

2. The effect of X-rays on pollen fertility of maize.

In the summer of 1965, a study on the effect of X-rays on pollen fertility of maize was carried out. Freshly collected pollen was irradiated with X-rays at three different doses, 1500r, 3000r and 4500r. This treated pollen was applied on the silks of an inbred maize strain homozygous for gl_1 . A total of 21 plants were fertilized with the rayed pollen; seven plants were fertilized with pollen rayed at a dose of 1500r, six plants with pollen rayed at a dose of 3000r, and eight plants with pollen rayed at a dose of 4500r. In addition, five plants were fertilized with non-irradiated pollen and these plants were maintained as control. During harvesting, conditions of the kernel sets of these plants were examined. It was found that as the radiation intensity on maize pollen increased, the per cent of kernel sets on the ears fertilized with this rayed pollen decreased. This decrease was about linearly proportional to the increase of radiation intensity. For instance, the kernel sets on the ears of the control were 95% of the total ovules produced, while the kernel sets on the ears fertilized with pollen rayed at 1500r were 65 per cent, the kernel sets with pollen rayed at 3000r were 20 per cent, and those with pollen rayed at 4500r were only five per cent. The results are shown in Table 2.

Table 2
Effect of X-rays on pollen fertility of maize
(based on % of kernel sets)

Dose (r)	% of kernel sets
1500	65
3000	20
4500	5
Control	95

Y. C. Ting

3. The inheritance of B-chromosomes.

Because of the study of mutagenic effects of B-chromosomes, an attempt was made to accumulate a large number of B's in individual maize plants. From the progeny of a selfed inbred maize plant, individuals possessing 3 B's were selected and self-fertilized in the summer of 1964. Bulked kernels

from three such plants were grown in the greenhouse in 1965. When the seedlings were three weeks old, samples of the root tips were collected and fixed in a 3:1 alcohol-acetic fixative. With the standard squash technique, B-chromosomes in the root tips of each plant were counted. Data were obtained as follows: among 40 plants, one had no B-chromosome; six plants, one B; nine plants, two B's; eight plants, three B's; seven plants, four B's; six plants, five B's; three plants, six B's. Therefore the distribution of B's among the plants of this small population follows, more or less, a standard modular form.

Y. C. Ting

4. Induced changes in number and structure of maize chromosomes by X-rays.

In the summer of 1964, maize pollen possessing B-chromosomes and other genetic markers was irradiated with X-rays at a dose of 1500r. The rayed pollen was crossed with an inbred maize strain having the factor Gp (good spreading pachytene chromosomes) and other known cytological markers to facilitate pachytene studies of the F_1 hybrids.

Kernels from the above hybrids were grown in the field in the summer of 1965. Up to the present, 126 plants were investigated cytologically. Among these plants, 57 were heterozygous for one translocation (some possible A-B translocation), four have one dicentric chromosome, one is monosomic, and three have a deficiency for one chromosome arm. Studies on the details of these alterations are in progress.

Y. C. Ting

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