Studies On Genetic Parameters For Yield And Yield Attributes In Groundnut (Arachis Hypogaea L.)

K. John*[1] and P. Raghava Reddy[2]

Regional Agricultural Research Station, Institute of Frontier Technology, Tirupati-517502, Andhra Pradesh

[1]Senior Scientist (Genetics & Plant Breeding), RARS, Tirupati, Andhra Pradesh, India

[2]Former Vice- Chancellor, Acharya N.G. Ranga Agricultural University, Andhra Pradesh, India

** Corresponding author: johnlekhana@rediffmail.com*

Abstract: **High GCV and PCV values were observed for number of secondary branches per plant. Moderate GCV observed for number of well-filled and mature pods per plant. Moderate values of GCV and PCV were recorded for kernel yield per plant. Moderate GCV and high PCV values were observed for pod yield per plant. Heritability values ranged from 15.41 per cent (Plant height) to 98.21 per cent (Number of primary branches per plant). High heritability and high GAM was recorded for number of primary branches per plant number of secondary branches per plant, number of well-filled and mature pods per plant kernel yield per plant and pod yield per plant indicating the importance of additive gene effects, selection for such characters may be rewarding.**

Key words: **Heritability, Phenotypic coefficient of variation, Genotypic coefficient of variation, Genetic advance, Groundnut.**

INTRODUCTION

Groundnut is an important oilseed crop grown in India and is largely cultivated as a rain-fed crop in dry lands. Drought is the most important factor limiting the yield potential of the rain-fed crop. Although high yield potential is the target of most crop breeding programs, it might not be compatible with superior drought resistance. On the other hand, high yield potential can contribute to yield in moderate stress environments. Genetic variability is the basic requirement for crop improvement as this provides wider scope for selection. Thus, effectiveness of selection is dependent upon the nature, extent and magnitude of genetic variability present in material and the extent to which it is heritable. In the present study, variability and other genetic parameters were studied for yield and yield attributes for efficient selection in segregating generations.

MATERIAL AND METHODS

Twenty four F_1s along with six lines and four testers were sown in a Randomised Block Design (RBD) with three replications during *kharif* 2014. Each parent was sown in 3 rows of 3 m length while F_1s were raised in a single row of 3 m length. All the 24 treatments were allotted at random to the experimental plots in each replication. Observations were recorded on ten random plants in each treatment per replication. The data were recorded for plant height (cm), number of primary branches per plant, number of secondary branches per plant, number of well-filled and mature pods per plant, shelling per cent, sound mature kernel per cent, kernel yield per plant (g) and pod yield per plant (g) on ten random selected plants. The data was analyzed statistically and genetic parameters *viz*., Phenotypic and Genotypic coefficients of variation (PCV and GCV) were computed according to the Burton (1952). Heritability in broad sense was estimated using the formula of Allard (1960). Genetic advance (GA) was calculated as per the formula as suggested by Johnson *et al.* (1955).

RESULTS AND DISCUSSION

Genotypic (GCV) and phenotypic (PCV) coefficients of variation

The analysis of variance revealed significant differences were observed for all the traits studied. The results are presented in the Tables 1 and 2. The estimates of genotypic and phenotypic coefficients of variability indicated that the values of PCV were higher than the GCV suggesting the influence of environmental factors. Less difference was observed between PCV and GCV in certain cases indicated that these characters were less influenced by the environment. Similar results were reported by John *et al*. (2006) and Ladole *et al*. (2009). High GCV and PCV values were observed for number of secondary branches per plant. Moderate GCV observed for number of well-filled and mature pods per plant. Moderate values of GCV and PCV were recorded for kernel yield per plant. Moderate GCV and high PCV values were observed for pod yield per plant. These findings are confirmed by Khote *et al.* (2009).Low GCV and low PCV were noticed for plant height, number of primary branches per plant, shelling per cent and sound mature kernel per cent.

Heritability and genetic advance as per cent of mean (GAM)

GCV measure the amount of variation present in a particular character. However, it does not determine the proportion of heritable variation present in the total variation. Therefore, heritability which represents the heritable variation existing in

the characters was calculated. In the present study, high heritability values were recorded for all the characters except plant height and pod yield per plant. Heritability values ranged from 15.41 per cent (Plant height) to 98.21 per cent (Number of primary branches per plant). The estimates of high heritability coupled with high genetic advance as per cent of mean were observed for number of secondary branches per plant, number well-filled and mature pods per plant and kernel yield per plant. Similar results were reported by John *et al.* (2006), Shinde *et al.* (2010) and Khote *et al* (2009).

High GAM was observed for number of primary branches per plant number of secondary branches per plant, number of well-filled and mature pods per plant kernel yield per plant and pod yield per plant. High heritability and high GAM was recorded for number of primary branches per plant number of secondary branches per plant, number of well-filled and mature pods per plant kernel yield per plant and pod yield per plant indicating the importance of additive gene effects, selection for such characters may be rewarding (Table 1 and 2). Similar results were reported by Padmaja *et al*. (2015) and Sanjeevakumar Patil *et al.* (2015). High heritability and low GAM was expressed for shelling per cent and sound mature kernel per cent, whereas low heritability and low GAM was recorded for plant height indicating the preponderance of non-additive gene action in inheritance of this character, hence, selection for these characters is not effective. Nagabhushanam *et al.* (1982) and Seethala Devi (2004). Low heritability and high GAM was observed for pod yield per plant indicating the importance of additive gene effects, selection for such characters may be rewarding.

CONCLUSIONS

The characters *viz.*, number of primary branches per plant, number of secondary branches per plant, number of well-filled and mature pods per plant and kernel yield per plant had shown high heritability and high GAM, pod yield per plant recorded low heritability and high GAM indicating the importance of additive gene effects, selection for such characters may be rewarding. High heritability and low GAM observed for Shelling per cent, Sound mature kernel per cent and low heritability and low GAM for plant height indicating the importance of non-additive gene action in inheritance of these character, hence, selection for these characters is not effective.

ACKNOWLEDGEMENT

This research was supported under the UGC Research award to the first author by the University Grants Commission (UGC), New Delhi is gratefully acknowledged.

REFERENCES

1. Allard R W 1960 Principles of Plant Breeding John Wiley and Sons, Inc., USA Wiley International Edition pp.85.
2. Burton G W 1952 Quantitative inheritance in grass. Proceedings of sixth international grassland congress. 1: 227-283.
3. John K and Vasanthi R P 2006 Heterosis in six single crosses of groundnut Legume Research 29 (4): 262-265.
4. Johnson H W Robinson H F and Comstock R E 1955 Estimates of genetic and environmental variability in soybean. Agronomy Journal 47: 413-418.
5. Khote, A.C., Bendale, V.W., Bhave, S,G. And Patil, P.P (2009). Genetic variability, heritability and genetic advance in some exotic genotypes of groundnut (*Arachis hypogaea* L.). Crop Res., 37 (1,2 &3):186-191.
6. Ladole , M.Y., Wakode, M.M., and Deshmuhkh, S.N (2009). Genetic variability and character association studies for yield and yield contributing traits in groundnut (*Arachis hypogaea* L.). J. Oilseeds Res., 26 (special Issue): 123-125.
7. Nagabhushanam GVS, Subramanyam D, Sree Rama Reddy N (1982). Studies on variability, heritability and genetic advance in groundnut (*Arachis hypogaea* L.). The Andhra Agric. J. 29:264-267.
8. Padmaja D, Eswari K. B., Brahmeswara Rao M.V, Shiva Prasad G. (2015). Genetic variability studies in F2 population of Groundnut (*Arachis hypogeaea* L.). *Helix Vol. 2: 668-672.*
9. Sanjeevakumar Patil, Shivanna, S., Irappa B. M. and Shweta (2015). Genetic variability and character association studies for yield and yield attributing components in groundnut (*Arachis hypogeae L.*). *International Journal of Recent Scientific Research 6 (6) :4568-4570.*
10. Seethala Devi G 2004 Genetic studies on certain morphological and physiological attributes in 10 F_2 populations of groundnut (*Arachis hypogaea* L.) M.Sc. (Ag.) Thesis, Acharya N.G. Ranga Agricultural University, Hyderabad.
11. Shinde, P.P., Khanpara, M.D., Jivani, L.L.., Vachhani, J.H and Kachhadia, V.H al. (2010). Genetic variability in Virginia bunch groundnut (*Arachis hypogaea* L.).Plant Archives, Vol.10 (2):703-706.

Table 1: Estimates of genetic parameters for yield and yield attributes in groundnut

Character	Mean	Coefficient of variation		Heritability (Broad sense)	Genetic advance	Genetic advance as per cent of mean
		Phenotypic	Genotypic			
Plant height	39.28	3.90	10.05	15.41	1.22	3.10
Number of primary branches per plant	4.41	16.82	16.97	98.21	1.51	34.26
Number of secondary branches per plant	1.09	81.03	83.08	95.12	1.77	162.39
Number of well-filled and mature pods per plant, Kernel yield per plant	25.56	19.58	20.03	97.17	10.15	39.70
Shelling per cent	71.51	4.04	4.17	93.70	5.84	8.16
Sound mature kernel per cent	91.06	3.78	3.95	91.79	6.81	7.48
Kernel yield per plant (g)	13.74	24.98	25.27	97.68	7.01	51.02
Pod yield per plant (g)	23.45	38.29	74.49	26.42	9.36	39.89

Table 2: Comparative statement based on estimates of different genetic parameters for yield and yield attributes in groundnut

Character	Genetic parameters	Gene effects	Influence of environment
Number of primary branches per plant, Number of secondary branches per plant, Number of well-filled and mature pods per plant, Kernel yield per plant	High h^2(b) and high GAM	Additive	Low
Shelling per cent, Sound mature kernel per cent	High h^2(b) and low GAM	Non-additive	High
Pod yield per plant	Low h^2(b) and high GAM	Additive	Low
Plant height	Low h^2 (b) and low GAM	Non-additive	High

