Indian J. Genet., **61**(4): 371-372 (2001)

Inheritance of main axis flowering and seed testa colour in groundnut (*Arachis hypogaea* L.)

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(Received: March 2001; Revised: July 2001; Accepted: August 2001)

Variability in testa colour of groundnut is considerable from white, tan, rose, pink, wine red to deep red. The commercially accepted colours are rose and red both to the consumers as well as millers. On the other hand, main axis flowering in groundnut is one of the important criteria used for classifying the species *hypogaea* into two sub-species viz., *hypogaea* and *fastigiata* [1-2]. Different types of gene actions have been reported for inheritance of testa colour and main axis flowering by different workers [3]. In the present investigation the inheritance of these two traits has been discussed.

Two crosses namely, Girnar 1 ms × PBS 11003 and Girnar 1 ms x M 13, were developed, advanced and evaluated for studying inheritance of seed testa colour and main axis flowering, respectively. In both the crosses Girnar 1 ms, (an EMS induced male sterile mutant of groundnut cultivar Girnar 1), having main axis flowering and rose colour testa was used as female parent. PBS 11003 is an advanced breeding line developed at the NRCG, Junagadh (with red testa) and M 13 is a popular Virginia runner variety (without main axis flowering), and both were used as male parents. Two single crosses were developed in the rainy season of 1998, their F_1's were evaluated during kharif 1999 and the respective F_2 populations were evaluated by space planting the materials during kharif 2000. Recommended crop production and protection practices were followed during the growing season. Phenotypic classification of individual plant testa colour was based on mature unblemished seed in one cross and the presence and absence of main axis flowering in another cross. Segregation data were analyzed using Chi-square test [4].

Genetics of seed testa colour

All F_1 plants of the cross Gimar 1 ms × PBS 11003 were having red testa colour, thus, reflecting the dominance of red testa colour over the rose. In F_2 generation each plant was screened for seed testa colour. Out of 251 plants, 66 plants had rose coloured testa while 185 plants had the red testa. This segregation in F_2 generation gave a good fit to an expected phenotypic ratio of 3 red: 1 rose (Table 1). Similar results were also reported earlier [5-8]. Hence, the gene symbols 'R' for red and 'r' for rose proposed by earlier workers [5,7] could be retained.

Genetics of main axis flowering

In Girnar 1 ms × M 13 cross, all the F_1 plants did not have reproductive axils on the main axis (absence of main axis flowering), thus, indicating the recessive nature of the gene (s) responsible for main axis flowering (maf), dominant nature of presence of only vegetative leaf axils on the main axis. In F_2, of the 237 plants screened, 225 plants did not have reproductive axils on the main axis while 12 plants had reproductive leaf axils on the main axis. The chi-square test was applied

Table 1. The F_2 segregation of main axis flowering (maf) and red tests colour in groundnut

Character/cross	Phenotype of F_1 plants	Number of F_2 phenotypes			Expected genetic ratio	χ^2 value	Probability
For main axis flowering (MAF)							
Girnar 1 ms × M 13	MAF	Without MAF	With MAF	Tota	15:1	0.568	0.50-0.30
		225	12	237			
For seed testa colour							
Girnar 1 ms × PBS 11003	Red	With red testa	With rose testa	Total	3:1	0.224	0.70-0.50
		185	66	251			

and an expected phenotypic ratio of 15 (maf) : 1 (no maf) was found to fit well (χ^2 = 0.57 with p = 0.5-0.1). This indicated that the inheritance of main axis flowering was governed by two independent genes interacting in duplicate manner so as to give the ratio of 15 (No main axis flowering) : 1 (main axis flowering). The gene symbols MAF_1/maf_1 and MAF_1/maf_1 are being proposed. The genotypic configuration of the parents could be explained as MAF_1 MAF_1 MAF_2 MAF_2 for M 13 and maf_1 maf_1 maf_2 maf_2 for Gimar 1 ms. Mouli *et al.* [9] had reported monogenic recessive segregation while control by two sets of duplicating loci interacting together with epistasis between loci has also been reported [10-11].

In the foregoing discussion it is concluded that red testa colour is dominant over rose colour and presence of maf is recessive in nature and its inheritance is governed by two sets of independent genes having duplicate interaction. However compli- cated gene expression for these two traits has been reported earlier. It might be due to the varying number of genes among the parental lines used in an inheritance study depending on the relationship between parents [12].

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