

2. Blotched aleurone, a mutagenic system.

The character blotched aleurone, described by Emerson in 1921 and shown by Anderson to be linked with Y on Chromosome 6, is actually a mutagenic system similar to that described by McClintock, and in our cultures is the product of crossing maize-teosinte derivatives with a multiple test stock.

The Bh factor on Chromosome 6, in the presence of three other factors tentatively located on Chromosomes 4, 5 and 7, causes the gene c on Chromosome 9 to mutate to C. The mutations are apparent only when the gene R on Chromosome 10 is present, irrespective of whether A is dominant or recessive. The stocks involving blotching may segregate for any or all of five loci (including A) to produce ratios of 3:1, 9:7, 27:37, 81:175 and 243:781. Segregation fitting all of these ratios has been obtained and is shown in the following table.

Segregation for Blotched Aleurone

Ratio	No. Ears	Total Seeds	No. Blotched	Theor. Blotched	Deviation
3:1	47	15,952	11,792	11,964	-172
9:7	49	16,131	8,820	9,074	-254
27:37	33	12,324	5,159	5,199	-40
81:175	22	8,045	2,552	2,545	7
243:781	6	1,929	461	458	3

The significant deficiency of blotched seeds in the first two categories and for the population as a whole may be attributed to (1) a failure to identify blotching when only a few cells in the aleurone are involved, or (2) the fact that somatic mutations with respect to the blotching system create small areas on some ears in which no blotching occurs.

The genetic factors involved in blotching have a dosage effect. All four factors must be present in at least one dose in order for blotching to show. With all four factors segregating, the dosage in the triploid aleurone may vary from 4 to 12, with 3 factors from 6 to 12, with 2 factors, 8 to 12, and with 1 factor, 10 to 12. Consequently, the lower the percentage of blotched seeds on a segregating ear, the lower (on the average) the intensity of the blotching.

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