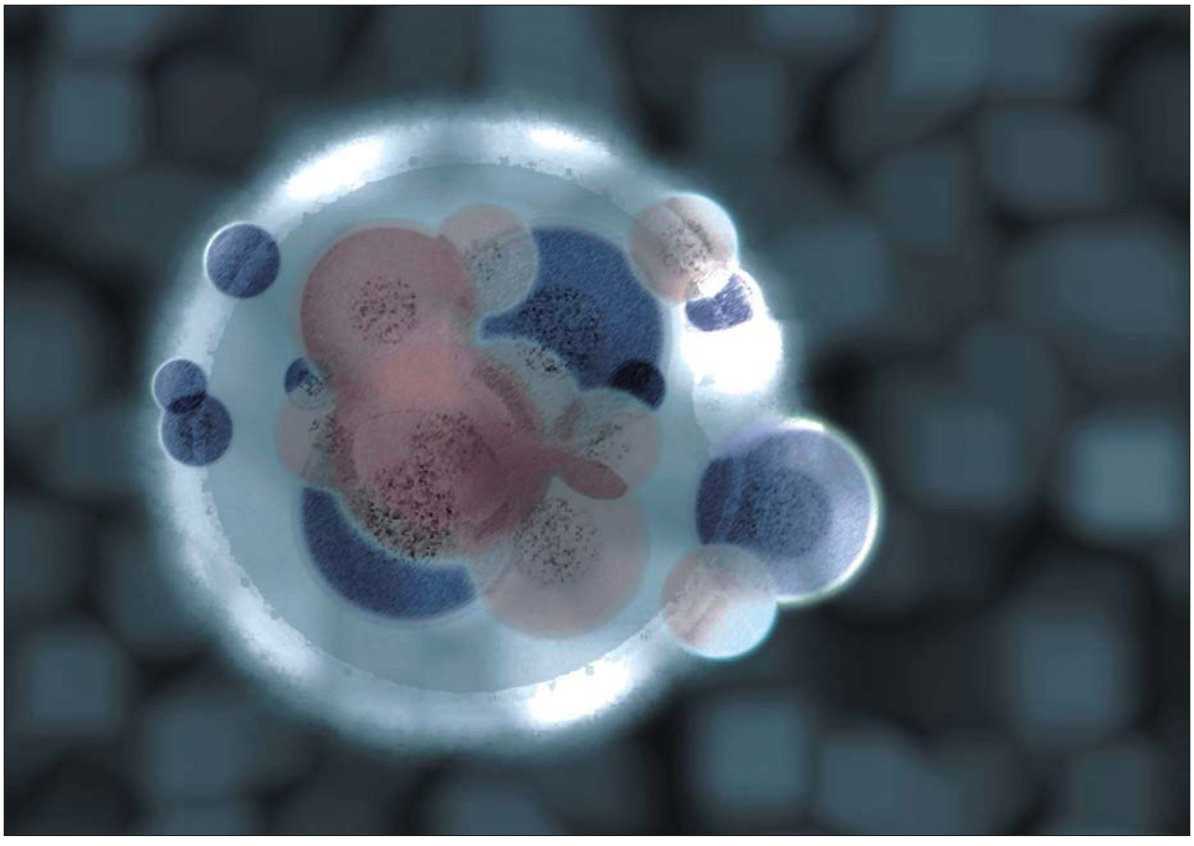

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Characters Association and Path Coefficient Analysis In Sesame (*Sesamum indicum* L.)

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Abstract: The extent of amenable genetic variability and association of important agronomic characters were determined in a set of 21 genotypes of sesame under Faisalabad conditions. The extent of genetic coefficient of variability, heritability and genetic advance as percent of mean in that order were 18.47,95.68,37.23; 89.04, 97.02, 1.33; 26.00, 94.49, 55.23; 12.81, 94.15, 25.61; 16.10, 99.02, 32.93 and 32.45, 99.97, 66.67 percent for plant height, number of branches per plant, number of capsules per plant, number of seed per capsule, 1000-seed weight and seed yield per plant, respectively.
The number of capsules per plant contributed the highest towards seed yield followed by 1000-seed weight and plant height. Selection emphasis on these traits could result in improvement of seed yield.

Key words: Sesame genotypes, genetic studies, seed yield improvement, Pakistan

Introduction

Sesame crop is being used for multifarious purposes. Its oil, which is about 50% in seed is of superior quality nearly matching olive oil. Besides, it contains about 22% protein of which 90% is assimilable. Its cake contains 12% ash which is rich in phosphorus that is why it is highly concentrated nutrient food. Seed is used as raw food as well as in confectionery, sweets, bakery products and margarine. In industries, its oil is used in the preparation of soap, perfume, carbon papers and typewriter ribbons.

Considering its broad spectrum range of consumption there is continuous need of increasing yield potential to make it more profitable crop. Information on the extent of genetic variability and role of important yield determining traits is of paramount importance for their skilful engineering in new ideotype exploiting the breeding material in hand. Several researchers i.e. Bishwas and Akbar (1995), Bhombe *et al.* (1994), Le and Zhang (1993), Mishra *et al.* (1995), Subramanian and Subramanian (1994) and Vanisri *et al.* (1994) have employed different genetic parameters and worked out association analysis to generate information for planned breeding programme. Their results differ widely for trait to trait which could be attributed due to differences in genetic material used for the study.

Materials and Methods

Twenty one genotypes of sesame viz; TS-3, 92001, 92002, 93001, 93002, Til-89 and their 15 crosses, made in half diallel fashion, were sown in 1998 in RCBD with four replications at Oilseeds Research Institute, Faisalabad keeping plot size 4x1.5 m and plant to plant distance 15 cm. respectively. The experiment was fertilized at 60:60 NP kg/ha and four irrigation were applied. At maturity data on ten competitive randomly selected plants were recorded for plant height (cm.), number of branches per plant, number of capsules per plant, number of seed per capsule, 1000-seed weight and seed yield per plant. The data were subjected to standard statistical techniques for analysis of variance to establish the level of significance among genotypes according to Steel and Torrie (1980). Genotypic coefficient of variability (GCV), phenotypic coefficient of variability (PCV), heritability estimates in broad sense (h^2), genetic advance (G.A.) as percent of means, genotypic (rg) and phenotypic (rp) correlation coefficients were determined as described by Singh and Chaudhary (1979) whereas path coefficient analysis was made according to Dewey and Lu (1959).

Results and Discussion

The study of Table 1 depicted that differences between PCV and GCV were very low for all characters studied which showed minimal environmental effects in the development of these parameters. The range of mean values for all traits was high and genotypic mean squares were significant. GCV was the highest in case of number of branches per plant followed by seed yield per plant, number of capsules per plant, plant height, 1000-seed weight and number of seed per capsule. Heritability was also higher than 90% for all parameters showing heritable variation among genotypes. Heritability for seed yield per plant, 1000-seed weight and number of branches per plant was comparatively higher than other traits studied. Genetic advance (GA) as percent of mean for seed yield per plant, number of capsules per plant, 1000-seed weight and plant height was higher signalling that these parameters were under control of additive genes. Bhombe *et al.* (1994) and Bishwas and Akbar (1995) reported more or less similar findings.

Correlation coefficients of various traits are exhibited in Table 2. Number of capsules per plant had highly significant correlation with seed yield followed by plant height, 1000-seed weight and number of branches per plant. Mishra *et al*. (1995), Ranganatha *et al*. (1994), Subramanian and Subramanian (1994), Le and Zhang (1993) and Vanisri *et al.* (1994) concluded same in their research.

Number of capsules per plant directly contributed the maximum towards seed yield per plant followed by 1000-seed weight, number of seed per capsule and plant height as shown in Table 3. Moreover, number of capsules per plant contributed indirectly via all other parameters studied except plant height in the development of seed yield per plant. Similarly 1000-seed weight imparted significant effect on seed yield via number of capsules per plant and plant height. Plant height significantly positively in the development of seed yield

Table 1: Range, TMS, GCV, PCV, h^2 and G.A. As percent of Mean of 21 genotypes of sesame for six parameters

Parameter	Range	TMS	GCV (%)	PCV (%)	h^2 (%)	G.A. as % of mean
Plant height(cm)	75.20-141.60	1308.67**	18.47	18.88	95.68	37.23
Number of branches per plant	0.07-5.13	7.41**	89.04	90.39	97.02	1.33
Number of capsules per plant	19.47-59.47	358.05**	26.00	26.75	94.49	55.23
Number of seed per capsule	58.20-81.70	220.96**	12.81	13.20	94.15	25.61
1000-seed weight(g)	2.52-4.03	0.84**	16.10	16.18	99.02	32.93
Seed yield per plant(g)	5.00-16.00	29.54**	32.45	32.45	99.97	66.67

** = Highly significant. TMS = Treatment mean square. GCV = Genotypic coefficient of variability
PCV = Phynotypic coefficient of variability. h^2 = Heritability. GA = Genetic advance.

Table 2: Genotypic and phenotypic correlation coefficients of various seed yield components with seed yield

Parameter		Plant height	Number of pods per plant	Number of seed per pod	1000-seed weight	Seed yield per plant
Number of branches	rg	0.849**	0.407 N.S	-0.570**	0.845**	0.445*
per plant	rp	0.817**	0.401 N.S	-0.549**	0.827**	0.439*
Plant height	rg	-	0.669**	-0.400 N.S	0.841**	0.712**
	rp	-	0.652**	-0.368 N.S	0.817**	0.697**
Number of capsules	rg	-	-	0.041 N.S	0.538*	0.949**
per plant	rp	-	-	0.049 N.S	0.515*	0.926**
Number of seed	rg	-	-	-	-0.611**	0.039 N.S
per capsule	rp	-	-	-	-0.599**	0.038 N.S
1000-seed weight	rg	-	-	-	-	0.627**
	rp	-	-	-	-	0.624**

N.S = Non-significant * = Significant ** = Highly significant

Table 3: Direct and indirect effects of five agronomic characters on seed yield of sesame

Parameter	Number of branches per plant	Plant height	Number of capsules/plant	Number of seed/capsule	1000-seed weight	Seed yield per plant
Number of branches per plant	(-0.202)	0.108	0.281	0.129	0.386	0.445*
Plant height	-0.172	(0.127)	0.462	-0.090	0.385	0.712**
Number of capsules per plant	-0.082	0.085	(0.691)	0.009	0.246	0.949**
Number of seed per capsule	0.115	-0.051	0.028	(0.226)	-0.279	0.039 N.S
1000-seed weight	-0.171	0.107	0.371	-0.138	(0.457)	0.627**

* = Significant** = Highly significant. N.S= Non-significant.

per plant via number of capsules per plant and 1000 seed weight. Number of seed per capsule indirectly contributed positive effect via plant height and number of capsules per plant. Although number of seed per capsule had optimum direct effect on seed yield but it was minimized via indirect negative effects of 1000 seed weight and plant height. Similar results had been observed by Subramanian and Subramanian (1994) and Vanisri *et al.* (1994).

From the result of this study it is concluded that effective selection for superior yielding genotypes is possible considering number of capsules per plant, 1000-seed weight and maximum plant height.

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