Madras Agric. J., 87(1-3): 74 - 76 January - March 2000
https://doi.org/10.29321/MAJ.10.A00421

Cause and effect relationship between seed yield and its components in sesame

R. KARUPPAIYAN AND P. RAMASAMY
School of Genetics, Tamil Nadu Agricultural University, Coimbatore

Abstract : Genotypic correlation and path co-efficient analysis were studied in 80 F_1 hybrids derived from 20 (lines) x 4 (testers) mating design for 10 quantitative traits. Significant correlation with seed yield was exerted by number of capsules, plant height, number of branches, test weight, days to maturity, days to 50 per cent flowering and oil content. Number of capsules had the highest positive direct effect on seed yield. The indirect effect of number of branches, plant height, days to maturity, days to per cent flowering and test weight on seed yield via number of capsules was maximum and positive. (*Key Words : Sesame, Correlation, Path Analysis)*

Yield is a complex polygenic character which depends upon a number of independent components that would contribute directly or indirectly. Therefore, selection of superior genotypes based on yield alone is not effective, but other components related to yield should also be considered. The knowledge of correlation helps in determining the components of complexity, while the path analysis provides an effective means of partitioning the total correlation into direct and indirect effects. As this investigation would be useful to formulate selection criteria, correlation and path analysis was studied in sesame.

Materials and Methods

Twenty lines and four testers were selected from a wide range of germplasm maintained at Regional Research Station, Vridhachalam and crosses were effected in L x T fashion during rabi 1995 at Cotton and Oilseeds Breeding Station Farm, Tamil Nadu Agricultrual University, Coimbatore. The resultant 80 F_1 hybrids along with their 24 parents were sown in randomised block design with three replications during Kharif, 1996. Each entry was raised in 3 rows of 3 m length. The spacing adopted was 30 x 30 cm. Observations were recorded on 10 randomly selected healthy plants in each entry in each replication. Genotypic correlation between seed yield per plant and its nine yield components viz., days to 50 per cent flowering, days to maturity, plant height, number of branches and number of capsules per plant, number of seeds per capsule, test weight, harvest index and oil content were worked out as per Johanson *et al.* (1955). Path analysis as suggested by Dewey and Lu (1959) was used to partition the genotypic correlation co-efficients into direct and indirect effects.

Results and Discussion

The genotypic correlation co-efficients between yield and its components are presented in Table 1. Seed yield was positively correlated with number of capsules, plant height, number of branches, test weight, days to maturity, days to 50 per cent flowering and oil content. Hence these traits could be appropriately used as selection criteria for improvement of yield in sesame. The findings are in agreement with the results of Chandrasekara and Ramana Reddy (1993).

Days to 50 per cent flowering, days to maturity, plant height, number of branches, number of capsules and test weight were with significant correlation among themselves. Thus, improvement of any of these traits, would simultaneously improve seed yield.

The major set back in improving oil productivity is the negative association between seed yield and oil content in most of the oilseed crops (Reddy, 1986 and Kavitha, 1995). However, in the present study seed yield had significant positive association with oil content, which is an encouraging information and therefore it would be possible to improve the oil content simultaneously by selecting genotypes with high seed yield.

The result also indicated that the number of seeds per capsules exerted significant negative correlation with number of branches, but it had no significant association with seed yield. Therefore selection for increased number of seeds per capsule would adversely affect the seed yield. Test weight had significant correlation with harvest index and by applying selection pressure on harvest index, it is possible to increase the test weight and intum seed yield. Similar findings were reported by Thirugnanakumar (1991) and Balan (1994) as well.

The genotypic correlation co-efficient of seed yield with other traits were further partitioned into direct and indirect effects and the results are

Table 1. Genotypic correlation co-efficients in parents and their F_1s in Sesame

	Days to maturity	Plant height	Branches/ plant	Capsules/ plant	Seeds/ capsule	Test weight	Harvest Index	Oil content	Seed yield / plant
Days to 50% flowering	0.793**	0.435**	0.468**	0.281**	-0.191	0.279**	-0.097	-0.238*	0.281**
Days to Maturity		0.547**	0.636**	0.372**	-0.209*	0.442**	0.134	-0.129	0.416**
Plant height			0.571**	0.492**	-0.083	0.485**	0.035	-0.118	0.567**
Branches/ plant				0.649**	-.0337**	0.312**	-0.002	-0.073	0.508**
Capsules / plant					-0.312**	0.277**	-0.064	0.074	0.770**
Seeds / capsule						-0.076	0.072	-0.029	0.036
Test Weight							0.194*	0.054	0.497**
Harvest Index								-0.027	0.148
Oil Content									0.197*

* and ** Significant at P = 0.05 and 0.01 level respectively.

Table 2. Genotypic path coefficient in parents and F_1's of Sesame

	Days to 50% flowering	Days to maturity	Plant height	Branches/ plant	Capsules/ plant	No. of Seeds/ capsule	Test weight	Harvest Index	Oil content	Genotypic correlation with yield
Days to 50% flowering	0.015	0.050	0.057	-0.021	0.207	-0.055	0.056	0.012	-0.040	0.281**
Days to Maturity	0.012	0.062	0.072	-0.029	-0.275	-0.060	0.088	0.017	-0.021	0.416**
Plant height	0.006	0.034	0.132	-0.026	0.363	-0.024	0.097	0.004	-0.020	0.567**
Branches/ plant	0.007	0.040	0.075	-0.045	0.478	-0.097	0.062	0.000	-0.012	0.508**
Capsules / plant	0.004	0.023	0.065	-0.029	0.738	-0.090	0.055	0.008	0.023	0.770**
No. of Seeds / capsule	-0.003	-0.013	-0.011	0.015	-0.230	0.289	-0.015	0.009	-0.005	0.036
Test Weight	0.004	0.028	0.064	-0.014	0.204	-0.022	0.200	0.024	0.009	0.497**
Harvest Index	0.001	0.008	0.005	0.000	-0.047	0.021	0.039	0.125	-0.005	0.148
Oil Content	-0.003	-0.008	-0.016	0.003	0.055	-0.008	-0.011	0.003	0.167	0.197*

Bold figures denotes direct effect
* and ** significant at 5% and 1% respectively
Residual effect = 0.188

presented in Table 2. It is evident that the direct contribution of number of capsules was maximum (0.738) on seed yield followed by number of seeds per capsule (0.289), test weight (0.200), oil content (0.167), plant height (0.132), days to maturity (0.062) and days to 50 per cent flowering (0.015).

The genotypic correlation co-efficient of number of branches with seed yield was significantly positive but it had negative direct effect on seed yield. The positive association was due to the indirect effect of number of capsules through number of branches and hence for effective selection, more emphasis should be given for number of capsules rather than number of branches.

Number of branches, plant height, days to maturity, days to 50 per cent flowering and test weight recorded high positive indirect effect on seed yield via number of capsules. Number of seeds per capsule, harvest index and oil content had predominantly direct effect and their indirect effects through other variable were either negative or negligible.

The present study clearly indicated that due importance should be given for number of capusles, test weight, plant height, oil content, days to 50 per cent flowering and days to maturity since they have recorded significant correlation with high direct effect on seed yield. Selection for any one of these traits might result in simultaneous improvement in other traits.

Aknowledgment

The authors are grateful to Dr. M. Rangaswamy and Dr. N. Sunderasan, School of Genetics, Tamil Nadu Agricultural University, Coimbatore for their inspiring guidance throughout the period of study.

Reference

Balan, A. (1994). Genetic improvement of sesame (Sesamum indicum L.) through biometrical approaches. Ph.D. Thesis, Tamil Nadu Agric. Univ., Coimbatore.

Chandrasekara, B. amd Ramana Reddt, C. (1993). Association analysis for oil yield and dry matter production in Sesame (Sesamum indicum L.) *Ann. agric.*, **14** : 40-44.

Deway, D.R. and Lu, K.H. (1959). A correlation and path coefficient analysis of components of crested wheat grass seed production. *Agron J.* **51** : 515-518.

Johanson, H.W., Robinson, H.F. and Comstock, R.E. (1955). Estimates of genetic and environmental variability in soyabean. *Agron. J.* **47** : 314-318.

Kavitha, M. (1995). Genetic analysis of amphidiploid (c_3) and amphidiploid x amphidiploid (F_2) of wide crosses in Sesame (Sesamum indicum L.) M.Sc., (Ag.) Thesis, Tamil Nadu Agric. Univ., Coimbatore.

Reddy, O.U.K. (1986). Studies on variability, character association and genetic divergence in Sesamum in dicum L. M.Sc., (Ag.) Thesis, Tamil Nadu Agricultural Univ., Coimbatore.

Thirugnanakumar, S. (1991). Seed genetics in relation to Sesame (Sesamum Indicum L.) Ph.D. Thesis, Tamil Nadu Agric. Univ., Coimbatore.

(Received : June 1997 ; Revised : September 1998)