Available online at www.ijpab.com

ISSN: 2320 – 7051
Int. J. Pure App. Biosci. **2 (2):** 194-197 (2014)

Research Article

INTERNATIONAL JOURNAL OF PURE & APPLIED BIOSCIENCE

Studies on Variability, Character Association and Path Analysis on Groundnut (*Arachis hypogaea* L.)

V. Thirumala Rao*, V. Venkanna, D. Bhadru and D. Bharathi
Regional Agricultural Research Station, Warangal
Acharya N.G.Ranga Agricultural University, Rajendranagar, Hyderabad-500 0030 (A.P.) India
*Corresponding Author E-mail: thirugene9@yahoo.com

ABSTRACT

The extent amenable genetic variability and association of important agronomic characters were determined in set of 50 Groundnut genotypes. Analysis of variance revealed the existence of significant differences among genotypes for all characters studied. The magnitude of PCV and GCV was moderate to high for number of pods per plant and plant height, kernel yield, dry pod yield, hundred kernel weight, and dry haulm yield. High heritability coupled with high genetic advance as per cent of mean was observed for hundred kernel weight, Dry pod yield, kernel yield, plant height and number of pods per plant indicating the role of additive gene in expressing these traits. Dry pod yield was significant positively correlated with kernel yield, number of pods per plant, hundred kernel weight and dry haulm yield. Path coefficient analysis indicated that number of pods per plant and hundred kernel weight was important traits to be considered for realizing the improvement in yield.

Keywords: *Genetic variability, Correlation path analysis and Groundnut.*

INTRODUCTION

Groundnut or peanut (*Arachis hypogaea* L.) is an important food and cash crop for resource-poor farmers in Asia and Africa and it can be consumed and utilized in diverse ways. It is primarily grown for edible oil (48–50%) as well as for direct consumption by people. In addition, groundnut haulms and groundnut cake (after oil extraction) are excellent animal feed. Information on extent of genetic variability and role of important yield determining traits is paramount importance for their skilful engineering in new ideotype exploiting the breeding material in hand. The presence of variability in crop is important for genetic studies and consequently used for improvement and selection. Selection for high yielding types with wider adaptability shall be not only very useful but shall help in increasing the production both locally and globally. Genetic improvement of seed yield, alone, is not possible through phenotypic selection because of polygenic nature and low heritability. Hence, resorting to selection through correlated response entailing several contributing factors which influence seed production both directly and indirectly shall be most appropriate. The path coefficient analysis is one of the effective technique to sought out inter relationship between different yield characters and their direct and indirect effect on yield through correlation values. The present study was undertaken to understand variability and the relationship between various characters and their contribution to yield.

MATERIALS AND METHODS

The material in the present investigation consists of 50 genotypes including two checks were sown in randomized complete block design (RBD) with two replications at Acharya N.G Ranga Agricultural University, Regional Agricultural Research Station, Jagtial during *Kharif* 2012. Each genotype was raised in 5m length with spacing of 30 X 10 cm. Recommended agronomic practices were followed to raise a good crop. Observations were recorded on days to 50% flowering, days to maturity, plant height(cm),

shelling percent, number of pods per plant, hundred kernel weight(g), dry pod yield(kg/ha), kernel yield(kg/ha) and dry haulm yield(kg/ha). The data were recorded on five randomly selected plants in each entry in each replication.The mean values were used for analysis of variance. The coefficient of variation was calculated as per Burton[3]. Heritability in broad sense and genetic advance were calculated as per Johnson *et al.,*[8]. The correlation coefficients and path analysis were carried out following the methods of Al-Jibouri *et al.,*[1] and Dewey and Lu[6] respectively.

RESULTS AND DISCUSSION

The analysis of variation revealed highly significant differences among the genotypes for all the characters studied *viz.,* days to 50% flowering, days to maturity, plant height(cm), shelling percent, number of pods per plant, hundred kernel weight(g), dry pod yield(kg/ha), kernal yield(kg/ha) and dry haulm yield(kg/ha). Indicating the existence of considerable genetic variation in the experimental material. Perusal the components of variance revealed that the phenotypic coefficient of variation (PCV) were higher than Genotypic coefficient of variation (GCV) for all the characters studied indicating the role of environmental variance in the total variance (Table 1). The magnitude of PCV and GCV was moderate to high for number of pods per plant, plant height, kernel yield, dry pod yield, hundred kernel weight, and dry haulm yield. Heritability in broad sense was higher in most of the characters *viz.,* hundred kernel weight, dry pod yield, kernel yield, shelling per cent, plant height, number of pods per plant and dry haulm yield. Johnson *et al.,*[8] had pointed out that in a selection programme, heritability values as well as genetic advance were more useful than heritability alone. High heritability coupled with high genetic advance as percent of mean was observed hundred kernel weight, dry pod yield, kernel yield, plant height and number of pods per plant indicating the role of additive gene in expressing these traits and revealed better scope for improvement of these traits through direct selection. High heritability and high genetic advance as per cent of mean for hundred kernel weight and number of pods per plant reported by Savaliya *et al.,*[10]. High heritability and high genetic advance as per cent of mean for pod yield reported by John *et al.,*[7] and Khote *et al.,*[9].

Table.1 Estimates of variability, heritability and genetic advance in Groundnut

Character	Mean	Range	GCV (%)	PCV (%)	Heritability in Broadsence(H^2)	Genetic advance	GA as percent of mean
Days to 50% flowering	27.05	31-25	3.37	4.997	45.50	1.623	6.000
Days to maturity	116.06	119-113	0.871	1.357	41.20	1.714	1.477
Plant height	46.87	69-28	22.028	22.999	91.70	26.105	55.696
Shelling (%)	66.76	79-60	6.522	6.791	92.20	11.039	16.535
Number of pods per plant	18.86	34-10	31.592	36.029	76.90	13.792	73.13
Hundred Kernal weight	33.3	45-21	17.82	18.056	97.40	15.461	46.431
Dry pod yield	3349.8	4401-2101	18.388	18.82	95.50	1588.732	47.428
Kernel yield	2232.38	3032-1387	18.432	19.096	93.20	1048.576	46.971
Dry haulm yield	3036.37	5038-2218	16.58	22.546	54.10	977.384	32.189

Pod yield is a complex character governed by several contributing traits. Hence, it is important to understand the association of different characters with seed yield for enhancing the usefulness of selection criterion to be followed while developing varieties. In the present investigation the genotypic and phenotypic correlations are on par with each other suggesting the less influence of environment. Hence, in this paper the genotypic correlations only discussed (Table 2). Invariably pod yield was significant positively correlated with Kernal yield, number of pods per plant, hundred kernel weight and dry haulm yield and significant negative association with das to 50% flowering. Chishti *et al.,*[4] reported positive and significant correlations between pod yield and the number of pods in plant, grain to pod weight, 100-grain weight and per cent oil as well as a negative and significant correlation between pod yield and the number of days to maturity. Deshmukh *et al.,*[5] and Syamasonta[12] also reported a positive and significant correlation between pod yield and the number of pods in peanut plant.

Table 2: Genotypic correlation coefficients between different traits in Groundnut

Character	DF	DM	PH	S%	NP/Pl	HKW	KY	DHY	Seed Yield/Plant
Days to 50% flowering(DF)	1.0000	0.8114**	0.1496	0.0818	-0.125	-0.0886	-0.2303	-0.0824	-0.2828*
Days to maturity(DM)		1.0000	-0.1343	0.1025	-0.0234	-0.0296	-0.1099	-0.0365	-0.1498
Plant height(PH)			1.0000	0.2868*	-0.2086	-0.0052	0.0406	-0.0781	-0.0599
Shelling (S%)				1.0000	-0.0513	0.1677	0.312	-0.0516	-0.0114
Number of pods per plant(NP/Pl)					1.0000	0.5487**	0.8007**	0.4722**	0.864**
Hundred Kernal weight(HKW)						1.0000	0.57**	0.1518	0.5495**
Kernal yield(KY)							1.0000	0.3401*	0.9447**
Dry haulm yield(DHY)								1.0000	0.3762**

*, ** Significant at P=0.05 and P = 0.01 level respectively

Path coefficient analysis (Table 3) revealed that the highest direct positive effect of kernel yield, days to maturity no of pods per plant and hundred kernel weight was revealed on pod yield. Hence, a direct selection criterion should be followed for traits *viz.*, no of pods per plant and hundred kernel weight to improve the pod yield. The results are in consonance with earlier reports[2,5,12,11] in which 100-grain weight was found to have significant positive and direct effect on pod yield.

Table 3. Direct(diagnol) and indirect effects of yield contributing characters in Groundnut

Character	DF	DM	PH	S%	NP/Pl	HKW	KY	DHY	Seed Yield/Plant
Days to 50% flowering(DF)	**-0.0566**	-0.0459	-0.0085	-0.0046	0.0071	0.005	0.013	0.0047	-0.2828*
Days to maturity(DM)	0.0354	**0.0436**	-0.0059	0.0045	-0.001	-0.0013	-0.0048	-0.0016	-0.1498
Plant height(PH)	0.0022	-0.002	**0.015**	0.0043	-0.0031	-0.0001	0.0006	-0.0012	-0.0599
Shelling (S%)	-0.027	-0.0338	-0.0946	**-0.3297**	0.0169	-0.0553	-0.1029	0.017	-0.0114
Number of pods per plant(NP/Pl)	-0.0042	-0.0008	-0.0071	-0.0017	**0.0339**	0.0186	0.0271	0.016	0.864**
Hundred Kernal weight(HKW)	-0.0008	-0.0003	0	0.0014	0.0047	**0.0086**	0.0049	0.0013	0.5495**
Kernal yield(KY)	-0.232	-0.1107	0.0409	0.3144	0.8068	0.5743	**1.0076**	0.3427	0.9447**
Dry haulm yield(DHY)	0.0002	0.0001	0.0002	0.0001	-0.0013	-0.0004	-0.0009	**-0.0027**	0.3762**

Residual effect (G) = 0.0524 G = Genotypic

REFERENCES

1. Al-Jibouri.H., Miller. P. A. and Robinson. H. F. Genotypic and environmental variances and covariance's in an upland cotton crosses of interspecific origin. *Agron. J.* **50:** 633-637 (1958)
2. Arunachalam. V. and Bandyopadhyay. A. Character association among components of genetic variation in F1 generation in *Arachis hypogaea* L. *Madras Agric. J.* **71(7):** 431-438 (1984)
3. Burton, G.W. Quantitative inheritance in grasses Proc. 6th Grassland Congr., **1:** 356-363 (1952)
4. Chishti, S. A. S., Akbar, M. Aslam, M. and Anwar. M. Morphogenetic Evaluation for pod yield and its components in early Spanish genotypes of Groundnut (*Arachishypogaea* L.). *Pakistan Jourl of Bio Scie* **3(5):** 898-899 (2000)
5. Deshmukh, S. N., Basu, M. S. and Reddy, P. S. Genetic variability, character association and path coefficients and quantitative traits in Virginia bunch varieties of groundnut. *Indian J. of Agr. Sci*. **56:** 816-821 (1986)
6. Dewey, D.R. and Lu, K.K. A correlation and path analysis of components of crested wheat grass seed production. *Agronomy Journal,* **51:** 515-518 (1959)
7. John, K., Vasanthi, R.P and Venkateswarlu, O. Variability and correlation studies for pod yield and its attributes in F2 generation of six Virginia x Spanish crosses of groundnut (*Arachis hypogaea* L.). *Legume Res.* **30(4):** 292-296 (2007)
8. Johnson, H.W., Robinson., H.F. and Comstock, R.E. Estimates of genetic and environmental variability in soyabeans. *Agronomy Journal.* **47:** 314-318 (1955)
9. Khote, A.C., Bendale, V.W., Bhave, S.G and Patil, P.P. Genetic variability, heritability and genetic advance in some exotic genotypes of groundnut (*Arachis hypogaea* L.). *Crop Res.* **37(1,2&3):**186-191 (2009)
10. Savaliya, J.J., Pansuriya, A.G., Sodavadiya, P.R and Leva,R. L. Evaluation of inter and intraspecific hybrid derivatives of groundnut (*Arachis hypogaea* L.) for yield and its components. *Legume Res.* **32(2):**129-132 (2009)
11. Siddiquey, M. N., Haque, M. M.. Ara, M. J. F. Ahmed, M. R and Roknuzzaman. M. Correlation and path analysis of Groundnut (*Arachis hypogaea* L.). *Int. J. Sustain. Agril. Tech.* **2(7):** 06-10 (2006)
12. Syamasonta, M. B. 'Pops' screening in groundnut. Prog. Of 5th Regional Groundnut workshop for Southern Africa, Patancheru, Andhra Pradesh, Ind. (1992)