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Correlation analysis for seed yield and its related attributes in genotypes of sesame (*Sesame indicum* L.)

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Abstract
At the Experimental Farm of AICRP on Safflower, Vasantrao Naik Marathwada, the current study was conducted to examine the correlation coefficients between the seed yield and yield contributing features in 30 genotypes of sesame. In summer 2022-2023, Krishi Vidyapeeth, Parbhani (Maharashtra). Three replications of a randomized block design were used to conduct the current experiment. At the genotypic and phenotypic levels, respectively, the seed yield per plant has shown a significant and positive correlation with plant height, number of capsules per plant, number of seeds per capsule, capsule length, and 1000 seed weight.

Keywords: Significant, positive, relationship, correlation, and sesame

Introduction
From roughly 40° N latitude, one of the most significant oil seed crops in mild, temperate, and tropical countries is sesame (*Sesamum indicum* L.). Although cross-pollination can range from 5 to over 50%, it typically self-pollinates (Pathirana, 1994) [7]. It is a member of the Tubiflorae (Pedaliaceae) order of family. One of the most popular nicknames for it is "queen of oil crop." It is grown in more than 50 countries across the globe. Despite the crop's African origins, India is thought to be the primary hub of genetic variation (Maiti *et al.*, 2012) [4]. Common names for sesame include gingelly, til, and tila. Because to its high oil content (38%–54%), protein (18%–25%), calcium, phosphorus, oxalic acid, and superior seed oil characteristics, sesame is known as the “Queen of oilseeds”. Because lignans (sesamin, sesaminol, and sesamolinol) have a remarkable antioxidant effect and can withstand oxidation, sesame seed oil has a long shelf life. In order to intelligently choose breeding procedures for evolving high yielding varieties, it is necessary to understand the mode of inheritance of the yield components, their correlation with each other, and the association between each component and yield (Robinson *et al.*, 1951 and Johnson *et al.*, 1955) [13, 3]. This is why the current investigation was conducted.

Materials and Methods
In the summer of 2022–2023, the experiment was carried out on the AICRP experimental farm on safflower at Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maharashtra. Thirty sesame germplasm collections made up the study's material. Three replications of the experimental material were assessed using Randomized Block Design (RBD). For the purpose of documenting observations, five plants were randomly chosen from each genotype in each replication. The average value of every characteristic was calculated using the measurements made on certain plants. Observations were recorded on traits *viz.*, days to 50 percent flowering, plant height (cm), primary branches per plant, number of capsules per plant, capsule length (cm), number of seeds per capsule, 1000 seed weight (g), days to maturity and seed yield per plant (g). The genotypic and phenotypic correlation coefficients were calculated from the corresponding variances and co-variances to determine the degree of link between various features. The correlation was computed using the formulas proposed by Johnson *et al.* (1955) [3].

Results and Discussion
Determining the nature of the relationship between various features and yield per plant is essential for a successful selection procedure. At both the genotypic and phenotypic levels, the essential link between various characteristics and yield per plant was ascertained using

correlation coefficient analysis. Thirty genotypes of sesame were used in the correlation analysis for nine features in order to calculate the interrelationship between various variables and yield per plant at the genotypic and phenotypic levels. Correlation estimations were compared to the tabulated value at the 5% and 1% level of significance to assess their significance. Nine features from among 30 genotypes have genotypic and phenotypic association coefficients shown in Table, and the corresponding correlation matrix is shown in Figures 1 and 2.

In present investigation seed yield per plant has recorded the significant and positive association with plant height, number of capsules per plant, number of seed per capsule, capsule length, 1000 seed weight, at both genotypic and phenotypic level respectively. These results are in conformity with earlier works of Nisha B Patel *et al*. (2023) [6]. Seed yield recorded positive and significant association with, capsule per plant, plant height and 1000 seed weight at both genotypic and phenotypic level this is conformity with Vinoth *et al*. (2018) [11], Navneetha *et al*. (2019) [5] and Disowja *et al*. (2020) [1].

The character days to 50 percent flowering has exhibited positive and significant association with days to maturity (0.830, 0.752) at both genotypic and phenotypic level. Similar results were obtained by NB Patel *et al*., (2023) [6] for days to maturity. The character days to maturity has shown negative and significantly associated with plant height (-0.441, -0.412), capsule length (-0.986, -0.255), 1000 seed weight (-0.272, -0.211) and number of seeds per capsule (-0.347, -0.257) at both genotypic and phenotypic level.

The trait plant height has shown positive and significant association with capsule length (0.989, 0.296), 1000 seed weight (0.598, 0.480), number of branches per plant (0.437, 0.383), number of seeds per capsule (0.562, 0.418) and seed yield per plant (0.496, 0.449) at both genotypic and phenotypic level, respectively. Plant height has exhibited positive and significant association with number of capsules per plant (0.261) at genotypic level only. Similar results were obtained by Nisha B Patel *et al*. (2023) [6] for number of branches per plant, number of capsules per plant and seed yield per plant. Capsule length showed positive and significant association with seed yield per plant. These results are in accordance with Ismaila and Usman (2014) [2].

The trait, 1000 seed weight has exhibited positive and significant association with number of seeds per capsule (0.837, 0.507) and seed yield per plant (0.902, 0.666) at both genotypic and phenotypic level, respectively. 1000 seed weight has exhibited positive and significant correlation with number of capsules per plant (0.276) at genotypic level only. These results are in conformity with the results obtained by Patil and Lokesha (2018) [8], Sasipriya *et al*. (2018) [9], Umamaheshwari *et al*. (2019) [10] and Nisha B Patel *et al*. (2023) [6]. The trait, number of primary branches per plant has exhibited positive and non-significant association with number of seeds per capsule (0.196, 0.130) and seed yield per plant (0.189, 0.140) at both genotypic and phenotypic level, respectively. This result was in agreement with result of Umamaheshwari *et al*. (2019) [10].

The character, number of seeds per capsule has shown positive and significant association with number of capsules per plant (0.501, 0.329) and seed yield per plant (0.748, 0.500) at both genotypic and phenotypic level, respectively. These results are accordance with the findings of Vivek *et al*., (2022) [12] and Nisha B Patel *et al*. (2023) [6] for seed yield per plant. The trait, number of capsules per plant has shown positive and significant association with seed yield per plant (0.283, 0.230) at both genotypic and phenotypic level, respectively. Similar results as mentioned above were observed by Vivek *et al*., (2022) [12] and Nisha B Patel *et al*. (2023) [6] for seed yield per plant.

Table 1: Genotypic and phenotypic correlation coefficient analysis in thirty genotypes of Sesame

Characters		Days to 50% flowering	Days to maturity	Plant height	Capsule length	1000 Seed weight	Number of branches	Number of seeds per capsule	Number of capsules per plant	Seed yield per plant
Days to 50% flowering	G	1.000	0.830**	-0.275**	-0.986**	-0.141	-0.127	-0.307**	-0.182	-0.091
	P	1.000	0.752**	-0.252*	-0.210*	-0.042	-0.112	-0.219*	-0.148	-0.098
Days to maturity	G		1.000	-0.441**	-0.986**	-0.272**	-0.152	-0.347**	-0.228*	-0.222*
	P		1.000	-0.412**	-0.255*	-0.217*	-0.109	-0.257*	-0.193	-0.195
Plant height	G			1.000	0.989**	0.598**	0.437**	0.562**	0.261*	0.496**
	P			1.000	0.296**	0.480**	0.383**	0.418**	0.195	0.449**
Capsule length	G				1.000	0.974**	-0.010	0.959**	0.462**	0.981**
	P				1.000	0.425**	0.080	0.394**	0.256*	0.311**
1000 Seed weight	G					1.000	0.183	0.837**	0.276**	0.902**
	P					1.000	0.127	0.507**	0.177	0.666**
Number of branches	G						1.000	0.196	-0.152	0.189
	P						1.000	0.130	-0.117	0.140
Number of seeds per capsule	G							1.000	0.501**	0.748**
	P							1.000	0.329**	0.500**
Number of capsules per plant	G								1.000	0.283**
	P								1.000	0.230*
Seed yield per plant	G									1.000
	P									1.000

*Significant at 5 percent level, **Significant at 1 percent level

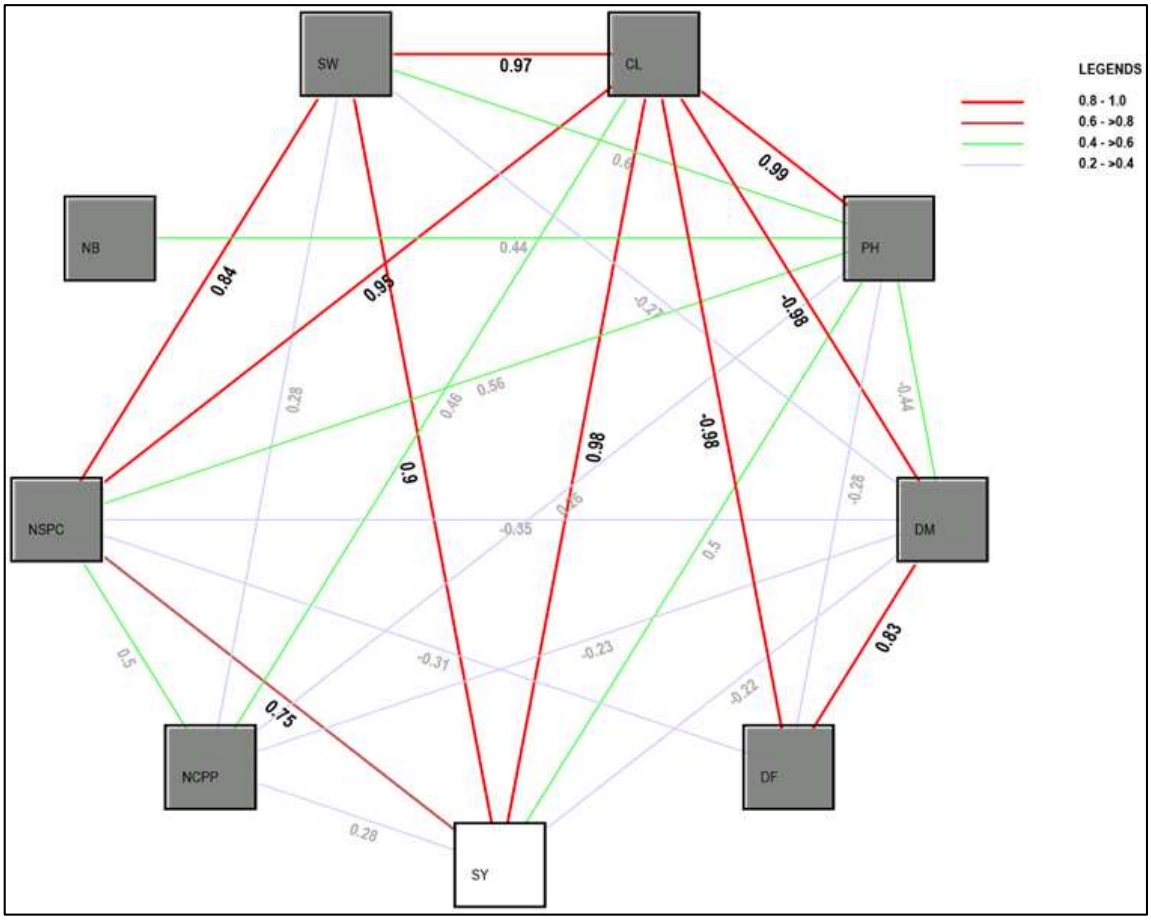

Fig 1: Genotypic correlation matrix for nine characters in sesame

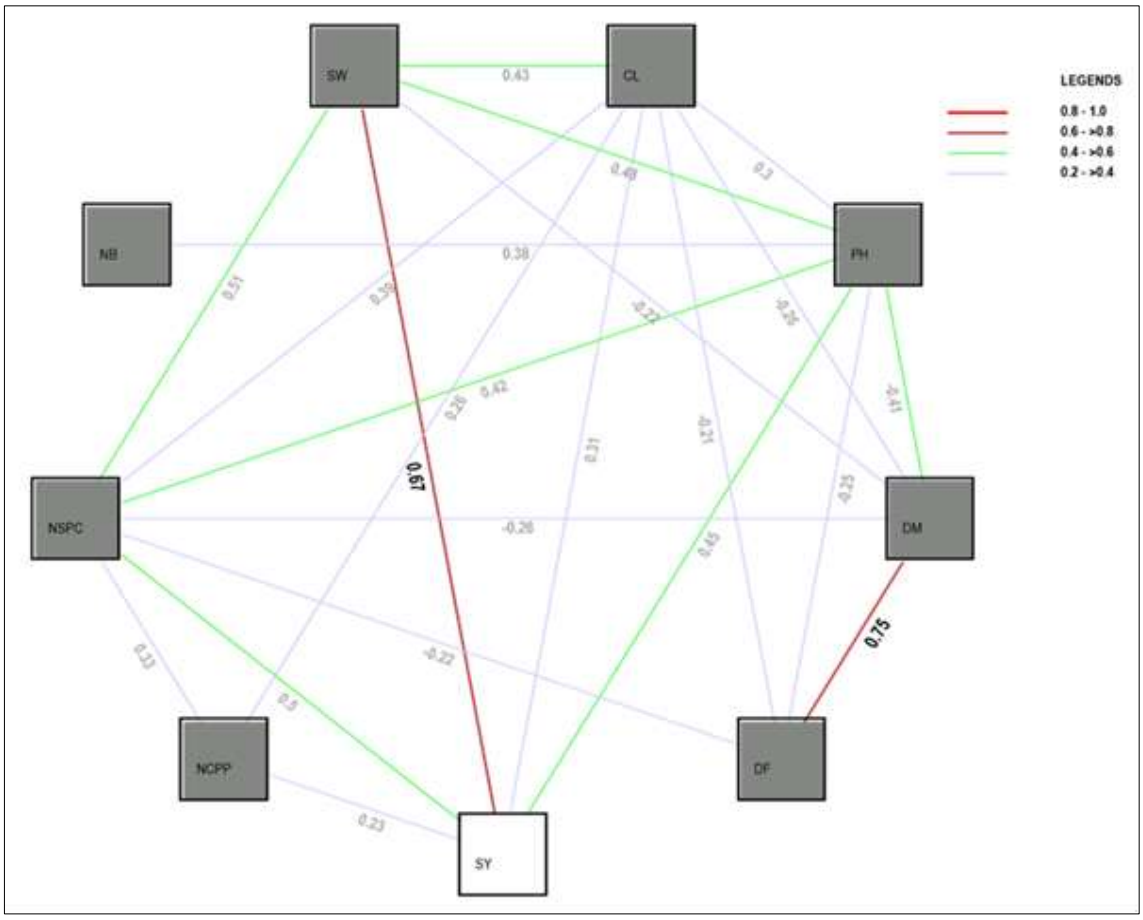

Fig 2: Phenotypic correlation matrix for nine characters in sesame

Conclusion

The results of the current study showed that there is considerable room for improvement in seed yield by breeders using genotype selection based on the following traits: plant height (cm), number of capsules per plant, number of seeds per capsule, capsule length (cm), and 1000 seed weight (g). These traits have demonstrated a strong and positive correlation with the seed yield per plant.

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