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Assessment of genetic variability, correlation and path analysis in Groundnut (*Arachis hypogaea* L)

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Abstract
Data was collected on Twelve characters measured on 27 progenies of three crosses and four checks (Cross 1-Phule Unnati x ICGV 15311, cross 2-Phule Unnati x ICGV 15308, cross 3-Phule Unnati x Girnar 4, checks-Phule Unnati, Girnar 4, ICGV 15311, ICGV 15308) evaluated in randomized block design with Three replications, studied the magnitude of genetic variability, character associations and direct and indirect contribution of various components on dry pod yield and oleic acid. The observations were recorded on days to 50% flowering, days to maturity, number of mature pods plant^{-1}, dry haulm yield plant^{-1}, dry pod yield plant^{-1}, hundred kernel weight, shelling percentage, harvest index (dry weight basis) (%), sound mature kernel (%), oil content (%), oleic acid (%) and protein content (%). The differences recorded in progenies were statistically significant for all the traits studied and the estimates of genotypic coefficient of variation and phenotypic coefficient of variation recorded the good amount of variability among all progenies. Phenotypic coefficient of variation estimates was higher than genotypic coefficient of variation for all traits studied indicating the influence of environment on these characters and the estimates of genotypic correlation coefficients were observed higher than their corresponding estimates of phenotypic correlation coefficients. The dry pod yield per plant showed significant positive correlation with dry haulm yield per plant, sound mature kernel, number of mature pods per plant, oil content, shelling percentage, harvest index, days to 50% flowering, days to maturity, hundred kernel weight, oleic acid (%). Dry pod yield per plant showed significant negative correlation with protein content (%). Path coefficient analysis revealed that the number of mature pods per plant showed higher direct effect on dry pod yield per plant followed by days to maturity, oil content, sound mature kernel. While protein content, dry haulm yield per plant, days to 50% flowering, shelling%, oleic acid (%), harvest index (dry weight basis), hundred kernel weight showed negative direct effect on dry pod yield.

Keywords: Groundnut (*Arachis hypogaea* L.), genetic variability, correlation, path coefficient analysis, dry pod yield

Introduction
Groundnuts (*Arachis hypogaea* L.) due to it's great nutritional and commercial value commonly referred as peanuts, is a significant oilseed and legume crop that is grown all over the world. Groundnuts belong to the Fabaceae or Leguminaceae family. It is a self-pollinating (autogamous) crop, allotetraploid with basic chromosome number ten (2n = 4x = 40) and with two genomes that is A and B having genome size 2800 Mb. Oleic acid is a monounsaturated fatty acid (MUFA) belonging to the omega-9 group, and it is a key component of Groundnut (*Arachis hypogaea* L.) oil. The proportion of oleic acid in Groundnut varies depending on genetic and environmental factors, with high-oleic varieties containing over 75% oleic acid compared to 40-50% in conventional varieties. Correlation is a biometrical approach that reveals the intensity of the association in between two pairs of characters and also provides information on those components that should be used as criteria for candidate selection in a plant breeding program. A positive genetic correlation between two desirable traits make the job of the plant breeder easy for improving both traits simultaneously. Even the lack of correlation is useful for the joint improvement of the two traits. On the other hand, a negative correlation between two desirable traits impedes or makes it impossible to achieve a significant improvement in both traits. Whereas path analysis divides the correlation coefficient into direct and indirect effects to determine the

relative contribution of each variable to yield (Saeidi *et al*., 2011) [19]. This study is aimed to analyze and determine the traits having greater interrelationship with grain yield utilizing the correlation and path analysis.

Materials and Methods

The field experiment related to the present investigation was conducted at All India Co-ordinated Research Project on Groundnut, Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Ahilyanagar (M.S.), The material used in the present study consisted of 27 F_3 progenies of 3 crosses and four check-Phule Unnati, Girnar 4, ICGV15311, ICGV15308. The lines were obtained from the Groundnut Breeder, All India Co-ordinated Research Project on Groundnut, M.P.K.V., Rahuri. The experiment was conducted in a randomized block design with Three replications. Each plot consisted of a single row of 2 m length with a spacing of 30 cm between rows and 10 cm between plants. The land was prepared by ploughing followed by two cross harrowing. The seeds were sown by dibbling single seed per hill at 30 x 10 cm^2 distance (between rows and between plants). During the growth period the usual cultural practices like weeding, irrigation and plant protection measures were followed as and when required. The data collected on individual characters were subjected to the method of analysis of variance commonly applicable to the randomized block design (Panse and Sukhatme, 1967) [16]. The genotypic and phenotypic coefficient of variation was calculated by using the following formula given by Burton (1952) [1]. To establish a cause and effect relationship, the genotypic correlation were partitioned into direct and indirect effects by path analysis as suggested by Dewey and Lu (1959) [3].

Results and Discussion

Genetic Variability

A diverse range of variability were observed in days to 50% flowering (32.33-37.66), days to maturity (118.66-122.00), number of mature pods per plant (18.66-38.00), dry haulm yield per plant (25.66-49.33), dry pod yield per plant (22.00-33.66), hundred kernel weight (34.32-45.41), shelling percentage (66.39-72.32), harvest index (36.36-46.67), sound mature kernel (92.66-97.33), oil content (46.74-52.80), oleic acid (41.14-79.43) and protein content (21.77-26.42). This showed there is a good scope for exploitation of these studied traits. The findings of Wagh *et al*. (2023) [10], Maurya *et al*. (2014) [14], Wadikar *et al*. (2018) [25], Gonya *et al*. (2018) [8], Saini and Sharma (2018) [20], Shinde *et al*. (2019) [21] and Kamdar *et al*. (2020) [11] was same as the results of the current investigation.

Genotypic and Phenotypic Coefficients of Variation

The magnitude of phenotypic coefficient of variation was higher than genotypic coefficient of variation for traits studied (Fig. 1) because the influence of environmental factors on studied traits. The phenotypic coefficient of variation estimates was higher for oleic acid (29.40) due to presence of Girnar 4 variety as a parent in cross no 3 which is high oleic acid content variety among the parents involve in three crosses. Phenotypic coefficient of variation estimates were medium for dry haulm yield/plant (g) (15.41), dry pod yield/plant (g) (13.49), number of pod/plants (19.51). These results are similar with earlier findings of E Aruna Kumari *et al*. (2019) [6] and Reddy *et al*. (2017) [18]. The genotypic coefficient of variation values was high for oleic acid (29.31) due to presence of Girnar 4 variety as a parent in cross no 3 which is high oleic acid content variety among the parents involve in three crosses. The genotypic coefficient of variation estimates were medium for number of mature pods per plant (18.15), dry haulm yield/plant (g) (14.00), dry pod yield/plant (g) (11.09). This finding showed similarity with earlier findings of Korat *et al*. (2010) [12], E Aruna Kumari *et al*. (2019) [6] and Reddy *et al*. (2017) [18] revealed a huge scope for exploitation of these studied characters. The results of Wagh *et al*. (2023) [10], Maurya *et al*. (2014) [14], Gonya *et al*. (2018) [8], Saini and Sharma (2018) [20], Wadikar *et al*. (2018) [25], Shinde *et al*. (2019) [21] and Kamdar *et al*. (2020) [11] E Aruna Kumari *et al*. (2019) [6] and Reddy *et al*. (2017) [18], were same as findings of current investigation.

Heritability and Genetic Advance

Heritability is used to estimate the relationship between two generations, namely, parents and their offspring. The genetic advance, on the other hand, provides information on the predicted genetic gain of a particular characteristic after selection. In general among autogamous crops, characters with high heritability coupled with high genetic advance and high heritability coupled with medium genetic advance which are believed to be regulated by additive gene action, indicating direct selection for characters. In contrast, two circumstances low heritability with high genetic advance or high heritability with low genetic advance are regarded the results of non-additive gene action and selection for such characteristics may not be profitable for crop improvement. In the current study Oleic acid had high heritability coupled with high genetic advance due to presence of Girnar 4 variety as a parent in cross no 3 which is high oleic acid content variety among the parents involve in three crosses showed that this trait was governed by additive gene action and simple selection in early generation of these traits would be more effective. Traits like dry haulm yield/plat (g) showed high heritability coupled with medium genetic advance showed that this trait was governed by additive gene action and simple selection in 1 or more generation of these traits would be more effective. The same results were obtained by Hampannavar *et al*. (2018) [9] and the traits like shelling%, sound mature kernel (%), hundred kernel weight (g), oil content, protein content had medium heritability coupled with low genetic advance showed non-additive gene action in inheritance of these traits.

Correlation

It is statistical measure, for investigating strength (degree) and direction of interrelation among two or more variables. Correlation among characters is may due to pleiotropism possessed by genes or may due to environmental influence or developmental and physiological interrelation. Thus, correlation coefficient analysis provides significant information about directions for selection to combine high yield potential with desired traits. Dry pod yield plant^{-1} were recorded highly significant positive correlation with dry haulm yield/plant (g), sound mature kernel, number of mature pods per plant. The same results were recorded by Shoba *et al*. (2013) [23], Dhakar *et al*. (2017) [4], Dhaygude (2017) [5] and showed significant positive correlation with harvest index, oil content (%), shelling (%), days to 50% flowering, days to maturity, hundred kernel weight, oleic acid, at both genotypic and phenotypic level of correlation.

Same findings were recorded in Gali *et al*. (2023) [7], Saini Haresh *et al*. (2018) [20], Shankar *et al*. (2018) [22], Kamdar *et al*. (2020) [11], Meena and Chandra (2022) [15]. While, dry pod yield per plant exhibited significant negative correlation with protein content at both genotypic and phenotypic level of correlation.

Thus, while making selection for desired improvement in dry pod yield, emphasis should be given on characters *viz*., number of mature pods/plant, dry haulm yield/plant (g), sound mature kernel, shelling (%), harvest index as these characters showed highly significant positive correlation with dry pod yield plant^{-1}. Same observation was noted by Patil *et al*. (2006) [17].

Path Coefficient Analysis

Path coefficient analysis is an effective method for understanding the direct and indirect effects of related characters on the dry pod yield per plant (dependant variable). In the current study, path coefficient analysis was performed to assess the direction and size of the direct and indirect effects of numerous yield contributing traits on dry pod yield plants^{-1}. Any character that has a direct effect on yield provides a basic sense about the viability of selecting a specific character to boost yield. If the correlation among direct effect and a casual component is below or greater of equal magnitude, it indicates a true relationship between the traits and direct selection by those characters is desired. If the correlation coefficient is positive but the direct influence is negative or minimal, the direct casual factors will be evaluated at a very small scale for selection.Path coefficient analysis revealed that highest direct effect on dry pod yield per plant (g) was exhibited by Number of mature pods/plant (0.574), followed by days to maturity (0.529), oil content (%) (0.450), sound mature kernel (%) (0.059). In the current study days to maturity, number of mature pods per plant, sound mature kernel, oil content, oleic acid recorded positive direct effects on dry pod yield per plant. Same findings were recorded by Cholin *et al*. (2010) [2], Gali Suresh *et al*. (2023) [7], Korale (2017) [13], Dhaygude (2017) [5], Vadher and Kachadia (2020) [24]. Negative direct effects on dry pod yield per plant showed by days to 50% flowering, dry haulm yield/plant, hundred kernel weight (g) shelling (%) harvest index (dry wt. basis) (%), protein content. Same observations were recorded by Wadikar *et al*. (2018) [25], Yadav *et al*. (2014) [26].

Table 1: Mean performance for twelve characters of twenty seven progenies (27 progenies + 4 checks) of F_3 generation of Groundnut for dry pod yield, oleic acid and yield contributing characters

Sr. No.	Progeny	Days to 50% flowering	Days to maturity	Number of mature pods/plants	Dry haulm yield/plant (g)	Dry pod yield/plant (g)	Hundred Kernel weight (g)	Shelling (%)	Harvest index (dry wt. basis) (%)	Sound mature kernel (%)	Oil content (%)	Oleic acid (%)	Protein content (%)
1	Cross-I-Prog.-1	35.00	120.33	30.66	46.66	31.33	38.75	70.48	46.43	97.00	52.80	45.37	22.31
2	Cross-I-Prog.-2	34.00	120.00	36.00	45.33	31.33	37.46	70.30	44.89	97.33	51, 36	45.22	23.54
3	Cross-I-Prog.-3	34.33	120.66	27.33	40.00	29.66	36.12	67.59	38.69	95.00	49.75	44.54	24.25
4	Cross-I-Prog.-4	35.33	120.33	32.33	43.66	31.00	38.74	70.28	43.59	96.00	51.54	45.32	23.07
5	Cross-I-Prog.-5	34.33	119.66	25.00	36.33	26.00	36.75	66.39	37.51	96.00	50.17	43.56	23.58
6	Cross-I-Prog.-6	34.00	120.33	27.66	36.66	27.33	36.90	69.48	37.88	95.00	48.91	45.44	22.82
7	Cross-I-Prog.-7	34.33	119.66	19.66	28.66	25.00	35.88	67.51	36.36	94.00	46.84	41.14	25.73
8	Cross-I-Prog.-8	34.66	120.00	26.66	36.66	28.33	35.88	68.62	46.67	94.00	49.80	43.34	24.54
9	Cross-I-Prog.-9	34.66	120.33	20.66	25.66	22.66	34.32	67.68	36.40	92.66	48.52	41.25	25.51
10	Cross-II-Prog.-1	34.66	121.00	38.00	46.66	32.00	39.58	72.32	44.29	96.66	50.95	45.51	23.07
11	Cross-II-Prog.-2	36.33	120.66	37.66	46.33	31.00	38.86	70.47	43.61	96.33	49.92	46.22	24.06
12	Cross-II-Prog.-3	37.66	120.33	38.00	47.00	32.00	38.66	72.17	44.47	97.00	51.36	43.55	24.52
13	Cross-II-Prog.-4	34.66	121.33	27.00	43.00	26.00	37.36	69.84	36.52	94.00	50.51	41.92	26.42
14	Cross-II-Prog.-5	34.33	120.33	27.00	45.00	26.66	36.92	68.56	38.77	94.33	50.77	41.56	24.90
15	Cross-II-Prog.-6	35.66	121.66	26..66	44.00	24.00	36.99	70.37	39.74	94.66	49.17	42.39	25.48
16	Cross-II-Prog.-7	35.33	120.00	33.00	45.66	27.33	37.36	70.93	43.16	97.00	51.29	43.65	25.76
17	Cross-II-Prog.-8	34.33	121.33	33.00	44.33	29.66	37.29	71.69	41.95	96.33	51.18	42.72	23.91
18	Cross-II-Prog.-9	34.00	120.33	32.33	44.66	29.33	37.20	69.54	42.47	96.00	51.40	42.54	24.69
19	Cross-III-Prog.-1	36.66	121.33	32.33	49.33	33.33	40.58	72.13	44.73	96.00	50.99	78.62	21.77
20	Cross-III-Prog.-2	37.66	121.00	33.00	48.66	33.66	40.29	71.45	45.06	97.00	51.65	77.89	22.45
21	Cross-III-Prog.-3	35.66	121.66	29.33	49.33	30.66	38.89	70.10	41.61	95.00	49.84	76.36	23.73
22	Cross-III-Prog.-4	34.33	122.00	26.33	44.66	30.33	39.22	70.39	42.29	94.00	49.65	77.02	24.77
23	Cross-III-Prog.-5	37.33	122.00	27.00	42.00	26.33	36.51	69.47	41.65	94.00	48.88	75.73	24.74
24	Cross-III-Prog.-6	35.66	120.66	26.66	42.00	25.00	37.45	69.75	43.17	95.00	50.43	75.98	25.99
25	Cross-III-Prog.-7	37.66	122.00	32.66	48.66	33.66	39.14	72.14	43.25	96.00	50.25	78.84	22.88
26	Cross-III-Prog.-8	34.00	121.33	31.00	43.66	31.66	38.43	70.97	41.51	97.00	50.07	76.63	24.87
27	Cross-III-Prog.-9	37.33	122.00	26.33	43.33	26.66	36.48	70.80	41.69	94.66	50.07	77.02	22.36
28	ICGV 15311 (C)	32.33	118.66	19.00	32.66	22.00	36.91	68.50	41.22	94.00	47.92	44.50	24.57
29	Girnar 4 (C)	32.33	119.66	25.00	32.66	22.66	45.41	70.26	40.50	94.00	46.74	79.43	24.36
30	ICGV15308 (C)	32.33	119.66	18.66	36.66	25.00	37.77	71.57	40.54	94.00	47.47	44.28	22.59
31	Phule Unnati (C)	33.66	121.66	24.00	40.00	29.33	37.91	69.47	39.62	94.00	48.14	45.21	23.32
	Mean	34.98	120.70	28.68	41.91	28.41	37.90	70.04	41.63	95.29	49.94	54.60	24.10
	S.E.	0.35	0.33	1.18	1.55	1.26	1.08	0.72	0.89	0.78	0.74	0.72	0.71
	C.D.5%	0.99	0.95	3.36	4.40	3.57	3.07	2.06	2.51	2.22	2.10	2.05	2.03
	C.V.	1.74	0.48	7.18	6.43	7.69	4.96	1.80	3.70	1.42	2.58	2.29	5.17

Cross I: Phule Unnati x ICGV 15311, Cross II: Phule Unnati x ICGV 15308, Cross III: Phule Unnati x Girnar

Table 2: Analysis of variance for twelve characters of twenty seven progenies (27 progenies + 4 check) of F_3 generation in Groundnut

Sr. No.	Characters	Replication	Genotypes	Errors
	DF	2	30	60
1	Days to 50% flowering	0.52	6.85**	0.37
2	Days to maturity	0.03	2.21**	0.34
3	Number of mature pod/plants	5.04	85.57**	4.24
4	Dry haulm yield/plant (g)	2.26	110.62**	7.26
5	Dry pod yield/plant (g)	4.29	34.57**	4.77
6	Hundred Kernel Weight (g)	1.14	11.29**	3.54
7	Shelling (%)	1.15	6.78**	1.59
8	Harvest index (dry wt. basis) (%)	0.87	25.19**	2.37
9	Sound mature kernel (%)	0.03	4.92**	1.85
10	Oil content (%)	0.19	6.62**	1.66
11	Oleic acid (%)	1.38	770.09**	1.57
12	Protein content (%)	0.27	4.37**	1.55

*, ** significance at 5% and 1% level of significance, respectively

Table 3: Estimation of variability and heritability for twelve characters of twenty seven progenies (27 progenies + 4 check) of F_3 generation in Groundnut

Sr. No.	Characters	General mean	Range	GCV (%)	PCV (%)	ECV (%)	Heritability broad sense (%)	GA	GAM (%)
1	Days to 50% flowering	34.98	32.33-37.66	4.20	4.54	1.74	85.30	2.79	7.99
2	Days to maturity	120.70	118.66-122.0	0.65	0.81	0.48	64.50	1.30	1.08
3	Number of mature pod/plants	28.68	18.66-38.00	18.15	19.51	7.18	86.50	9.97	34.76
4	Dry haulm yield/plant (g)	41.91	25.66-49.33	14.00	15.41	6.43	82.60	10.98	26.21
5	Dry pod yield/plant (g)	28.41	22.00-33.66	11.09	13.49	7.69	67.50	5.33	18.77
6	Hundred kernel Weight (g)	37.90	34.32-45.41	4.24	6.52	4.96	42.20	2.15	5.67
7	Shelling (%)	70.04	66.39-72.32	1.87	2.60	1.80	52.00	1.95	2.79
8	Harvest index (dry wt. basis) (%)	41.63	36.36-46.67	6.62	7.59	3.70	76.20	4.95	11.91
9	Sound mature kernel (%)	95.29	92.66-97.33	1.06	1.78	1.42	35.60	1.24	1.30
10	Oil content (%)	49.94	46.74-52.80	2.57	3.64	2.58	49.90	1.87	3.74
11	Oleic acid	54.60	41.41-79.43	29.31	29.40	2.30	99.40	32.87	60.19
12	Protein content (%)	24.10	21.77-26.42	6.55	6.55	5.17	37.70	1.22	5.08

Table 4: Estimates of Genotypic correlation coefficient with dry pod yield, oleic acid and yield contributing twelve characters of twenty seven progenies (27 progenies + 4 checks) of F_3 generation of Groundnut

Characters	Days to 50% flowering	Days to maturity	Number of mature pods/plants	Dry haulm yield/plant (g)	Hundred Kernel weight (g)	Shelling (%)	Harvest index (dry wt. basis) (%)	Sound mature kernel (%)	Oil content (%)	Oleic acid (%)	Protein content (%)	Genotypic correlation with Dry pod yield/plant (g)
Days to 50% flowering	1.000	0.627**	0.540**	0.612**	-0.018	0.454**	0.396**	0.469**	0.564**	0.412**	-0.221*	0.546**
Days to maturity		1000	0.296**	0.628*	-0.033	0.456**	0.082	-0.002	0.291**	0.566**	-0.169	0.489**
Number of mature pods/plants			1.000	0.818**	0.393*	0.672**	0.638**	0.989**	0.869**	0.068	-0.310**	0.807**
Dry haulm yield/plant (g)				1.000	0.344**	0.753**	0.638**	0.808**	0.880**	0.311**	-0.422**	0.830**
Hundred kernel weight (g)					1.000	0.587**	0.403**	0.258*	-0.086	0.588**	-0.552**	0.288**
Shelling (%)						1.000	0.658**	0.473**	0.345**	0.402**	-0.622**	0.639**
Harvest index (dry wt. basis) (%)							1.000	0.723**	0.678**	0.268**	-0.556**	0.630**
Sound mature kernel (%)								1.000	0.898*	0.014	-0.532**	0.821**
Oil content (%)									1.000	-0.055	-0.363**	0.794**
Oleic acid (%)										1.000	-0.310**	0.249*
Protein content (%)											1.000	-0.726**

Table 5: Estimates of phenotypic correlation coefficient with dry pod yield, oleic acid and yield contributing twelve characters of twenty seven progenies (27 progenies + 4 checks) of F_3 generation of Groundnut

Characters	Days to 50% flowering	Days to maturity	Number of mature pods/plants	Dry haulm yield/plant (g)	Hundred Kernel weight (g)	Shelling (%)	Harvest index (dry wt. basis) (%)	Sound mature kernel (%)	Oil content (%)	Oleic acid (%)	Protein content (%)	Phenotypic correlation with Dry pod yield/plant (g)
Days to 50% flowering	1.000	0.481**	0.447**	0.508**	0.046	0.290**	0.344**	0.210*	0.360**	0.379**	-0.139**	0.400**
Days to maturity		1000	0.250*	0.454**	0.125	0.359**	0.086	0.046	0.123	0.463**	-0.103	0.334**
Number of mature pods/plants			1.000	0.716**	0.288**	0.541**	0.623**	0.687**	0.615**	0.077	-0.174	0.748**
Dry haulm yield/plant (g)				1.000	0.259*	0.578**	0.577**	0.564**	0.611**	0.292**	-0.236**	0.696**
Hundred kernel weight (g)					1.000	0.492**	0.324**	0.327**	0.095	0.405**	-0.179**	0.298**
Shelling (%)						1.000	0.550**	0.559**	0.409**	0.317**	-0.221**	0.483**
Harvest index (dry wt. basis) (%)							1.000	0.511**	0.486**	0.253*	-0.257**	0.622**
Sound mature kernel (%)								1.000	0.629**	0.039	-0.215**	0.644**
Oil content (%)									1.000	-0.016	-0.085	0.529**
Oleic acid (%)										1.000	-0.170	0.228*
Protein content (%)											1.000	-0.323**

Table 6: Direct (diagonal) and indirect (above and below diagonal) path coefficient for twelve characters of Twenty seven progenies (27 progenies + 4 check) of F_3 generation in Groundnut

Sr. No.	Characters	Days to 50% flowering	Days to maturity	Number of mature pods/plants	Dry haulm yield/plant (g)	Hundred kernel weight (g)	Shelling (%)	Harvest index (dry wt. basis) (%)	Sound mature kernel (%)	Oil content (%)	Oleic acid (%)	Protein content (%)	Genotypic correlation with Dry pod yield/plant (g)
1	Days to 50% flowering	-0.172	0.332	0.310	-0.301	0.001	-0.027	-0.006	0.027	0.254	0.007	0.122	0.546**
2	Days to maturity	-0.108	0.529	0.170	-0.308	0.002	-0.027	-0.001	-0.003	0.131	0.010	0.093	0.489**
3	Number of mature pods/plants	-0.093	0.156	0.574	-0.402	-0.001	-0.040	-0.010	0.060	0.391	0.001	0.171	0.807**
4	Dry haulm yield/plant (g	-0.105	0.332	0.469	-0.491	-0.001	-0.045	-0.010	0.047	0.396	0.005	0.232	0.830**
5	Hundred kernel weight (g)	0.003	-0.017	0.225	-0.169	-0.003	-0.035	-0.006	0.015	-0.038	0.011	0.304	0.288**
6	Shelling (%)	-0.078	0.241	0.386	-0.370	-0.002	-0.059	-0.011	0.027	0.155	0.007	0.342	0.639**
7	Harvest index (dry wt. basis) (%)	-0.068	0.043	0.366	-0.313	-0.001	-0.039	-0.016	0.042	0.305	0.005	0.306	0.630**
8	Sound mature kernel (%)	-0.080	-0.001	0.585	-0.397	-0.002	-0.028	-0.012	0.059	0.404	0.001	0.293	0.821**
9	Oil content (%)	-0.097	0.154	0.499	-0.433	0.001	-0.020	-0.011	0.053	0.450	-0.001	0.200	0.794**
10	Oleic acid (%)	-0.071	0.299	0.039	-0.152	-0.002	-0.024	-0.004	0.002	-0.025	0.019	0.170	0.249*
11	Protein content (%)	0.038	-0.089	-0.178	0.207	0.002	0.037	0.009	-0.031	-0.163	-0.005	-0.551	-0.726**

RESIDUAL EFFECT: 0.137 Bold features indicate direct effect

Conclusion

The differences recorded in progenies were statistically significant for all the traits studied and the estimates of genotypic coefficient of variation and phenotypic coefficient of variation recorded the good amount of variability among all progenies. The character oleic acid (%) showed the higher heritability followed by number of mature pods per plant, days to 50% flowering, dry haulm yield/plant (g), harvest index, dry pod yield per plant, days to maturity. Whereas moderate heritability was observed for shelling%, oil content, hundred kernel weight, protein content, sound mature kernel. Within traits studied higher estimates of genetic advance were observed for oleic acid (%). Medium genetic advance by dry haulm yield per plant and low genetic advance by number of mature pods per plant, dry pod yield per plant, harvest index (dry weight basis), days to 50% flowering, hundred kernel weight, shelling percentage, oil content, days to maturity, sound mature kernel and lowest estimate was recorded by protein content%. The estimates of genotypic correlation coefficients were observed higher than their corresponding estimates of phenotypic correlation coefficients. The dry pod yield per plant showed significant positive correlation with dry haulm yield per plant, sound mature kernel, number of mature pods per plant, oil content, shelling percentage, harvest index, days to 50% flowering, days to maturity, hundred kernel weight, oleic acid (%). Dry pod yield per plant showed significant negative correlation with protein content (%). Path coefficient analysis revealed that the number of mature pods per plant showed higher direct effect on dry pod yield per plant followed by days to maturity, oil content, sound mature kernel, oleic acid (%). While protein content, dry haulm yield per plant, days to 50% flowering, harvest index (dry weight basis), hundred kernel weight showed negative direct effect on dry pod yield.

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