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1. X-ray induced reversion of sh-bz-x2?

The two genes involves in the x-ray-induced double mutant sh-bz-x2 revert to the dominant state simultaneously but at an extremely low frequency (MNL 44:183-185). In an attempt to increase the reversion rate, stocks homozygous for sh-bz-x2 were x-rayed and testcrossed.

Two experiments were performed in which the radiation was applied at different stages. In the first, sh-bz-x2/sh-bz-x2 individuals were treated with ca. 1000r at a stage just prior to the onset of meiosis. The proper stage was determined by sampling the sporocytes of a few plants. Pollen from 28 treated individuals was applied to silks of sh bz plants in an isolation field to eliminate the possibility of contamination.

In the second experiment, seeds of Yg sh-bz-x2 pr homozygotes were x-rayed with ca. 1000 r, planted and pollinated by a yg sh bz Pr stock. Both yg and Pr served as contamination markers. This experiment was performed for the following reasons. The two original cases of reversion are the only ones to date in which the source of the dominant phenotypes is certain; contamination and heterofertilization have been ruled out. In both of these cases the revertants segregated on the ears rather than appearing as single kernels, indicating that the causal event occurred early in the development of the plant. It was felt that the change giving rise to the dominant phenotypes might be prone to induction at the embryo stage.

Experiment #1 yielded a total of 75,323 kernels, none of which was Sh Bz in phenotype. Two possible Sh bz seeds were recovered but one of these did not germinate when planted and thus, cannot be tested. It is probable that the plump phenotypes were spurious and the kernels were genotypically sh bz/sh bz. The genotype of the plant which survived will be confirmed in a testcross.

In experiment #2, 1221 testcross ears from treated seeds were harvested. If reversion was induced at the embryo stage in one of the

homologs, ears segregating for the Sh Bz and sh bz phenotypes would be expected. None was found but a total of 48 ears contained kernels of the following phenotypes: 33 Pr Sh Bz; 41 pr Sh Bz; 4 Pr sh Bz; 4 pr sh Bz; 1 pr Sh bz; and 4 Sh colorless. The pr classes are most likely the result of fertilization by foreign pollen. Rhode Island summers are generally quite breezy, a condition which raises the comfort factor appreciably but also increases the likelihood of contamination. The alternative of simultaneous reversion of sh-bz-x2 and mutation of Pr to pr is highly unlikely. The origin of the remaining classes will be determined by testing for the presence of yg. The four colorless Sh kernels could have arisen from Sh a pollen since some of the sh-bz-x2 homozygotes used in this study were A/a in constitution.

Since the above exceptional kernels occurred as single cases rather than segregating populations, it is unlikely that they represent reversions induced by the x-ray treatment. It is conceivable that the events which gave rise to the original reversions were discrete changes which might not be readily induced by ionizing radiation. Since EMS is known to induce genetic changes at the molecular level at a detectable frequency in maize (Chourey, MNL 43:53-54), treatment of sh-bz-x2 with this mutagen will be performed next summer.

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2. Tests of bz-x3, bz-x4 and bz-x5 with the Ac Ds and Spm systems.

The x-ray-induced mutants bz-x3, bz-x4 and bz-x5 are mutable alleles which revert to the dominant state somatically in both endosperm and plant tissue. (For background, see MNL 44:182-183). Tests have been conducted to determine if the mutability is due to the presence of either Ac or Spm.

Plants of the constitution bz-x3 wx/bz wx, bz-x4 wx/bz wx or bz-x5 wx/bz wx which exhibited reversion activity due to the presence of the bz-x alleles were crossed with a stock homozygous for wx^{m-8}, an allele which responds to Spm. In the progeny of these crosses, no kernels with Wx tissue were observed indicating that Spm was not present in the bz-x heterozygotes.