

BHABHA ATOMIC RESEARCH CENTRE  
Trombay, Bombay 85, India  
Biology and Agriculture Division

1. Mutation studies at the  $Sh_1$  locus in maize.

The  $Sh_1$  locus is particularly suited to a study of the nature of induced mutations. It has an easily recognizable phenotype, closely linked flanking markers, and a protein product which is easily analyzable by electrophoretic and immunochemical criteria. Furthermore, positive evidence of interallelic complementation among previously analyzed  $sh_1$  mutants suggests that newly induced mutants can also be put to the functional test.

A project to induce  $sh_1$  mutants by gamma irradiation and to investigate them with regard to the above characteristics has been initiated. Kernels and plants of the  $C Sh_1$  genotype ( $A C R$  stock) were irradiated in two different experimental lots. Acute doses of 10 and 15 kR were given to the first and chronic doses of 0.8, 1.1 and 2.5 kR were applied to the second lot.  $M_1$  plants were used mainly as female parents in crosses with pollen from a  $c sh_1$  tester stock. Ten ears showing kernels of colored  $sh_1$  type in a total population of 1145 ears were obtained. Electrophoretic analysis with nine of these mutants shows that neither the  $Sh_1$  protein nor any other new protein band is visible in their endosperm extracts. The single mutant kernel born on the tenth ear gave rise to a plant which did not produce any seeds on selfing and the mutant is consequently lost. Electrophoretic results such as these are most likely to be caused by the loss of the  $Sh_1$  locus. Efforts to further characterize these mutants and to obtain a larger number of  $sh_1$  mutants by gamma irradiation are in progress.

P. S. Chourey

2. Unusual property of the  $C_1$  locus.

A derivative of  $I$  Trombay (Inhibitor of aleurone color) was apparently not transmitted through the male gametes (Chandra Mouli et al., Can. J. Genet. Cytol. 12:259-263, 1970). During the course of further analysis of this line, it was observed that even through the female its

Table 1

Types of kernels obtained in reciprocal crosses of colorless individuals (I Sh Bz wx x C sh bz wx) and C sh bz wx plants.

Cross	Kernel types						
	<u>I</u> <u>Sh</u> <u>Bz</u> <u>wx</u>	<u>C</u> <u>sh</u> <u>bz</u> <u>wx</u>	<u>I</u> <u>sh</u> <u>bz</u> <u>wx</u>	<u>C</u> <u>Sh</u> <u>Bz</u> <u>wx</u>		<u>C</u> <u>sh</u> <u>Bz</u> <u>wx</u>	<u>C</u> <u>Sh</u> <u>bz</u> <u>wx</u>
				Light	Dark		
♀ <u>I</u> <u>Sh</u> <u>Bz</u> <u>wx</u> x <u>C</u> <u>sh</u> <u>bz</u> <u>wx</u>	51	158	19	5	86	4	0
	55	116	13	4	101	1	0
♂ <u>C</u> <u>sh</u> <u>bz</u> <u>wx</u>	10	66	10	8	50	3	1
	47	121	11	34	42	2	0
	49	187	12	33	111	2	0
	28	138	15	23	75	4	0
	3	102	5	17	110	0	0
	18	99	9	9	72	1	0
	32	112	15	18	85	0	0
	23	124	16	18	79	4	1
	Total	316	1223	125	<u>169</u>	<u>811</u>	23
Exact Reciprocals		76			60	1	2
♀ <u>C</u> <u>sh</u> <u>bz</u> <u>wx</u> x		96			89	2	0
		89			89	2	0
♂ <u>I</u> <u>Sh</u> <u>Bz</u> <u>wx</u> <u>C</u> <u>sh</u> <u>bz</u> <u>wx</u>		74			72	3	0
		42			53	0	0
		75			75	0	3
		80			86	0	0
		73			79	2	2
		71			76	2	1
	143			153	2	2	
Total		822			832	14	10

Table 2

Types of kernels obtained in reciprocal crosses of colorless individuals (I Sh Bz wx x C sh bz wx) and c sh Bz wx plants.

Cross	Kernel type			
	<u>I</u> Sh <u>Bz</u> wx*	<u>C</u> sh <u>Bz</u> wx	<u>I</u> sh <u>bz</u> wx	<u>C</u> Sh <u>Bz</u> wx
♀ <u>I</u> Sh <u>Bz</u> wx x <u>C</u> sh <u>bz</u> wx	94	96	5	6
csh <u>Bz</u> wx ♂	124	123	8	10
	110	106	6	12
	134	140	14	9
	78	65	6	3
	44	44	2	3
	98	94	9	12
	124	131	8	8
	113	119	9	15
	91	96	5	5
Total	1010	1014	72	83
Exact Reciprocal	138	148	4	4
♀ csh <u>Bz</u> wx x <u>I</u> Sh <u>Bz</u> wx ♂	84	74	2	4
<u>C</u> sh <u>bz</u> wx	80	74	2	5
	80	72	5	5
	108	116	6	12
	57	55	1	3
	84	89	4	2
	112	104	5	4
	89	98	2	2
	71	62	4	2
Total	903	892	35	43

\*Colorless.

transmission is apparently subnormal. However, the closely linked markers Sh and Bz segregate as expected (see Table given below), suggesting an alternative possibility that I is not expressed.

Cob no.	Genotype	Kernel type				
		I Sh Bz	C sh bz	I sh bz	C Sh Bz	C sh Bz
B70-40-4 I-40	<u>I Sh Bz</u> x <u>C sh bz</u> <u>C sh bz wx</u>	60	164	22	100	7

Colorless kernels were reciprocally crossed with C sh bz wx and C sh Bz wx stocks. Tables 1 and 2 show the types of kernels obtained in the crosses.

The findings are:

1. In crosses involving the C tester (Table 1) I was expressed in 3.7% to 28.6% of the kernels in the observed cobs and the average frequency through the female parent was only 16.5%.
2. Through the pollen, I was not expressed in more than 80 cobs studied.
3. Both the linked markers, Sh<sub>1</sub> and Bz, had equal and normal transmission indicating that only I is affected.
4. There is a normal proportion and segregation of I (colorless), Sh and Bz in reciprocal crosses involving a c tester (Table 2). But, colorless individuals as pollen parents on C and c gave colored and colorless kernels, suggesting lack of transmission of I, complete inactivation, or mutation of I to i in the male and a partial change in the female parent.
5. Therefore, there is a difference in the mutational event of I in both male and female parents.
6. There is a high proportion of I sh bz wx kernels (Table 1). Further studies are in progress to clarify this type of behavior.

S. E. Pawar  
Chandra Mouli