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Research article

GENETIC VARIABILITY AND CHARACTER ASSOCIATION STUDIES IN GROUNDNUT (*ARACHIS HYPOGAEA* L.)

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ABSTRACT: An experiment was conducted at the Agricultural Research Station, Darsi, during *Kharif* 2009-10, 2010-11 and 2011-12. The trial was conducted in a randomized block design with three replications for estimation of genetic variability, genetic parameters and correlation coefficients among different yield components. Highly significant variations were observed among the genotypes for all the characters studied. The highest genetic coefficient of variation was observed for no.of pods/plant followed by pod yield, 100 seed weight, no.of branches per plant, plant height and days to 50 % flowering. The highest heritability was observed in 100 seed weight (98.0%) followed by pod yield (96.0%), no.of pods/plant (94.0%), no.of branches /plant (89.0%), plant height (88.0%) and days to 50 % flowering (79.0%). while high values of genetic advance were obtained in all the characters except plant height and days to 50% flowering. Pod yield exhibited significant and positive genotypic correlations with all the characters except with plant height. Number of pods per plant showed positive direct effect on pod yield / plant followed by 100 seed weight, no.of branches/plant and days to 50% flowering. Selection for characters showing high heritability with high genetic advance, positive and high significant correlation and showing high direct effects will helpful in the improvement of yield in the groundnut.
Keywords: PCV, GCV, Character Association, Groundnut.

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is an important annual oilseed legume crop, valued as a rich source of protein, minerals and vitamins. It is the major oilseed crop in India and in Andhra Pradesh. It is an unpredictable crop due to its underground pods development. Nut yield is not only polygenically controlled, but also influenced by its component characters [1]. For improvement of yield in groundnut direct selection is often misleading. The knowledge of existing variability and degree of association between yield contributing characters and their relative contribution in yield is essential for developing high yielding genotypes in groundnut. The genetic variability has to be looked into for planning suitable measures for the crop improvement. This necessitates a thorough knowledge of variability owing to genetic factors, actual genetic variation heritable in the progeny and the genetic advance that can be achieved through selection. The observed variability is a combined measure of genetic and environmental causes [8]. The genetic variability is heritable from generation to generation. Heritability and genetic advance is a useful tool for breeders in determining the direction and magnitude of selection. Correlation studies provide an opportunity to study the magnitude and direction of association of yield with its components and also among various components. Path coefficient is essential to accumulate optimum combination of yield contributing characters and to know the implication of the interrelationships of various characters in a single genotype. Considering the above points, the present study was undertaken to evaluate the genotypes for yield and its components and to estimate the inter-relationship among the agronomic traits in groundnut.

MATERIAL AND METHODS

The experimental material comprised of 16 genotypes. The present investigation was carried out at Agricultural Research Station, Darsi during *kharif* 2009-10, 2010-11 and 2011-12. The sixteen genotypes were grown in randomized block design with three replications. Each entry was sown in six rows of 4 m length by adopting spacing of 30 x 10 cm. Observations were recorded on 5 competitive plants selected at random for six characters viz., days to 50 per cent flowering, plant height (cm), number of branches per plant, 100seed weight (g), number of pods per plant and pod yield (kg/ha). All the plant protection measures taken based on need.

The phenotypic and genotypic coefficient of variations was computed according to Burton [2]. Heritability, genetic advance, correlation coefficients calculated according to Singh and Choudary [9] and Dewey and Lu [3] for path coefficient analysis.

RESULTS AND DISCUSSION

The analysis of variance revealed significant differences among the genotypes for all the characters indicating the prevalence of genetic variability. Co-efficient of genotypic variation, phenotypic variation, environmental variation, heritability and genetic advance of various characters are given in the Table 1. Coefficient of variation at phenotypic and genotypic levels was relatively high in no.of pods/plant, pod yield, 100 seed weight, no.of branches/plant, plant height and days to 50 % flowering. Similar results were also obtained by Nath and Alam, [7]. On the other hand, 100 seed weight and no.of branches/plant showed very low differences between genotypic and phenotypic coefficient of variation, suggesting less environmental influence on the expression of traits. The magnitude of PCV was higher than GCV for all the characters indicating the influence of environment upon these traits. The highest heritability in broad sense was observed in 100 seed weight (98.0%) followed by pod yield (96.0%), no.of pods/plant (94.0%), no.of branches/plant (89.0%), plant height (88.0%) and days to 50 % flowering (79.0 %). The results are in accordance with Nath and Alam, [7]. Katiyar *et al*., [5] mentioned that the only heritability value provides no indication of the amount of genetic progress that would result from selecting the best individuals. However, Johnson *et al*. [4] suggested that heritability estimates along with genetic advance would be more useful in predicting yield under phenotypic selection than heritability estimate alone. In the present study the character no.of pods/plant as well as pod yield showed the high genetic advance (51.07% and 44.63%) along with high heritability (94.0% and 96.0% indicating additive gene effect. Similar results are also reported by Nath and Alam, [5] and Zaman *et al*., [10].

No.of branches/plant (22.90) and 100 seed weight (27.81) also showed the high values of genetic advance which were also linked with acceptable values of heritability. The character days to 50 % flowering and plant height showed low genetic advance with high heritability (88.0 %, 79.5%) indicates the influence of environment on this trait. The genotypic correlations were calculated for all pairs of characters (Table 2). No.of branches/plant exhibited highly significant and positive genotypic correlations with all the characters. Pod yield showed significant and positive genotypic correlations with all the characters except with plant height. no.of pods / plant showed positive and significant correlations with pod yield, days to 50 % flowering and no.of branches/plant. Plant height showed significant and positive correlation with no. of branches/plant. 100 seed weight exhibited positive and significant correlation with no.of branches/plant and pod yield.

Table:1 Estimation of genetic parameters of six characters of different genotypes in groundnut

	ECV	GCV	PCV	H^2 (broad sense)	Genetic advance 5 %	Genetic advance as % of mean 5 %
Days to 50 % flowering	5.186	3.40	3.81	79.0	2.23	6.25
Plant height (cm)	7.98	7.22	7.70	88.0	4.70	13.97
No.of branches	12.22	11.76	12.45	89.0	1.43	22.90
No.of pods/ plant	17.81	25.46	26.14	94.0	8.13	51.07
Pod yield (kg / ha)	12.37	22.04	22.42	96.0	731.452	44.63
100 seed weight (g)	4.25	13.57	13.64	98.0	13.24	27.81

Table :2 Genotypic correlation coefficients among six characters of groundnut

Character	Days to 50 % flowering	Plant height (cm)	No.of branches	No.of pods/ plant	100 seed weight (g)	Pod yield (kg / ha)
Days to 50 % flowering		-0.1494	0.2213*	0.3242*	-0.3567	0.2907*
Plant height (cm)			0.4969*	0.0317	-0.1016	-0.2075
No.of branches				0.7863*	0.1447*	0.6022*
No.of pods/ plant					-0.3109	0.6511*
100 seed weight (g)						0.1827*

*- significant at 5 %

The results of direct and indirect effects on seed yield per plant are given in Table 3. Number of pods plant positive direct effect on pod yield / plant followed by 100 seed weight, no.of branches and days to 50% flowering. These results are in accordance with Mustafa Sadeghi1 and Ali Noorhosseini-Niyaki, [6]. On the other hand plant height exhibited direct negative effect on pod yield indicating that pod yield could be increased in groundnut by selecting the plant with maximum number of pods, higher 100 seed weight, higher no.of branches/plant, with short plant stature. Proper attention should therefore be given to the above traits for the improvement of groundnut yield.

Table : 3 Direct (bold) and indirect effect among six characters of Groundnut

Character	Days to 50 % flowering	Plant height (cm)	No.of branches	No.of pods/ plant	100 seed weight (g)
Days to 50 % flowering	**0.1658**	-0.0248	0.0367	0.0538	-0.0591
Plant height (cm)	0.0340	**-0.2277**	-0.1132	-0.0072	0.0231
No.of branches	0.0290	0.0652	**0.1313**	0.1032	0.0190
No.of pods/ plant	0.2022	0.0198	0.4904	**0.6237**	-0.1939
100 seed weight (g)	-0.1404	-0.0400	0.0570	-0.1224	**0.3936**
Pod yield (kg / ha)	0.2907	-0.2075	0.6022	0.6511	0.1827

R SQUARE = 0.6524 RESIDUAL EFFECT = 0.5895

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