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Correlation and path analysis study direct and indirect contribution of different component characters on seed yield sesame (*Sesamum indicum* L.)

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Abstract
Twenty-five genotypes including one check were studied for character association for yield and its components. Correlation study estimates gives some idea as to the relative importance of each of the components to final seed yield, although it is an established fact that nature and magnitude of associations would vary with the composition of the material. In present study simple correlation co-efficient were estimated at both the phenotypic and genotypic levels in twenty-five genotypes. It was observed that the magnitude of association varied among the genotypes. Correlation studies revealed that, seed yield per plant had significant positive association with plant height, number of capsules per plant, number of seed per capsule, capsule length, capsule width and 1000 seed weight and non-significant positive association with number of primary branches per plant point out that the importance of these characters in selection programme for selecting high yielding genotypes in sesame.

Keywords: Correlation, path analysis, sesame, phenotypic and genotypic

Introduction
A significant oilseed crop in warm tropical and subtropical areas is sesamum. 20–30% protein and 40–60% semi-drying oil are both present in sesame seeds. Its protein is extremely digestible and its oil exhibits anti-oxidative qualities. Sesame has a variety of functions, including as an ingredient in food production, a decorative component in food production, and a highly nutritional component in bread, cakes, pastry, and halva. As a result, its market demand is still strong and rising. India, China, Myanmar and Sudan are the main sesame producing countries, accounting for almost 68% of production genetic variability exists. Correlation studies, together with path analysis provide a better understanding of the association of different characters with grain yield. Path coefficient analysis separates direct effects from indirect effect through other related characters by partitioning the correlation coefficient (Dixit and Dubey, 1984) [4]. The relationship of yield with other characters is of great significance while formulating any selection programme for crop improvement. Selection based on only seed yield in white seeded sesame without considering the component characters is not effective since seed yield is a dependent character influenced by several other characters (Thouseem *et al*., 2022) [11].

Material and Methods
The present investigation was undertaken to study genetic variability and character associated studies in twenty-five genotypes of sesame (*Sesamum indicum* L.) including one check (Table 1). The experiment was conducted on experimental farm of AICRP on safflower, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani (Maharashtra) during *Summer*, 2020-2021. The experimental material was evaluated in Randomized Block Design (RBD) with two replications under rainfed condition at experimental farm of AICRP on safflower, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani (Maharashtra). All the recommended cultural practices and packages were applied for growing healthy and good crop, in each entry, five plants are randomly selected from each replication and following observations were recorded for days to 50 percent flowering, plant height, primary branches per plant, days to maturity, number of capsules per plant, capsule length, capsule width, number of seeds per capsule, 1000 seed weight, seed yield per plant. To understand the degree of relationship between different characters the genotypic and phenotypic correlation coefficients were carried out from respective variances and co-variances as suggested by Johnson *et al*. (1955) [6].

The genotypic correlation coefficient among yield and its attributes were classified into direct and indirect effects with the path coefficient analysis as outlined by Wright (1921) [4] and Dewey and Lu (1959) [3].

Results and Discussion

In the present study, significant and positive correlation of seed yield per plant was recorded (Table 2) with traits *viz*., plant height, number of capsules per plant, number of seed per capsule, capsule length, capsule width, 1000 seed weight. Days to 50% flowering has exhibited positive and significant association with days to maturity (0.984, 0.782) at both genotypic and phenotypic level. Plant height has shown positive and significant association with number of capsules per plant (0.537, 0.533), number of seeds per capsule (0.753, 0.608), capsule width (0.703, 0.487), 1000 seed weight (0.652, 0.496) and seed yield per plant (0.984, 0.483) at both genotypic and phenotypic level. Number of primary branches per plant exihibited positive and significant association with number of capsules per plant (0.446, 0.366), number of seeds per capsule (0.415, 0.362), capsule length (0.423, 0.338) at both genotypic and phenotypic level. Number of capsules per plant has shown positive and significant association with number of seeds per capsule (0.954, 0.764), capsule length (0.774, 0.639) capsule width (0.571, 0.371), 1000 seed weight (0.711, 0.593) and seed yield per plant (1.098, 0.622) at both genotypic and phenotypic level. Number of seeds per capsule has shown positive and significant association with capsule length (0.683, 0.522), capsule width (0.749, 0.616), 1000 seed weight (0.754, 0.596) and seed yield per plant (1.160, 0.702) at both genotypic and phenotypic level. Capsule length has exhibited positive and significant association with capsule width (0.480, 0.333), 1000 seed weight (0.510, 0.346) and seed yield per plant (0.688, 0.601) at both genotypic and phenotypic level. Capsule width has shown positive and significant with 1000 seed weight (0.768, 0.603) and seed yield per plant (0.983, 0.608) at both genotypic and phenotypic level. 1000 seed weight has exhibited positive and significant association with seed yield per plant (1.028, 0.606) at both genotypic and phenotypic level. Similar result obtained by Vekaria *et al* (2015) [12] for days to 50 per cent flowering, Vivek *et al* (2022) [12] for number of productive branches, number of capsules per plant, number of seeds per capsule and days to maturity, Abate and Mekbib (2015) [1] for primary branches per plant and Patil and Lokesha (2018) [8] for number of capsules per plant. Partitioning of yield and yield components into direct and indirect effects (Table no. 3 and 4) revealed that presence of positive direct effect on seed yield for traits like plant height (0.984, 0.483), number of capsules per plant (1.098, 0.622), number of seed per capsule (1.160, 0.702), capsule length (0.688, 0.601), capsule width (0.983, 0.608) and 1000 seed weight (1.028, 0.606) at both genotypic and phenotypic level. Similar result were obtained by Gangadhara *et al*. (2012) [5], Parameshwarappa *et al*. (2009) [7], Sudhakar *et al*. (2007) [10], Chandramohan (2014) [2] and Shekhawat *et al*. (2013) [9]. Maximum positive direct effect seed yield recorded by number of seed per capsule (1.160, 0.702) at genotypic and phenotypic level and maximum negative direct effect recorded by days to maturity (-0.266, -0.217) at both genotypic and phenotypic level whereas, minimum flowering (-0.116, -0.154) at both genotypic and phenotypic level. The genotypic residual effect was 0.82 whereas. Phenotypic residual effect was -0.48positive direct effect recorded by number of primary branches per plant (0.575, 0.2269) at genotypic and phenotypic level and minimum negative direct effect recorded by days to 5%. high and negligible residual effect was observed in present study, it shows that there is some other factors that contribute to yield besides the character studied.

Table 1: Analysis of variance (ANOVA) for ten characters in sesame

Sr. No.	Source of variation	df	Days to 50% flowering	Plant height	No. of primary branches/plant	No. of capsules/ plant	No. of seeds/ capsule	Capsule length	Capsule width	1000 Seed weight	Days to maturity	Seed yield/ plant
1	Replication	1	3.790	34.789	0.023	0.037	6.175	0.033	0.001	0.025	3.204	0.468
2	Genotypes	24	13.000**	218.630**	0.676**	53.629**	39.555**	0.145**	0.016**	0.209**	6.965**	2.368**
3	Error	24	1.739	38.140	0.037	8.707	9.614	0.025	0.002	0.033	3.086	0.875

** Significant at 1% level of probability or level of significance

Table 2: Genotypic and phenotypic correlation coefficient analysis in twenty-five genotypes of Sesame

Characters		Days to 50% flowering	Days to maturity	Plant height (cm)	Number of primary branches per plant	Number of capsules per plant	Number of seeds per capsule	Capsule length (cm)	Capsule width (cm)	1000 Seed weight (g)	Seed yield per plant (g)
Days to 50% flowering	G	1.000	0.984**	-0.345*	-0.040	-0.474**	-0.347**	-0.134	-0.148	-0.051	-0.116
	P	1.000	0.782**	-0.178	-0.025	-0.312*	-0.256	-0.148	-0.100	-0.056	-0.154
Days to maturity	G		1.000	-0.365**	-0.184	-0.486**	-0.466**	-0.143	-0.310*	-0.232	-0.266
	P		1.000	-0.305*	-0.102	-0390**	-0.277	-0.122	-0.192	-0.200	-0.217
Plant height (cm)	G			1.000	0.309*	0.537**	0.753**	0.203	0.703**	0.652**	0.984**
	P			1.000	0.248	0.533**	0.608*	0.156	0.487**	0.496**	0.483**
Number of primary branches per plant	G				1.000	0.446**	0.415**	0.423**	0.174	0.110	0.575**
	P				1.000	0.366**	0.362**	0.338*	0.152	0.067	0.269
Number of capsules per plant	G					1.000	0.954**	0.774**	0.571**	0.711**	1.098**
	P					1.000	0.764**	0.639**	0.371**	0.593**	0.622**
Number of seeds per capsule	G						1.000	0.683**	0.749**	0.754**	1.160**
	P						1.000	0.522**	0.616**	0.596**	0.702**
Capsule length (cm)	G							1.000	0.480**	0.510**	0.688**
	P							1.000	0.333*	0.346*	0.601**

Capsule width (cm)	G								1.000	0.768**	0.983**
	P								1.000	0.603*	0.608**
1000 Seed weight (g)	G									1.000	1.028**
	P									1.000	0.606**
Seed yield per plant (g)	G										1.000
	P										1.000

Table 3: Direct and indirect effects genotypic level of yield components on seed yield in Sesame

Characters	Days to 50% flowering	Days to maturity	Plant height	No. of primary branches/plant	No of capsule / plant	No of seeds / capsule	Capsule length	Capsule width	1000 Seed weight	Seed yield / plant
Days to 50% flowering	1.383	-3.502	3.099	-1.791	-0.288	-8.072	5.678	-1.612	-3.324	-0.116^{NS}
Days to maturity	2.405	0.951	4.929	-2.885	-0.456	-12.853	9.072	-2.589	-5.350	-0.266^{NS}
Plant height	1.055	-2.443	3.262	-1.151	-0.174	-4.779	3.727	-1.003	-2.104	0.984**
No. of primary branches/plant	0.745	-1.747	1.407	-1.233	-0.124	-3.535	2.589	-0.755	-1.581	0.575**
No of capsule / Plant	0.788	-1.816	1.400	-0.818	-2.601	-3.299	2.546	-0.737	-1.515	1.098**
No of seeds / capsules	0.796	-1.844	1.384	-0.838	-0.119	-0.171	2.623	-0.734	-1.536	1.160**
Capsule length	1.106	-2.573	2.133	-1.213	-0.181	-5.183	-0.111	-1.096	-2.278	0.688**
Capsule width	1.029	-2.405	1.880	-1.158	-0.172	-4.751	3.592	0.204	-2.066	0.983**
1000 Seed weight	1.153	-2.701	2.143	-1.318	-0.192	-5.402	4.055	-1.123	-0.661	1.028**

Table 4: Direct and indirect effects phenotypic level of yield components on seed yield in Sesame

Characters	Days to 50% flowering	Days to maturity	Plant height	No. of primary branches/plant	No. of capsule / plant	No. of seeds / capsule	Capsule length	Capsule width	1000 Seed weight	Seed yield / plant
Days to 50% flowering	1.210	-3.285	0.664	-0.045	-0.579	2.612	3.925	1.488	2.326	-0.154
Days to maturity	1.603	1.841	1.090	-0.074	-0.959	4.330	6.489	2.443	3.807	-0.217
Plant height	0.596	-2.006	-1.371	-0.030	-0.415	1.858	2.575	1.009	1.565	0.483**
No. of primary branches/plant	0.511	-1.717	0.377	0.432	-0.346	1.536	2.241	0.823	1.269	0.269
No. of capsule / plant	0.438	-1.486	0.349	-0.023	-0.722	1.464	2.074	0.755	1.206	0.622**
No. of seeds / capsules	0.511	-1.736	0.405	-0.026	-0.379	0.181	2.343	0.897	1.384	0.702**
Capsule length	0.639	-2.163	0.466	-0.032	-0.446	1.948	1.051	1.057	1.641	0.601**
Capsule width	0.633	-2.128	0.477	-0.031	-0.424	1.948	2.761	1.213	1.660	0.608**
1000 Seed weight	0.685	-2.298	0.513	-0.033	-0.470	2.084	2.973	1.150	-0.050	0.606**

Conclusion

The present investigation it may be concluded that seed yield had significant association in desired direction with plant height, number of capsules per plant, number of seeds per capsule, capsule length, capsule width and 1000 seed weight. Path coefficient analysis revealed that the trait seed yield per plant have exhibited significantly highest positive direct effect on number of seeds per capsule followed by number of capsules per plant, plant height, capsule width, capsule length and number of primary branches per plant at genotypic level only. At phenotypic level, the results of path analysis revealed that the trait seed yield per plant have highest positive and direct effect on number of seeds per capsule followed by number of capsules per plant, capsule width, capsule length, plant height and number of primary branches per plant estimated positively.

References

1. Abate M, Mekbib F. Assessment of genetic variability and character association in Ethiopian low altitude sesame (*Sesamum indicum* L.) genotypes. Journal of Advanced Studies in Agricultural, Biological and Environmental Sciences. 2015;2(3):55-66.
2. Chandramohan Y. Variability and genetic divergence in sesame (*Sesamum indicum* L.). International Journal of Applied Biology and Pharmaceutical Technology. 2014;5(3):222-225.
3. Dewey DR, Lu KH. A correlation and path analysis of component of crested wheat grass seed production. Agronomy Journal. 1959;51:515-518.
4. Dixit P, Dubey DK. Path analysis in lentil (*Lens culinaris Medic*.). Lens Newslett. 1984;11(2):1517.
5. Gangadhara K, Chadraprakash J, Rajesh AM, Gireesh C, Jaggal Somappa, Yethish KR. Correlation and path coefficient analysis in sesame (*Sesamum indicum* L.). Bioinfolet Journal. 2012;9(3):303-310.
6. Johnson HW, Robinson HF, Comstock RE. Genotypic and Phenotypic correlation in soyabean and their implications selection. Agronomy Journal. 1955;47:314-18.
7. Parmeshwarappa SG, Palakshappa MG, Salimath PM, Parameshwarappa KG. Studies on genetic variability and character association in germplasm collection of sesame (*Sesamum indicum* L.). Karnataka Journal of Agricultural. Science. 2009;22(2):252-254.
8. Patil M, Lokesha R. Estimation of genetic variability, heritability, genetic advance, correlation and path analysis in advanced mutant breeding lines of Sesame (*Sesamum indicum* L.). Green Farming. 2018;9(2):257-260.
9. Shekhawat RS, Meena SK, Singh B. Genetic divergence analysis in sesame. Indian Research Journal of Genetics and Biotechnology. 2013;5(2):105-110.
10. Sudhakar N, Sridevi O, Salimath P. Variability and character association analysis in sesame (*Sesamum indicum* L.). Journal of Oilseeds Research. 2007;24(1):56-58.
11. Thouseem N, Arya K, Gayathri G, Anju Mariam Joseph.

Correlation and path analysis for seed yield and its attributing traits in white seeded sesame (*Sesamum indicum* L.). The Pharma Innovation Journal. 2022;11(7):1293-1297.
12. Vekaria DM, Dobariya KL, Patel MB, Rajani CJ. Genetic variability, correlation and path analysis in F_2 generation of sesame (*Sesamum indicum* L.) Green farming. 2015;6(4):682-686.
13. Vivek Kumar, Sima Sinha, Sweta Sinha, Ravi Shankar Singh, Singh SN. Assessment of genetic variability, correlation and path analysis in sesame (*Sesamum indicum* L.). Electronic journal of plant breeding. 2022;13(1):208-215.
14. Wright S. Correlation and causation. Journal of Agricultural Research. 1921;20:557-585.