

TWO CASES OF PLEIOTROPY IN *CICER ARIETINUM*

G. P. ARGIKAR

Agricultural Research Station, Bijapur

SOME genetic studies undertaken by the author in *Cicer arietinum* L. reveal two interesting instances of pleiotropy which are described below.

1. *Cotyledon Colour and Foliage Colour*: A green seeded strain of *Cicer* possessing green cotyledon was found to breed true for its bluish-green foliage as contrasted with the normal green foliage of several other types. The bluish-green foliage of the green seeded strain was found to turn bluish-violet on the complete maturity of the plants thus again clearly distinguishing itself from the more common types raised from seed containing yellow cotyledon whose foliage turns either yellowish-white as in case of *Gulab* or the white seeded types used in the crosses studied, or brown as is noticed in case of types like *Chafa* or *Bada-Chana* as also the mutant forms *Alternifolia* and *Prostrata* (Argikar : 1952).

The data obtained by the author from a study of the crosses made between the *Green Seeded* strain and several other strains having seed containing yellow cotyledon are presented below:—

Serial number	Name of the cross	Foliage colour of F ₁ plants	No. of seeds of F ₁ plants segregating for		Total No. of seeds
			Yellow cotyledon	Green cotyledon	
1.	(Green Seeded × Gulab)	Green-yellowish white	1,331	448	1,779
2.	(Green Seeded × White Seeded) ...	” ”	617	205	822
3.	(Green Seeded × Bada-Chana) ...	” ”	673	215	888
4.	(Green Seeded × Alternifolia) ...	” ”	393	131	524
Totals (observed)			3,014	999	4,013
Expected on a monogenic ratio :			3,009·75	1,003·25	4,013

$\chi^2 = 0.024$; P between 0.95 to 0.50. The fit is good.

All the above seeds with yellow and green cotyledons as produced by the F₁ plants of each of the crosses were sown separately to raise the second hybrid generation of the crosses. There was hardly any gappiness and there was no wilting of plants. Without exception all the plants raised from seeds with yellow cotyledon were found to have the normal green foliage as possessed by the male parent in each case, while those raised from seeds with green cotyledon had a bluish-green foliage turning bluish-violet on maturity. Since the green foliage of the F₁ plants is found to be dominant over the

bluish-green one and as the segregation for cotyledon colour obtained in the seeds of the F_1 plants is monogenic, (Argikar: 1952), the two types of foliage colours are found to be governed by one factor pair only. Similar findings were reported by Aiyar as early as 1937 in connection with the normal green and pale yellowish green foliage. It could be concluded from the data obtained that the cotyledon colour of the seed sown and the foliage colour of the resultant plant are controlled by the same pleiotropic gene.

Since the study involves various crosses with entirely different parents and since there is no exception to the rule in the frequencies obtained, the possibility of a close or a tight linkage appears to be remote.

2. *Stem Colour and Flower Colour*: The *Gulab* and the *White Seeded* types, both possessing a yellowish-white stem and white flower, were crossed with some pink flowered types having a purplish-green stem with a view to study the inheritance of stem and flower colours. It was found that the pink flower differed monogenically with the white one confirming the findings of Pimplikar (1943) who designated the two genes as *P* and *p*. Khan and Akhtar (1934) and Ramnath Ayyar and Balasubrahmaniam (1936) had found that the genes *P* and *B*, and *P*, *C*, *B* were responsible for producing the pink colour of the flower in case of *Cicer* and it is to be ascertained whether our material is homozygous for the genes *C* and *B*.

The results obtained by the author in connection with the study of stem and flower colours are tabulated below :—

Serial number	Name of the cross	Nature of F_1 plants	Nature of F_2 population		Total No. of plants observed
			No. of plants with purplish-green stem and pink flower	No. of plants with yellowish-white stem and white flower	
1.	(Green Seeded × Gulab)	Pink flowered with a purplish-green stem	451	135	586
2.	(Gulab × Alternifolia)	„ „	306	93	404
3.	(Gulab × Prostrata) ...	„ „	142	47	189
4.	(White Seeded × Alternifolia)	„ „	203	63	266
5.	(Green Seeded × White Seeded) ...	„ „	318	100	418
Totals (observed)			1,420	443	1,863
Expected on a monohybrid ratio :			1,397.24	465.75	1,863

$\chi^2 = 1.48$; *P* between 0.50 to 0.20. The fit is good.

In all the above crosses, therefore, the otherwise expected recombinant phenotypes viz., pink flowered plants with a yellowish-white stem and white flowered plants with a purplish-green stem did not occur at all in the F_2 generation to make up the di-hybrid ratio. This indicates that the stem and the flower colours are in all probability controlled by a single gene. Not a single recombinant individual was traced in any of the crosses to think of the possibility of a tight linkage between the two characters.

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