-0.103	0.418	0.437	0.767**
	P		1.000	0.279	0.888**	-0.096	0.404	0.427	0.757**
No.of branches per plant	G			1.000	0.364	0.154	-0.074	0.559	0.411
	P			1.000	0.355	0.151	-0.063	0.524	0.392
No.of capsules per plant	G				1.000	-0.033	0.411	0.341	0.898**
	P				1.000	-0.026	0.401	0.333	0.891**
100 seed weight (g)	G					1.000	0.043	-0.005	0.162
	P					1.000	0.043	-0.006	0.164
Oil content (%)	G						1.000	0.189	0.433
	P						1.000	0.187	0.427
Days to maturity	G							1.000	0.328
	P							1.000	0.323
Grain yield per plant (g)	G								1.000
	P								1.000

* Significance at P = 5% level ; ** Significance at P = 1% level

Table 2. Direct and indirect effects of different characters towards grain yield at genotypic level in Sesame

Characters	Days to 50% flowering	Plant height (cm)	No.of branches per plant	No.of capsules per plant	100 seed weight(g)	Oil content (%)	Days to maturity	Grain per plant yield (g)
Days to 50% flowering	**-0.11**	-0.02	-0.06	-0.01	0.007	0.006	-0.07	0.064
Plant height (cm)	-0.03	**-0.21**	-0.06	-0.18	0.02	-0.084	-0.09	0.767**
No.of branches per plant	0.06	0.031	**0.11**	0.04	0.02	-0.008	0.06	0.411
No.of capsules per plant	0.12	0.99	0.36	**0.997**	-0.03	0.409	0.34	0.898**
100 seed weight (g)	-0.01	-0.02	0.02	-0.005	**0.15**	0.006	-0.0007	0.162
Oil content (%)	-0.01	0.04	-0.01	0.04	0.003	**0.09**	0.02	0.433
Days to matuirity	0.05	0.03	0.04	0.02	-0.0004	0.013	**0.071**	0.328

Residual effect = 0.3695 Bold figures are direct effects ** Significant at P = 0.01

plants. Normal recommended cultural practices and plant protection measures were followed. Five competitive plants were randomly selected for recording biometrical measurements on eight traits *viz.*, days to 50 per cent flowering, days to maturity, plant height, number of branches per plant, number of capsules per plant, 100 seed weight, grain yield per plant and oil content. Correlation coefficients for yield and yield components were evaluated utilizing the formula suggested by Al-jibouri *et al.* (1958). Further partitioning of correlations into direct and indirect effects by path coefficient analysis was estimated by using the procedure suggested by Dewey and Lu (1959).

Results and Discussion

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 (Table 1). Such results are in concurrence with the results of Ganesh and Sakila (1999). The characters, plant height and number of capsules per plant showed significant and positive correlations with single plant yield at both genotypic and phenotypic levels. Similar results were reported by Pawar *et al.* (2002) and Deepa Sankar and Ananda Kumar (2003) for plant height and number for capsules per plant and Rami Reddy Kumar and Sundaram (2002) for number of capsules per plant. The grain yield was positively correlated with all the other traits but non significant.

The information on the inter correlation between the yield contributing traits showed the nature and extent of their relationship with each other. This will be thelpful for the simultaneous improvement of different characters along with the seed yield in

breeding programmes. Days to 50 per cent flowering had positive correlation with all the other traits except 100 seed weight and oil content both at genotypic and phenotypic level, they showed negative correlation but non significant.

The traits plant height and number of capsules per plant showed positive correlation with all the other traits except 100 seed weight where as number of branches per plant showed negative correlation to oil content. Backiyarani *et al.* (1999) reported positive correlation between number of branches and number of capsules per plant. Negative association may occur due to the competition of two developing structures of the plant for limited measures 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 with each other.

The results of path coefficient analysis based on the genotypic correlation coefficient are presented in table. 2. The character number of capsules per plant showed high positive direct effects on grain yield per plant. The traits number of branches and 100 seed weight showed positive but low direct effects on grain yield per plant. The direct effect of oil content and days to maturity on grain yield was negligible. The indirect effect of plant height, days to 50 per cent flowering, number of branches per plant, 100 seed weight, oil content and days to maturity *via* other traits was not considerable, but the indirect effect of number of capsules per plant on grain yield through plant height, number of branches per plant, oil content and days to maturity was high.

In the present study, the residual effect (0.37) was high in magnitude which showed that some other important yield contributing characters which contributed to yield had to be included. From the above results, it could be inferred that the characters, number of capsules per plant and plant height were to be given prime importance as they revealed a significant positive correlation coefficient and a high positive direct effect compared to other traits.

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