INHERITANCE OF CHARACTERS IN GRAM (*C. arietinum*)

Foliage colour and rough seed coat.

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Foliage colour. Among the various exotic and extra provincial types of gram introduced and studied on the Cotton Breeding Station, Coimbatore, three types viz., L22 from Sirsa in the Punjab, T16 and T62 from Pusa in Bihar possessed pale yellowish chlorotic leaves. It was found to be a definite varietal character breeding true in L22, but in the other types observations were made only for one season and as such need further confirmation. It might however be stated that colour difference noticed in L22 is different from those described by Shaw and Khan (1931). These authors have recorded that the colour ranges from light yellowish green to dark bluish green. But in L22, the leaves assume a distinctly greenish yellow colour especially after a month after germination, which hue remains so, till harvest.

In order to find whether the character is Mendelian, this strain was crossed with a strain (No. 416) having normal green foliage. Their F_1 was dark green like the green parent 416 showing thereby its dominant feature. F_2 segregated into the two parental classes (Plate I) giving the following numbers.

Normal green.	Pale yellowish green.	Total	P value for 3:1 ratio
71	20	91	>0·5

The fit is good for a single pair of factors which may be designated by Lg lg.

The two parents differed also in seed colour. Opportunity was taken to study if their progenies showed any linkage between seedcoat colour and foliage colour in F_2. Unfortunately by the time they produced seeds, six plants from the green leaved type and twelve from the pale yellowish type dried without giving any seed. This differential sterility resulted in the distortion of the normal dihybrid ratio (vide Table I)

Table I.

Actual number of plants in seed grade.			
C. S. 12.		C. S. 10.	
Green	Pale yellowish green.	Green	Pale yellowish green.
51	7	14	1

Within each of the foliage colour groups however, the fit was good for monohybrid ratio, indicating that the two genes T^1t^1 and Lg lg are independent.

Roughness of seed coat. The seed coat in gram may be either wrinkled, smooth to slightly granulated, or rough having a feel like sand paper. The inheritance of wrinkling in relation to smoothness has been worked out by V. Ramanatha Ayyar and R. Balasubramania Ayyar [1936], but the genetic behaviour of the rough surface has not yet been studied.

With a view to get information on the above point the rough seeded T 69 was crossed with two smooth surfaced types T 11 and T 43. The F_1s had a rough seed surface and the F_2 showed a simple monohybrid segregation (vide Table II).

Table II.

Cross.	Actual number of plants with seeds.		Total.	P value for a 3 : 1 ratio.
	Rough.	Smooth.		
T11 × T 69	22	10	32	>0·30
T43 × T 69	236	85	321	>0 50

The pair of factors responsible for this phenomenon may be represented by the symbols R r.

The two smooth surfaced parents T11 and T43 differed also from the other, in factors P and T^2 respectively. When their segregation was studied with reference to seed roughness it was found that these two factors T^2 and P segregated independently of factor R (vide Table III).

Table III.

Cross.	Actual number of plants in seed grade.						Total	Value of P
	C. S, 10		C. S. 8		C. S. 7			
	Rough	Smooth	Rough	Smooth	Rough	Smooth		
T11 × T69 F_2	18	8	...	...	4	2	32	>0·80
T43 × T69 F_2	186	56	50	29	...	...	321	>0·10

Acknowledgement. The author's thanks are due to the Indian Central Cotton Committee for permitting these studies during the off-season.

Summary. 1. Green and pale yellowish green colours of leaves in Bengal gram differ genetically from one another by a single pair of factors which are termed Lg lg. The factor Lg is found to be independant of factor T^1.

2. Roughness and smoothness of seed coat are governed by a single pair of factors designated by letters Rr. They are independent of factors T^2 and P.

References.

1. V. Ramanatha Ayyar and R. Balasubramania Ayyar (1936) Proc. Indian Acad. Science, Bangalore Vol. 4 Section B, pp. 1—26.
2. Shaw F. J. F. and A. R. Khan (1931) Mem. Dep. Agriculture in India, Bot. Series Vol. 19.