

Inheritance of Testa Colour in Groundnut (*Arachis hypogaea* L.)

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Analysis of nine F₂ progenies of intervarietal hybrids in (*A. hypogaea*) groundnut showed that red testa in monogenic and dominant to rose; purple is also monogenic but incompletely dominant to rose. A three factor segregation is met with in crosses between varieties possessing red x white and rose x white colour of testa indicating that the varieties with white colour of testa also carried the factor for red.

The study of inheritance of colour of testa has been a fascinating one in view of the complex interactions and segregation ratios reported by many investigators (Hammons, 1963; Harvey, 1967; Srivastava, 1968). The present study was carried out at the Tindivanam centre of All India Coordinated Research Project on oilseeds to elicit information on inheritance of colour of testa.

MATERIAL AND METHODS

Eight bunch varieties were selected to represent four testa colours and employed in hybridisation. The accessions representing red testa were Gangapuri and B.131 and in EC 76446, the testa colour was purple; three others viz., CO.969, TG.14, EXI.1 had rose testa and in MF.2 and AH.8068 the testa colour was white. Three sets of reciprocal crosses were effected between parents possessing red and rose, red and white and rose and white testa colours. The fourth combination was between parents with rose and purple testa. Artificial

hand emasculation of the flowers and pollination were effected during 1975 summer season and the study of F₁ and F₂ was carried out during 1976 Kharif and 1977 summer respectively. Testa colour of seeds was determined from mature pods after curing in the field. The testa colour of the hybrids and its segregation in the F₂ are given in Table I.

RESULTS AND DISCUSSION

Red x Rose : The hybrids of Gangapuri x GO. 969 and Gangapuri x TG14 had red testa indicating dominance of red colour over rose. The reciprocal hybrids also showed the red testa. The F₂ behaviour presented a good fit to the expected ratio of 3 red:1 rose. Patel *et al.* (1936) reported similar results. Patil (1965) also found a monogenic segregation for red and rose testa colours in the F₂. However, Srivastava (1972) recorded a ratio of 3rose:1 red in crosses between M1688-1 (red testa) x T28 (rose testa) and its reciprocal. The ratio of 1 rose:1 red

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TABLE. Segregation of testa colour in groundnut

Particulars	Colour of testa in F ₁	Number of F ₂ Plants				Ratio	Probability Chi-square
		Purple	Red	Rose	White		
Red x Rose							
Gangapuri x GO.969	Red	—	95	32	—	3 : 1	95.98 0.0026
Reciprocal	Red	—	96	32	—	3 : 1	100 ...
Gangapuri x TG.14	Red	—	54	14	—	3 : 1	30.50 0.695
Reciprocal	Red	—	168	54	—	3 : 1	80.90 0.054
Red x White							
B.131 x Ah. 8068	Red	—	50	15	4	45 : 15 : 4	90.95 0.146
Reciprocal	Red	—	54	17	4	45 : 15 : 4	90.95 0.154
Rose x White							
TG.14 x MF.2	Red	—	103	40	9	45 : 15 : 4	50.70 0.741
Reciprocal	Red	—	139	48	13	45 : 15 : 4	95.98 0.048
Rose x Purple							
Ex.1-1 x EC. 76446	Red	125	236	119	—	1 : 2 : 1	80.90 0.278

in the back cross progeny of F₁(M.1688-1 x T 28) x M 1688-1 is at variance with the single factor difference between the rose and red colour of the testa. The rose testa behaved as a simple recessive for the red testa in another cross of T 28 x EC 21150. He concluded that there are two genetically different types of red testa in *A. hypogaea* L and that the rose testa colour is determined by a single factor and its presence is not determined by single factor and its presence is not necessary for the expression of red colour. Harvey (1967) reported that red is dominant to flesh testa (rose, pink) apparently as a monogenic difference, but gene(s) for both flesh and colour development are necessary for expression of the red colour. Ashri (1970) studied the inheritance of colour of testa in crosses between three virginia groundnuts with flesh (pink) testa and another virginia type specified as 94 (red testa). The F₂

showed a good fit of 13 red : 3 flesh. He believed that two loci, R₁ and R₂ control red testa. The dominant or partially dominant R₁ allele gave red pigment which the recessive r₁ did not. R₂ at the second locus did not produce red pigment whereas its recessive did. In view of the presence of a second red testa locus only in certain varieties, the reports on the inheritance of colour of testa have been controversial. It is reasonable to conceive the existence of a second locus controlling red pigment formation, since different shades of red are known in the testa colour of groundnuts. The D and F factors for testa colour are probably duplicated due to the amphiploid nature of the species. Since the homozygous recessive r₁ r₂ produces red testa, it may well be epistatic to another locus which produces the pigment. Then it may be a regulatory gene with R₂ being the suppressor. If so, the tested varieties could be homo-

zygous for the red pigment producing allele of the possible third locus (Ashri, 1970). The results of the present study point to the testa colour in Gangapuri, GO 969 and TG 15 being governed by monogenic inheritance.

Red x White

When B.131 (Red testa) was crossed with AH. 8068 (white testa), the red testa was dominant in the F_1 and in the F_2 , segregation for red, rose and white colours occurred in the proportion of 45 : 15 : 4. Patel *et al* (1936) also observed similar segregation in crosses between the varieties, Philippine white and Small Japan, indicating that the factor rose is necessary for the development of red and that Small Japan carried both rose factors. It is possible that B.131 carries both the rose factors as evidenced from the present study.

Rose x White

The reciprocal hybrids of TG 14 and MF 2 had red testa and the F_2 gave segregation for red, rose and white testa colour in a 45 : 15 : 4 ratio, thus, confirming the results of Varisai Muhammad *et al.* (1966). They observed presence of red testa in the F_1 of white x rose testa coloured parents and a 45 : 15 : 4 segregation for red, rose and white in the F_2 . However, Patel *et al* (1936) and Patil (1965) reported 15 : 1 segregation for rose and white testa colour in the F_2 .

Rose x Purple

The F_1 of Ex 1-1 X EC 76446 had red testa and in the F_2 , the segregation was in a 1 : 2 : 1 ratio for purple, red and rose respectively, showing an incomplete dominance of purple over rose. Patel *et al.* (1936) inter-

preted his finding on a simple Mendelian basis, purple being dominant to rose. Prasad and Srivastava (1968) obtained segregations for purple and rose in the basis of a 15 : 1 ratio. Patil (1965) obtained purple and rose in the proportion of 45 : 19 in the F_2 . It would appear that depending upon the genetic constitution of the varieties of groundnut, the inheritance of testa colour also varied. The determination of colour of testa in the Spanish, Valencia and Virginia grounds seem to be different and that this difference is reflected in the varying segregation ratios observed by different workers.

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