

The length of the spine-bearing area ( $a$ ) was studied in relation to the total length of the hind-femur ( $b$ ). In the *solitaria* males the ratio  $b/a$  is  $0.428 \pm 0.006$  and this figure is significantly less than in females ( $0.469 \pm 0.007$ ). In the *gregaria* phase, however, the ratio in males ( $0.486 \pm 0.007$ ) is significantly higher than in females ( $0.453 \pm 0.013$ ).

Sexual dimorphism in respect of the size, etc., of the spines was also studied. It was found that the size is larger in females than in males.

Fuller results will be published elsewhere.

Zoological Survey of India, M. L. ROONWAL,  
Calcutta. R. K. BHANOTAR.  
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## ANOTHER CASE OF INTERACTION OF FACTORS IN *CICER ARIETINUM* L.

CHOUDHARY (1957) described two tiny-seeded segregates in *Cicer* having small-sized leaves and tiny pods containing small seed. The tiny pod and seed were observed to be recessive to the normal pod and seed of the 'Chafa'

variety (Kadam, 1945) and differed from it by a single pair of factors.

A similar *small-leaved* and tiny-seeded spontaneous mutant was spotted by the author (Argikar: unpublished) in a crop of 'Chafa' gram in 1948-49. In 1953-54, this new mutant was crossed with the *tiny-leaved* from (Ekbote, 1937; Choudhary and Argikar, 1957; Argikar, 1958), having tiny, clustered pinnules but normal-sized pods and seed. The seed, leaf and leaflet measurements of the two mutants used in the cross and of their  $F_1$  hybrid are presented in Table I along with those of the normal type 'Chafa'. For the sake of convenience, the *tiny-leaved* form will be denoted as Mutant A and the *small-leaved* one as Mutant B in this note.

The  $F_1$  hybrid of the cross between the two mutant forms had, therefore, *normal* leaves, leaflets and seed. The  $F_2$  segregation observed for the leaf character is presented in Table II.

Since the fit for a digenic ratio is good, it is proposed to designate the Mutant A as  $Tlv\ Tlv\ smlv\ smlv$  and the Mutant B as  $tlv\ tlv\ Smlv\ Smlv$ .

The  $F_3$  frequencies and the genic symbolization of the types obtained are given in Table III.

The  $F_3$  study confirms the  $F_2$  findings. It will be seen that both the dominant genes  $Tlv$  and  $Smlv$  interact to produce *normal* leaf while  $Tlv$  alone produces *small* leaf as found in Mutant B,  $Smlv$  causing the leaf to be *tiny* as in Mutant A. The double recessive also produces *tiny* leaves.

TABLE I

Name of the type	Mean size of the seed in mm.		Mean leaf length in mm.	Size of the leaflet in mm.		Mean 100 grain weight in mg.
	Length	Width		Length	Width	
Mutant A ..	7.8	5.7	32.5	5.0	1.5	11.79
Mutant B ..	5.6	3.9	35.0	6.5	4.0	4.20
$F_1$ hybrid ..	7.9	5.8	40.0	8.5	5.0	12.00
Chafa (normal) ..	8.0	5.9	45.0	8.5	5.0	13.50

TABLE II

Name of the cross	No. of plants having			Total	$X_2$	P value
	Normal leaves	Small leaves	Tiny leaves			
Mutant A $\times$ Mutant B ..	247	88	97	432	..	..
Reciprocal of the above ..	90	38	53	181	..	..
Total observed ..	337	126	150	613	..	..
Expected on a 9 : 3 : 4 ratio ..	344.80	114.94	153.26	613	1.59	0.20-0.30

TABLE III

F <sub>2</sub> Phenotype	Genotype	No. of F <sub>3</sub> progenies	F <sub>3</sub> frequencies	Ratio	X <sub>2</sub>	P value
Normal-Leaved	Tlv Tlv Smlv Smlv	3	143 Normal-leaved plants	Breeding true	..	..
	Tlv Tlv Smlv smlv	8	272 Normal 178 Small-leaved	3:1 Fit not very good	..	..
	Tlv tlv Smlv Smlv	8	284 Normal 110 tiny-leaved	3:1	1.790	0.10-0.20
	Tlv tlv Smlv smlv	5	110 Normal 51 Small 53 tiny-leaved	9:3:4	4.070	0.10-0.20
Mutant B ..	Tlv Tlv smlv smlv	1	63 Small-leaved plants	Breeding true	..	..
	Tlv tlv smlv smlv	3	97 Small 33 tiny-leaved	3:1	0.033	0.95-0.50
Mutant A ..	tlv tlv Smlv Smlv	10	213 tiny-leaved plants	Breeding true	..	..
	tlv tlv Smlv smlv					
	tlv tlv smlv smlv					

Studies on the inheritance of the seed character in the above cross indicated that the normal seed was dominant to the tiny seed, the difference being monogenic. When the two characters, viz., the leaf and seed types are considered together in all the plants that bore seed, it is found that one of the two dominant factors that affect the leaf is also responsible for the production of normal seed; the same character in its recessive condition produces tiny seed. From the recombinations obtained for the leaf and seed characters as are presented in Table IV, it will be observed that the factor

Smlv causes the seed to be of normal size while smlv governs the tiny size, the factor Tlv having no effect on the seed character.

The normal leaf in *Cicer* could, therefore, be now designated as Slv Slv Tlv Tlv Nlv Nlv Glv Glv Alv Alv Smlv Smlv comprising of at least six pairs of factors in continuation of the five already mentioned (Argikar, 1958).

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TABLE IV

	Normal-leaved normal-seeded	Small-leaved tiny-seeded	Tiny-leaved normal-seeded	Tiny-leaved tiny-seeded	Total
Observed No.	310	102	97	32	541.00
Expected on a 304.40	101.40	101.40	33.80	541.00	
9:3:3:1 ratio					
X <sub>2</sub> —0.18; P—between 0.95-0.99.	The fit is good.				

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2. Choudhary, B. B. and Argikar, G. P., *Ibid.*, 1957, 26, 395.
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## ULTRASONIC WELDER

THE welding industry has a valuable new piece of equipment in a 2,000-watt welder, part of the Sonoweld line which utilizes ultrasonics to join similar and dissimilar metals without fusion, and with very little external deformation.

Ultrasonic welding is a solid state joining process in which the materials to be joined are subjected to high frequency alternating vibra-

tions, which are generated by the transducer in the welding head system and transmitted through the coupling members to the work being done. The resulting joints are accomplished without fusion, and, in many materials, exceed the strength of similar joints made by standard resistance welding methods.—*J. Frank Inst.*, October 1958.