Electronic Journal of Plant Breeding, 9 (3) : 1206 - 1212 (Sep 2018) DOI: 10.5958/0975-928X.2018.00148.5
ISSN 0975-928X

Research Article

Correlation and path analysis studies in hybrids of Line x Tester for yield and yield component traits in sesame (*Sesamum indicum* L .)

P. Vinoth[1], E. Murugan[2], M. Arumugam Pillai[3], M. L. Mini[4]
[1] M.Sc., (Agri.) Student [Genetics and Plant breeding],
[2]Professor & Head Agricultural Research Station, Kovilpatti,
[3]Professor & Head, Dept. of Plant breeding and Genetics,
[4]Assistant Professor. Department of Plant breeding and Genetics, Agricultural College and Research Institute. Killikulam, Vallanadu, Tamil Nadu Agricultural University, Tamil Nadu, India.
E-Mail: vno0504@gmail.com

(Received:16 Aug 2018; Revised:08 Oct 2018; Accepted:08 Oct 2018)

Abasract
The experimental material comprised of 12 sesame genotypes of six lines (black/brown seed) and six testers (white seed). Crosses were made in ' Line x Tester ' fashion and thirty six hybrids were developed. The 36 F_1s along with parents were utilized for this study to assess the relationship and effects between yield and its components traits. Biometrical data were recorded on twelve characters *viz.*, days to fifty percent flowering, plant height, number of branches per plant, number of capsules on main stem, number of capsule per plant, capsule length, number of seeds per capsule, height of first node from base, height of first capsule, thousand seed weight, single plant yield and oil content. Correlation analysis revealed that there was a positive significant association of seed yield with number of capsule per plant. Path analysis revealed that the trait number of capsule per plant exhibit high positive direct effect on single plant. From this study it was observed that number of capsule per plant made the most contribution to seed yield and should therefore be used as a selection index for sesame improvement.

Key words
Sesame, Hybrids, Correlation, Path analysis, Yield.

Introduction

Sesame (*Sesamum indium* L.) is Queen of oilseed crop (Weiss, 1971) because of its high oil content. It is one of the ancient and traditional oilseed crops cultivated in India for its good quality oil. Not only it is a source of edible oil, the seed itself provides a nutritious food for human. Besides, it had a excellent characteristic feature of having resistance to oxidative deterioration. The seed yield is a complex quantitative trait controlled by polygenes and highly influenced by the environment. Selection based on yield is not effective. The change in one trait influences the change over several others traits. The knowledge on the relationship between yield and its component traits are helpful to the plant breeder in selecting a desirable strains. The study on nature and degree of association of component traits with yield assumes greater importance for fixing desirable trait which play a decisive role in influencing the yield. Path coefficient analysis permits the separation of direct effects from indirect effect and gives more realistic relationship of the characters and helps in effective selection. Hence, the present investigation was carried out to gather information on character association and direct and indirect effect of crosses between white seeded testers with black and brown seeded lines for yield, oil content and oil quality from the cross.

Materials and Methods

Thirty six hybrids were obtained from the crosses involved crossing six lines (black/brown seeded type) with six testers (white seeded type) through Line x Tester fashion, the method developed by Kempthorne (1957). Thirty six hybrids were raised along with parents (Table. 1) in a randomized block design replicated twice at Agricultural Research Station, Kovilpatti, Tamilnadu. The parents and hybrids were sown in each row of 4 meter length with a spacing of 30 cm. between rows and 30 cm. between plants. Recommended package of practices with need based plant protection measures were given to raise good crop. The association study was made to assess the relationship among yield with twelve traits *viz.*, days to fifty percent flowering, plant height (cm), number of branches per plant, number of capsules on main stem, number of capsule per plant, capsule length (cm), number of seeds per capsule, height of first node from base, height of first capsule, thousand seed weight (g), single plant yield (g) and oil content (%). In each replication ten randomly selected plants were

taken and observed on twelve quantitative traits were in yield and oil content was estimated in lab. The association analysis was made with mean obtained from the 12 traits. The genotypic correlation done for yield and yield component characters in sesame are

presented in (Table 2). 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). The direct and indirect effect done for yield and yield component characters in sesame are presented in (Table 3 & Figure 1).

Results and Discussion

Correlation studies help in evaluating the direction and magnitude of yield and yield components and within yield contributing characters. Yield is a dependable complex inherited character as a result of interaction of several contributing attributes that may be related or unrelated. In the present study single plant yield had positive and significant association with number of capsule per plant (Sobundharrya *et.al.* 2017) and positive association with plant height, number of primary branches, number of capsule on main stem, capsule length, number of seeds per capsule thousand seed weight and oil content. Inter-correlation among the yield component study is helpful for the simultaneous improvement of two or more characters that are directly related to each other. Days to fifty percent flowering exhibited a positive and significant association with height of first node and height of capsule. The trait plant height showed a positive and significant association with number of primary branches, number of capsule on main stem and number of capsules per plant. Such results are in concurrence with the results of Ahmed and Ahmed (2012) and Teklu *et al*. (2014). The association of primary branches exhibited positive significant association with plant height and height of first capsule. Number of capsule on main stem registered positive significant association with plant height and number of capsules per plant. Number capsule per plant showed a very high positive significant association with plant height, number of capsule on main stem and single pant yield. Similar results were reported by Azeez and Morakinyo (2011) and Ahmed and Ahmed (2012). Height of first node showed a positive significant association with days to 50 per cent flowering and height of first capsule. Number seeds per capsule exhibited a positive significant association with thousand grain. This was in conformity with the earlier findings of Adeoti *et al*. (2012). The residual effect was about (3.6). This result clearly indicate that the crosses differ in the contribution of seed yield and yield contributing traits. Hence separate selection indices are necessary for selection of genotype for improvement of yield.

In the present study path analysis revealed that the trait number of capsule per plant alone exhibited very high positive direct effect on single plant yield. This was in uniformity with Chandra Mohan (2011) and Abate and Mekbib (2015). Capsule length showed moderate and positive direct effect on single plant yield. The other traits like plant height, number of primary branches and 1000 seed weight had positive low direct effect. The indirect effect also indicated that the number of capsule per plant showed high positive association with single plant yield through number of capsule on main stem, plant height and capsule length.

Based on the correlation studies, it is inferred that the trait number of capsule per plant had a very high positive and significant direct association with single plant yield. Whereas the height of first node, height of first capsule exhibited positive significant inter correlation with each other. According to path analysis, number of capsule per plant showed very high direct positive effect on single plant yield. Hence, in sesame the trait number of capsule per plant should be given prime importance during the selection programme for the improvement of yield.

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 DOI: 10.5958/0975-928X.2018.00148.5

Table 1. List of parents

S.NO	LINES	S.NO	TESTERS
1.	Co 1	1.	SVPR 1
2.	KMR 77	2.	VRI 3
3.	IC 199438	3.	Hima
4.	Chandana	4.	ACM–14-004
5.	Punjab Til	5.	ACM–14-005
6.	Rajeswari	6.	ACM–14-007

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Table 2. Genotypic correlation coefficient of different characters with single plant yield

	DFF	PH	NPB	NCMS	NCP	HFN	HFC	CL	NSC	1000	OC
DFF											
PH	-0.15										
NPB	0.237	0.344*									
NCMS	-0.219	0.385**	0.040								
NCP	-0.265	0.427**	0.159	0.604**							
HFN	0.356	0.107	0.203	-0.142	-0.310*						
HFC	0.53	0.176	0.398*	-0.293	-0.284	0.767**					
CL	-0.053	0.081	0.295	0.184	0.223	0.038	-0.013				
NSC	-0.275	-0.046	-0.138	0.058	0.078	-0.025	-0.315	0.137			
1000	-0.123	0.017	0.076	0.109	0.103	-0.079	-0.268	0.117	0.518**		
OC	0.143	-0.097	-0.050	-0.164	0.056	-0.072	0.101	-0.158	0.183	0.051	
SPY	-0.088	0.259	0.171	0.214	0.571**	-0.249	-0.179	0.241	0.005	0.115	0.025

* Significant at 5% level ** Significant at 1% level

DFF	Days of 50 % flowering	HFC	Height of first capsule (cm.)
PH	Plant height (cm.)	CL	Capsule length (cm.)
NPB	Number of primary branches	NS/C	Number of seeds / capsule
NCMS	Number of capsules on main stem	1000	1000 seed weight (g.)
NC/P	Number of capsules / plant	SPY	Single plant yield (g.)
HFN	Height of first node (cm.)	OC	Oil content (%)

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Table 3. Direct and indirect effect of different characters on single plant yield

	DFF	PH	NPB	NCMS	NCP	HFN	HFC	CL	NSC	TSW	OC
DFF	**0.058**	-0.009	0.014	-0.013	-0.015	0.021	0.031	-0.003	-0.016	-0.007	0.008
PH	-0.009	**0.060**	0.021	0.023	0.026	0.006	0.011	0.005	-0.003	0.001	0.006
NPB	0.004	0.006	**0.019**	0.001	0.003	0.004	0.007	0.006	-0.003	0.001	0.001
NCMS	0.056	-0.099	-0.010	**-0.256**	-0.155	0.036	0.075	-0.047	-0.015	-0.028	0.042
NCP	-0.175	0.283	0.105	0.400	**0.663**	-0.205	-0.188	0.148	0.052	0.068	0.037
HFN	-0.028	-0.008	-0.016	0.011	0.024	**-0.078**	-0.060	-0.003	0.002	0.006	0.006
HFC	-0.042	-0.014	-0.031	0.023	0.022	-0.061	**-0.079**	0.001	0.025	0.021	-0.001
CL	-0.008	0.013	0.047	0.029	0.035	0.006	-0.002	**0.159**	0.023	0.019	-0.025
NSC	0.028	0.005	0.014	-0.006	-0.008	0.003	0.032	-0.015	**-0.103**	0.053	-0.013
TSW	-0.009	0.001	0.006	0.008	0.007	-0.006	-0.019	0.008	0.037	**0.072**	0.004
OC	-0.005	0.003	0.002	0.005	-0.002	0.002	0.001	0.005	0.006	0.002	**-0.032**
SPY	-0.088	0.259	0.171	0.214	0.571	-0.249	-0.179	0.241	0.005	0.115	0.025

Bold numbers are indicate direct effect

Residual effect = 3.6

DFF	Days of 50 % flowering
PH	Plant height (cm.)
NPB	Number of primary branches
NCMS	Number of capsules on main stem
NC/P	Number of capsules / plant
HFN	Height of first node (cm.)
HFC	Height of first capsule (cm.)
CL	Capsule length (cm.)
NS/C	Number of seeds / capsule
1000	1000 seed weight (g.)
SPY	Single plant yield (g.)
OC	Oil content (%)

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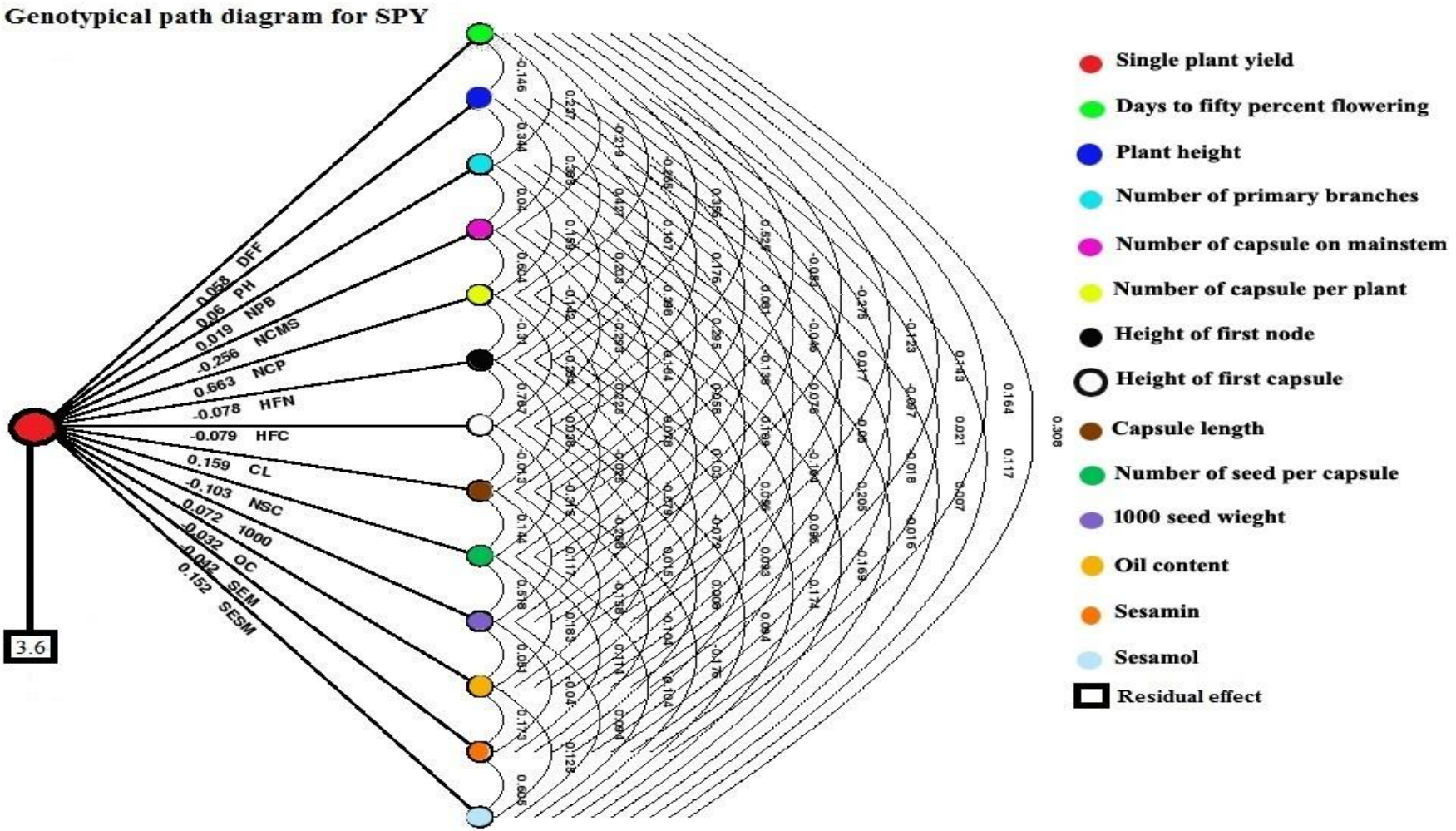

Fig. 1. Path analysis