

A New Genotype for Red Testa in *Arachis hypogaea*, L¹

by

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Four distinct testa-colours, viz, purple, red, rose and white have been reported in groundnut. The present day concept of the genotypes for these colours is based on the assumptions of Patel *et al.* (1936) and Higgins (1940). According to them, a factor P determines purple colour, while R determines red. Two sets of duplicate factors F₁, F₂ and D₁, D₂ condition the testa colour. The rose colour is also determined by F₁ and F₂, and in the absence of either set of the testa colour conditioners, the testa is white or colourless. It was on these assumptions that the presence of a rose factor was found necessary by them for the development or expression of red and purple colour. During the course of study of testa-colour inheritance in *Arachis hypogaea*, a few cases came to light where the mode of inheritance of rose and red colours did not agree with the findings of the previous workers and the same have been described in this paper.

Material and Method: The parents involved are M 1688-1 and T28. The former was picked out as a mutant from E. C. 1688 having variegated red testa. It has a fully developed red testa. E. C. 1688 was introduced from Africa and conforms to all morphological descriptions given for the variety *rasteiro*. T28 is a variety recommended by the Department of Agriculture, U. P. and is being extensively grown all over the State. It has a pink rose testa in freshly harvested crop, which changes to russet-brown when weathered. The crossing was done by hand emasculation and pollination and a reciprocal cross was also made. In order to confirm the genetic results of the F₂ generation, the F₁ progeny of the cross M. 1688-1 XT28 was back crossed with the recessive parent M. 1688-1.

Observations: The testa colour in F₁ was found to be rose showing complete dominance of rose over red colour. F₂ population segregated in the ratio of 3 Rose: 1 Red indicating the consistency of the expected ratio in the two crosses both separately as well as combined. This shows a single factor difference to exist between the two colours. On this assumption, a factor T (denoting tan or rose colour) has been assigned for rose colour and for red one. Thus T28 with rose coloured testa has the constitution TT, and M. 1688-1 with red colour of the testa has the constitution tt. The F₁ progeny with Tt constitution, therefore has rose colour. The ratio 1 Rose: 1 Red of the back

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cross population (Table 1) confirms the single factor difference occurring between rose and red colour.

TABLE 1. Segregation of testa colour in F_2 generation in expected ratio of 3:1 and in back cross

Sl. No.	Cross	Testa colour	Actual No. observed	Calculated No.	χ^2	Value of P
1.	M 1688-1 \times T 28	Rose	103	101.25	0.0303	.80-.70
		Red	32	33.75	0.0907	
					0.1210	
2.	T 28 \times M 1688-1	Rose	313	317.25	0.0569	.70-.50
		Red	110	105.75	0.1708	
					0.2277	
3.	Pooled	Rose	416	418.50	0.01497	.90-.80
		Red	142	139.50	0.04480	
					$\chi^2 = 0.05977$	
4.	Back cross F_1 (M 1688-1 \times T 28) \times M 1688-1	Rose	26	27.0	0.0370	.80-.70
		Red	28	27.0	0.0370	
				54.0	$\chi^2 = 0.0740$	

Discussion: The simple Mendelian ratio of 3 Rose: 1 Red with the dominance of rose over red is no doubt illuminating and not reported earlier. Where the rose testa of T28 was dominant over red testa of M (1688-1) in this cross, it was simple recessive (hypostatic) to the red in a separate cross (T28 \times E.C. 21150). This proves that the red must have two different genotypes. The duplicate factors R1 R2 of Patel *et al.* (1936) corresponding to F1, F2 of Higgins (1940) assumed to determine the rose testa in *A. hypogaea* cannot explain the monogenic difference between red and rose. This lends support to the assumption of a single gene for rose colour in place of the duplicate one which is dominant over its allele determining a red colour not distinguishable from the other red, produced by the factor R.

Summary: The two important conclusions that could be drawn are (i) that there are two genetically different types of red testa in *A. hypogaea* and (ii) that the rose testa is determined by a single factor and its presence is not necessary for the expression of red colour.

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