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EFFECT OF FNVIRONMENT ON PATH-COEFFICIENT ANALYSIS IN SESAME (*SESAMUM INDICUM* L)

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Genotypic correlation coefficients and path-coefficient analysis were studied in 84 genotypes of sesame *(Sesamum Indicum* L*)* under three environments. Grain yield per plant had significant positive correlation with number of effective branches per plant, number of capsules per plant, capsule length and number of seeds per 5 capsules over the environments studied. The magnitude of correlation coefficients, direct and indirect effects of various yield contributing traits differed from location to location suggesting considerable amount of genotype x environment interaction in the expression of various charactrs. Path analysis revealed that number of capsules per plant was the most important component trait contributing to seed yield due to its positive direct and indirect effect on seed yield in all the environments under study.

The importance of path-coefficient analysis has now been well recognised by plant breeders. In sesame (*Sesamum indicum* L) most of the studies made so far in this aspect are based on single environment only. Since the inter-relationships like other genetic estimates are known to vary from environment to environment and depending on the material used, the genetic association has to be determined for the genetic material under the given set of environmental conditions before planning an efficient breeding programme. Thus to have a thorough understanding of genetic relationship between characters under study, it is essential to study association analysis under different environmental conditions. In the present investigation an attempt has been made to study the influence of environment on direct and indirect effects of various yield attributes.

MATERIAL AND METHODS

Eighty four genotypes of sesame comprising 28 parents, 14 F_1 s and 14 F_2 s, 14 B_1 s and 14 B_2 s were grown in randomised block design with three replications. Plant to plant distance of 20 cm was maintained in 4 m long row spaced 60 cm apart. Two rows each of parent and F_1, 3 rows each of B_1 and B_2 and 4 rows each of F_2 were planted in each replication. The experiment was conducted at 3 locations viz., Udaipur (L_1), Sumerpur (L_2) and Banswara (L_3) during kharif 1981. Ten plants from each parent and F_1 and 20 plants from each B_1 B_2 and F_2 were randomly, selected for recording data on days to flowering, days to maturity, plant height, plant, height upto 1st capsule, number of effective branches per plant, number of capsule per plant, capsule length, number of

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Table 1 Path coefficient analysis indicating direct (diagonal) and indirect effect of variables on seed yield of sesame in different environments

Correlated variables	Location	Days to flowering	Days to maturity	Plant height	Plant height upto 1st capsule	No of effective branches/plant	No. of capsules/plant	Capsule length	No. of seeds/5 capsules	1000-seed weight	Genotypic correlation with seed yield
Days to flowering	L1	-0.924	-0.334	0.495	0.257	0.033	-0 041	0.108	0.115	0.011	-0.267**
	L2	0.037	-0.081	-0.003	0 020	0.010	-0.061	0.095	-0.102	-0.090	-0.002
	L3	0.012	0.033	0 016	0 007	-0 076	-0.079	0.025	-0.007	-0.001	-0 068
Days to maturity	L1	-0.743	-0.416	0 352	0 233	0 040	-0.051	0.101	0.111	0.012	-0.361**
	L2	0.022	-0.121	-0.038	0.045	0 012	0.102	0.077	-0 057	0.141	0.192
	L3	0 099	0.043	0.016	0.007	-0.051	-0.002	0 024	0.005	-0.001	0.050
Plant height	L1	-0.609	-0.195	0.751	0.179	-0 020	0.018	0.031	-0 075	0.011	0.185
	L2	0.006	-0.036	-0.117	0.071	0.031	0.474	-0 052	0.070	0 052	0.494**
	L3	0.004	0.014	0.047	0.011	-0.095	0 454	-0.009	0.067	-0.001	0.495**
Plant height upto 1st capsule	L1	-0.691	-0.281	0.391	0 344	0.030	-0.009	0 083	0 077	0.008	-0 047
	L2	0.004	-0.038	-0 063	0 132	0 008	-0.059	0.023	-0.037	0.049	0.020
	L3	0.003	0.013	0.021	0.025	-0.051	0.270	0.007	-0.016	0.000	0.272**
No. of effective branches/plant	L1	0.185	0 100	0.091	0.062	-0.167	0 220	-0 048	-0.028	-0 002	0 288*
	L2	0.082	-0.017	-0 047	0.014	-0.078	0.730	-0.034	0.020	0.027	0.776**
	L3	0.005	0.013	0.028	0.008	-0.161	0 414	0 008	0.012	0.000	0.329**
No. of capsules/plant	L1	0.124	0.068	0.260	-0 010	-0.119	0.311	-0.045	-0.120	0.003	0.472**
	L2	-0.002	-0.012	-0.059	-0.008	0.061	0.942	-0.065	0.059	0 014	0.930**
	L3	-0.001	0.000	0.024	0.007	-0.073	0.912	-0.015	0 062	0 000	0.915**
Capsule length	L1	0 717	0.300	-0.168	-0.205	-0.058	0.101	-0.140	-0.205	-0 003	0.337**
	L2	-0.016	0.047	-0.034	-0.017	-0.015	0 338	-0.180	0.122	-0.060	0.215*
	L3	-0.007	-0.024	0.010	-0.004	0.029	0.342	-0.043	0.076	0.000	0.379**
No. of seeds/5 capsules	L1	0.311	0.134	0.165	-0.078	-0.014	0.109	-0.084	-0.343	0.008	0 210*
	L2	-0.016	0.032	-0.041	-0.025	0.008	0.281	-0.111	0 198	-0.053	0.273**
	L3	-0.001	0.003	-0.020	-0.002	-0.012	0.352	-0.020	0.161	-0.001	0.499**
1000-seed weight	L1	-0.351	-0.161	0.395	0.093	0.010	0.036	0.016	-0 095	0.030	-0.024
	L2	0.013	-0.073	-0 028	0.030	0.010	0.060	0 050	-0 049	0.214	0.227*
	L3	0.003	0.022	0.016	0.001	-0.039	0.188	0.010	0.030	-0.001	0.230*

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

seeds per 5 capsules, 1000 seed weight and seed yield per plant. Coefficient analysis were worked out according to the method suggested by Dewey and Lu (1959).

RESULTS AND DISCUSSION

The estimates of direct and indirect effect of various yield attributes under varying environments are presented in Table 1. The estimates vary considerably from environment to environment revealing the fact that the involvement of genotype x environment interaction in the expression of various traits studied which pointed out to the necessity of multienvironmental approach for such studies. Results based on single environment can be very misleading.

Seed yield per plant showed a significant positive correlation with number of effective branches per plant, number of capsule per plant, capsule length and number of seeds per 5 capsule in all the three locations. Consistent association over the environments suggested genetic basis for this relationship and lesser influence of environment on these estimates. Days to flowering and days to maturity exhibited nagative significant association with seed yield per plant only at L^1. 1000- seed weight revealed significant positive relationship with seed yield per plani at L_2 and L_3. In the presence of such inconsistence results it is difficult to draw any type of conclusion.

Seed yield is a multiplicative end product of many yield components which contribute to it directly as well as indirectly through each other. Thus correlation studies alone may not give a clear picture of the contribution to yield by its components. In conjuction with correlations, path-coefficient analysis may give a clear picture (Dewey and Lu, 1959). The path-coefficients were also affected by the environment similar to the correlations (Table 1). The capsule length and number of effective branches per plant seemed to make negative direct contribution to grain yield in all the three locations. The significant positive correlations were due to its indirect contribution through number of capsules per plant. 1000 - seed weight (L_3), plant height upto 1st capsule (L_3) and plant height (L_3) possessed almost no direct contribution to seed yield, but positive significance in relationships were due to indirect effect of number of capsules per plant. From the present study it is apparent that number of capsules per plant was the most important trait contributing to seed yield due to its consistance in high direct and indirect contribution over the environments. Hence as such is important in programmes aimed at improving seed yield of sesame. Dixit (1975), Gupta (1976) and Gupta and Gupta (1977) have also emphasized on similar observations made in their studies regarding maximum contribution of number of capsules per plant to seed yield.

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EFFECT OF BUTACHLOR, THIOBENCARB AND PENDIMETHALIN ON *ECHINOCHLOA COLONUM* IN DRY SEEDED BUNDED RICE (Var.) *BHAVANI*

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A field experiment was conducted in dry seeded bunded rice for two seasons at Tamil Nadu Agricultural University, Coimbatore. The intensity of annual grass *Echinochloa colonum* during the first and second monsoon was 52 and 165/sq.m under moderately clay soil with 1.3 per cent organic matter. Either individual application of herbicides viz. butachlor 1.0 kg a.i/ha, thiobencarb 1.0 kg a.i/ha and pendimethalin 0.75 kg a.i/ha at 8 d.a.s or as mixture with propanil 2.00 kg a.i/ha at 16 d.a s was effective in controlling the above grass weed and recorded low weed dry matter production. Eighth day application of pendimethalin gave higher mean grain yield of 4012 kg/ha. It was on par with butachlor, thiobencarb applied on eigth day and herbicides mixtures at 16 d.a.s and superior to twelfth day application of herbicides.

Direct seeding in upland bunded condition is practised in the East coast areas of Tamil Nadu and the area under cultivation is about 2 lakh hectares. It is the only possible method in arees of uncertain distribution of rainfall or inadequate availability of irrigation water. Weeds compete with rice primarly for nutrients, water and light. The extent of yield reduction due to weeds is estimated to be over 50 per cent in direct sown upland condition. In the case of upland condition, the failure of germination due to moisture stress, uneven stand and establishment and slow growth rate of rice provide room for annual grass *Echinochloa colonum*. It is difficult to identify the above weed with rice crop in the early stage and

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