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Association analysis in sesame (*Sesamum indicum* L.)

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Abstract

Sesame is regarded as queen of oil seeds by the users because of its superior quality. Association analysis of twenty one hybrids of sesame developed through Line X Tester mating designs revealed. Seven lines and three testers were crossed and the F₁ and parents were evaluated for seven quantitative character. Seven lines viz., FFAT 08 2, FFAT 08 16, FFAT 08 18, FFAT 08 20, FFAT 08 31, FFAT 08 41, FFAT 08 45 and three testers CO 1, SVPR 1 and TMV 6 were involved in this study. The 21 F₁ hybrids were grown in a randomized block design with three replications. Spacing between the rows was 30 cm and seeds were dibbled at the distance of 30 cm with in rows. Observations were recorded for seven quantitative characters viz., plant height, number of branches per plant, number of capsules per plant, capsule length, number of seeds per capsule, 100 seed weight and seed yield per plant. The mean values of ten plants selected at random in each replication were used for the statistical analysis. The path analysis revealed that 100 seed weight, number of seeds per capsule, capsule length and plant height were the most yield attributes as can be seen from their high positive direct effects and significant positive genotypic association with seed yield. The indirect effect of number of branches per plant through capsule length and 100 seed weight were positive and high. Other traits had low negative and negligible indirect effect. The residual effect was low magnitude which showed that most of the important characters contributing to seed yield have been utilized. Thus, from the present study it is concluded that more emphasis should be given on number of capsules per plant, capsule length, number of seeds per capsule and 100 seed weight during selection programme.

Keywords: Association analysis, path analysis

Introduction

Sesame is regarded as queen of oil seeds by the users because of its superior quality. The complex nature of quantitative traits like yield necessarily requires the knowledge about its relationship with other components. Estimation of correlation coefficients between yields and its components gives a guide lines to the breeder for making proper selections to evolve suitable plant types. Such preliminary information which is most essential is lacking in sesame. The present investigation was undertaken correlation coefficient in relation to yield and its components.

Materials and Methods

Seven lines and three testers were crossed and the F₁ and parents were evaluated for seven quantitative character. Seven lines viz., FFAT 08 2, FFAT 08 16, FFAT 08 18, FFAT 08 20, FFAT 08 31, FFAT 08 41, FFAT 08 45 and three testers CO 1, SVPR 1 and TMV 6 were involved in this study. The 21 F₁ hybrids were grown in a randomized block design with three replications. Spacing between the rows was 30 cm and seeds were dibbled at the distance of 30 cm with in rows. Timely operations were carried out to control pest and diseases. Observations were recorded for seven quantitative characters viz., plant height, number of branches per plant, number of capsules per plant, capsule length, number of seeds per capsule, 100 seed weight and seed yield per plant. The mean values of ten plants selected at random in each replication were used for the statistical analysis.

Results and Discussion

Data on genotypic and phenotypic correlation coefficients between different characters are presented in Table1. The genotypic correlation coefficient were found to be higher than phenotypic correlation coefficients in all the characters studied. This indicated that the expression of high genetic association was hindered by the environment. Seed yield per plant was found to be significant and positively associated with all the characters studied. Similar results were obtained by Kumeresan and Nadarajan (2002) [3] and Deepa Sankar and Ananda Kumar (2003) [2].

The inter correlation between the yield components revealed significant and positive association of plant height with number of branches per plant and number of capsules per plant, capsule length, number of seeds per capsule and 100 seed weight. Regarding number of capsules per plant it was positively associated with number of capsules per plant, capsule length, number of seeds per capsule and 100 seed weight. Similar results have been obtained by several workers. Deepa Sankar and Ananda Kumar (2003) [2] and Bharthi Kumar (2005) [1]. The capsule length had significant and positive with number of seeds per capsule and 100 seed weight. The number of seeds per capsule had positive and significant association with 100 seed weight.

From the above discussion, it may be concluded that an intensive selection in the positive side for all the characters will improve seed yield. Since these traits expressed significant and positive correlation among themselves and seed yield per plant.

The path analysis devised by Wright (1921) [5] provides an effective measure to find out the direct and indirect effects when more number of characters are included in the correlation study. Perusal of Table 2 revealed that 100 seed weight, number of seeds per capsule, capsule length and plant height were the most yield attributes as can be seen from their high positive direct effects and significant positive genotypic association with seed yield. The result is in agreement with the earlier reports Kumerasan and Nadarajan (2002) [3] and Deepa Sankar and Ananda Kumar (2003) [2]. However, the indirect effect of plant height through capsule length was

positive and high. The similar results were reported by Kumerasan and Nadarajan (2002) [3].

The indirect effect of number of branches per plant through capsule length and 100 seed weight were positive and high. Other traits had low negative and negligible indirect effect. This findings is in accordance with findings of Kumerasan and Nadarajan (2002) [3] and Pauer *et al.*, (2002) [4]. Capsule length had negative and number of branches per plant had indirect effects through plant height, number of capsules per plant, number of seeds per capsule and 100 seed weight. The similar findings reported by Yingzhong and Yishon (2002) [6]. The indirect effect of character number of seeds per capsule through number of branches per plant and number of capsules per plant were negative. This is in accordance with findings of Yingzhong and Yishon (2002) [6]. Contrary to this, positive and high indirect effects were observed through capsule length. 100 seed weight had negative and moderate through plant height, number of branches per plant, number of capsules per plant. Contrary to this, positive and high, positive and moderate indirect effects were observed through capsule length and number of seeds per capsule respectively. This result is in corroboration with findings of Kumerasan and Nadarajan (2002) [3] and Pauer *et al.*, (2002) [4].

The residual effect was low magnitude which showed that most of the important characters contributing to seed yield have been utilized. Thus, from the present study it is concluded that more emphasis should be given on number of capsules per plant, capsule length, number of seeds per capsule and 100 seed weight during selection programme.

Table 1: Phenotypic (p) and genotypic (g) correlation coefficients between yield and different traits in sesame

Characters		Plant height	Number of branches per plant	Number of capsules per plant	Capsule length	Number of seeds per capsule	100 seed weight	Seed yield per plant
Plant height	P	1.000	0.340	0.470*	0.363	0.232	-0.092	0.415*
	G	1.000	0.523*	0.492*	0.441	0.273	-0.139	0.498*
No. of branches per plant	P		1.000	0.636*	0.550*	0.503*	0.425*	0.541*
	G		1.000	0.935*	0.961**	0.700**	0.769**	0.920**
No. of capsules per plant	P			1.000	0.730*	0.602*	0.461*	0.518*
	G			1.000	0.944*	0.680**	0.521*	0.678**
Capsule length	P				1.000	0.575**	0.479*	0.419
	G				1.000	0.683**	0.535*	0.729*
No. of seeds per capsule	P					1.000	0.498*	0.615**
	G					1.000	0.613**	0.864**
100 seed weight	P						1.000	0.419
	G						1.000	0.656**

Table 2: Direct and indirect effect of different characters on seed yield in sesame

Characters	Plant height	Number of branches per plant	Number of capsules per plant	Capsule length	Number of seeds per capsule	100 seed weight	Seed yield per plant
Plant height	0.676	-0.197	-0.354	0.334	0.129	-0.095	0.498
Number of branches per plant	0.356	-0.376	-0.673	0.739	0.330	0.546	0.92
Number of capsules per plant	0.333	-0.351	-0.719	0.726	0.321	0.369	0.678
Capsule length	0.298	-0.361	-0.352	0.769	0.323	0.379	0.729
Number of seeds per capsule	0.814	-0.263	-0.361	0.525	0.472	0.435	0.864
100 seed weight	-0.904	-0.289	-0.263	0.411	0.289	0.709	0.656

Diagonal Bold indicates direct effect Residual Effect: 0.25

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