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STUDIES ON GENETIC VARIABILITY FOR PHYSIOLOGICAL, YIELD AND YIELD RELATED ATTRIBUTES IN GROUNDNUT (*ARACHIS HYPOGAEA* L.)

G.D. NANDINI*, K.JOHN, M. REDDISEKHAR AND P. LATHA

Dept. of Genetics and Plant Breeding, S.V. Agricultural college, ANGRAU, Tirupati, Chittoor Dt.517502, Andhra Pradesh, India

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ABSTRACT

Forty diverse genotypes of Spanish bunch groundnut were evaluated during *kharif* 2017 for variability studies. The genotype TCGS-1847 registered higher mean values for pod yield per plant, kernel yield per plant, harvest index, shelling per cent, number of mature pods per plant, number of primary branches per plant and desirable low specific leaf area at 60 DAS. The estimates of PCV were higher than the estimates of GCV for all the characters. Moderate GCV and PCV values were observed for pod yield per plant, kernel yield per plant, number of mature pods per plant, dry haulms yield per plant, hundred kernel weight and hundred pod weight. Moderate heritability coupled with moderate genetic advance as per cent of mean was recorded by number of primary branches per plant, hundred pod weight, hundred kernel weight and dry haulms yield per plant.

KEYWORDS: Groundnut, genetic variability, genetic advance, heritability

INTRODUCTION:

Groundnut (*Arachis hypogaea* L.) is an allotetraploid (2n = 4x = 40) and is an important annual oilseed legume crop, valued as a rich source of protein, minerals and vitamins. It belongs to the family Fabaceae. It is a self-pollinated, annual, herbaceous legume and is a king of vegetable oil seeds in India which occupies pre - eminent position in national edible oil economy. In breeding program, to improve pod yield in groundnut, it is essential the plant characters that determine productivity must be identified. Therefore, the information on the nature and extent of genetic variability and transmission of traits is of paramount importance in enhancing the efficiency of selection for seed and pod yield. Genetic variability is an essential prerequisite for crop improvement programme for obtaining high yielding varieties, through the estimation of different genetic parameters like components of variances, genotypic and phenotypic coefficient of variability, heritability and genetic advance. This study will facilitate an understanding behind expression of character and also role of environment therein

MATERIALS AND METHODS:

Forty groundnut genotypes were sown during *kharif,* 2017 in a Randomized Block Design with two replications. In each replication every genotype was sown in three rows of 5m length with a spacing of 30 cm between the rows and 10 cm between the plants within the row. The fertilizers in the experimental area was applied at the rate of 20 kg N, 40 kg P_2O_5 and 40 kg K_2O per hectare as it is a recommended dose for *kharif* cultivation of groundnut in the region. Data were recorded on randomly selected five plants from each genotype and average value was used for the statistical analysis for 19 characters *viz.,* days to 50% flowering, days to maturity, SPAD chlorophyll meter reading, specific leaf area at60 DAS, specific leaf weight at 60 DAS, relative water content at 60 DAS, plant height (cm), number of primary branches per plant, number of secondary branches per plant, number of mature pods per plant, number of immature pods per plant, 100-pod weight (g), 100-kernel weight (g), sound mature kernel (%), shelling per cent, harvest index (%), kernel yield per plant (g) and pod yield per plant (g).

RESULTS AND DISCUSSION:

The analysis of variance revealed significant differences for 19 characters indicating the existence of sufficient variability in the material.

The estimates of PCV for all the characters were higher than the estimates of GCV, which is mainly due to interaction of genotypes with the environment. The genotypic coefficient of variation is ranged from 0.49 to

*Corresponding author, E-mail: *nandinigurram935@gmail.com

40.09 per cent. The highest estimate of genotypic coefficient of variation was registered for number of secondary branches per plant (40.09%) and number of immature pods per plant (31.76%).The results obtained on variability and genetic parameters are presented here under (Table 1).

Heritability in broad sense was estimated for all the characters and it ranged from 2.59 to 69.08 per cent. High heritability was observed for days to maturity (69.08%) followed by SPAD chlorophyll meter reading at 60 DAS (66.12%) and days to 50 per cent flowering (62.16%).

On contrary, moderate heritability was noticed for most of the characters under the study *viz.,* shelling per cent (57.56%) followed by hundred kernel weight (55.55%), pod yield per plant (51.30%), hundred pod weight (48.27%), kernel yield per plant (45.62%), plant height (45.06%), dry haulms yield per plant (40.63%), number of immature pods per plant (40.54%), number of secondary branches per plant (33.32%), sound mature kernel per cent (30.59%) and number of primary branches (30.10%).

However, low heritability was seen for number of mature pods per plant (28.39%), specific leaf area at 60 DAS (25.82%), harvest index (20.21%), specific leaf weight at 60 DAS (17.38%) and relative water content at 60 DAS (2.59%).

The range of genetic advance varied from 0.0003 to 16.13. The moderate genetic advance was recorded for specific leaf area at 60 DAS (16.13) and lowest genetic advance was recorded for specific leaf weight (0.0003).

Genetic advance as per cent of mean ranged from 0.16 to 47.67 per cent. Genetic advance as per cent of mean (GAM) was recorded highest for number of secondary branches per plant (47.67%), number of immature pods per plant (41.66%), pod yield per plant (24.41%) and kernel yield per plant (22.23%).

While, moderate genetic advance as per cent of mean was observed for hundred kernel weight (16.23%) followed by dry haulms yield per plant (15.78%), number of mature pods per plant (14.87%), hundred pod weight (14.63%), number of primary branches per plant (10.41%) and specific leaf area at 60 DAS (10.08%).

On contrary, low genetic advance as per cent of mean was observed for shelling per cent (9.23%) followed by plant height (8.97%), SPAD chlorophyll meter reading at 60 DAS (8.83), days to maturity (7.05), days to 50 per cent flowering (6.48) and sound mature kernel per cent (2.01). Relative water content at 60 DAS (0.16) recorded least genetic advance as per cent of mean.

Reports of high GCV and PCV for number of secondary branches per plant, by Korat *et al.* (2010); John *et al.* (2013) and Patil *et al.* (2015), were in accordance with the present findings. Similar kind of high variability for number of immature pods per plant was reported by Shinde *et al.* (2010); John *et al.* (2013), Patil *et al.* (2015) and Hampannavar *et al.* (2018).

Moderate GCV and PCV values were observed for pod yield per plant, kernel yield per plant, number of mature pods per plant, dry haulms yield per plant, hundred kernel weight and hundred pod weight in decreasing order of their magnitude. Similar kind of moderate variability for pod yield per plant was reported by Korat *et al.* (2010), Kumar *et al.* (2010), Patil *et al.* (2015) and Vasanthi *et al.* (2015).

The moderate variability estimates obtained for kernel yield per plant were similar to the reports of Kumar *et al.* (2010), Patil *et al.* (2015) and Hampannavar *et al.* (2018). Moderate variability for number of mature pods per plant was in conformity with the following findings Jyothi *et al.* (2012), Vishnuvardhan *et al.* (2012) and Patil *et al.* (2014). Moderate variability for dry haulms yield was reported by Hampannavar *et al.* (2018). Moderate variability for hundred kernel weight and hundred pod weight was similar to the reports of Korat *et al.* (2010), Hiremath *et al.* (2011), Pradhan *et al.* (2011) and Hampannavar *et al.* (2018),

Low estimates of variability was observed for specific leaf area at 60 DAS , number of primary branches per plant, plant height, shelling per cent, SPAD chlorophyll meter reading at 60 DAS, days to maturity, days to 50 per cent flowering and sound mature kernel per cent. A low estimate of variability was observed for specific leaf area at 60 DAS was in concurrence with the reports of John *et al.* (2014). Low variability for number of primary branches per plant observed in the present study was also reported by John *et al*. (2009), Shinde *et al*. (2010) and Vasanthi *et al*. (2015). The findings of Kar *et al*. (2016) and Yusuf *et al*. (2017) are in accordance with the present result of low estimates of variability obtained for plant height.

Low estimates of variability was observed for shelling per cent, was in agreement with the reports of Korat *et al.* (2010), Hiremath *et al.* (2011), Pradhan *et al.* (2011), Vasanthi *et al.* (2015) and Kadam *et al*. (2016). The low variability estimates recorded for SPAD chlorophyll meter reading at 60 DAS was in conformity with the findings of John *et al*. (2008); Nandini *et al*. (2011) and Bhargavi *et al.* (2017). Reports of low variability for days to maturity by Shinde *et al*. (2010), Korat *et al*. (2010) and Shukla *et al*. (2014) were in accordance with the present findings. Low variability observed for days to 50 per cent flowering was similar with the findings of John *et al*. (2009), Shinde *et al*. (2010), Nandini *et al*. (2011), Korat *et al.* (2010), Vasanthi *et al*. (2015) and Kadam *et al*. (2016). Similar kind of of low variability for sound mature kernel per cent was reported by John *et al*. (2008), Hiremath *et al.* (2011), Yadav *et al*. (2014) and Hampannavar *et al.* (2018).

High heritability coupled with low genetic advance as per cent of mean was recorded by days to 50 per cent flowering is in agreement with the reports of Yadav*et al.* (2014), Hampannavar *et al*. (2018). High heritability coupled with low genetic advance as per cent of mean for days to maturity in the present study is similar to the reports of Korat *et al*. (2009), Yadav *et al*. (2014) and John *et al*. (2014). High heritability coupled with low genetic advance as per cent of mean was also reported for SPAD chlorophyll meter reading at 60 DAS but no confirmation was found with this attribute.

Moderate heritability coupled with moderate genetic advance as per cent of mean was recorded by number of primary branches per plant, hundred pod weight and hundred kernel weight and dry haulms yield per plant. Hundred pod weight and hundred kernel weight displayed moderate heritability coupled with moderate genetic advance as per cent of mean which is similar to the reports of Shinde *et al*. (2010) and Patil *et al*. (2014). This indicates the involvement of additive gene action and there is further scope for improvement of these characters through selection. Moderate heritability coupled with moderate genetic advance as per cent of mean was recorded for number of primary branches per plant and dry haulms yield per plant but no confirmation was found with this characters.

In the present study, the display of moderate heritability coupled with high genetic advance as per cent of mean by majority of characters indicates additive gene action and selection is effective for these characters. However, the characters pod yield per plant, kernel yield per plant, number of immature pods per plant and number of secondary branches per plant registered moderate heritability coupled with high genetic advance as per cent of mean. The estimates recorded for pod yield per plant was in conformity with the findings of John *et al*. (2009), Shoba *et al*. (2009) and Vasanthi *et al*. (2015). Moderate heritability coupled with high genetic advance as per cent of mean observed for kernel yield per plant were similar with the findings of Shoba *et al*. (2009). Moderate heritability coupled with high genetic advance as per cent of mean for number of immature pods per plant, was in agreement with the report of Vasanthi *et al*. (2015).

In this case, moderate heritability coupled with low genetic advance as per cent of mean was registered by plant height, shelling per cent and sound mature kernel per cent. The estimates recorded for shelling per cent was in conformity with the findings of Rajesh *et al*. (2012) and Hampannnavar *et al*. (2018). Moderate heritability coupled with low genetic advance as per cent of mean for plant height in the present study is similar to the reports of Suneetha *et al*. (2005). These estimates with respect to plant height, shelling per cent and sound mature kernel per cent reveal the presence of non-additive gene action with more influence of environment in its inheritance. Hence, the traits are further improved by selection or by inter mating among selected ones or by single plant selection. Whereas, low heritability coupled with low genetic advance as per cent of mean was recorded for specific leaf area at 60 DAS, relative water content at 60 DAS and harvest index indicating the preponderance of non- additive gene action in inheritance of these characters. Hence, selection for these characters was not effective. Low heritability coupled with low genetic advance as per cent of mean was recorded for specific leaf area at 60 DAS, relative water content at 60 DAS and harvest index but no confirmation was found with these characters.

From the foregoing discussion on variability and genetic parameters it is evident that pod yield per plant, kernel yield per plant, number of secondary branches per plant, number of immature pods per plant, dry haulms yield per plant, hundred kernel weight and hundred pod weight weight had high to moderate GCV, PCV and moderate heritability coupled with high to moderate genetic advance advance as per cent of mean indicating the variation is mainly due to additive gene effects. Hence, simple direct selection may be effective to improve these traits. Low values exhibited by specific leaf weight at 60 DAS, relative water content at 60 DAS and harvest index for these parameters suggested lesser scope for the improvement of these traits due to non-additive gene action.

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