

As a result of this scarification treatment, the pericarp and aleurone layers were uniformly worn away, especially on the edges and tips of the kernels, while a recessed "germ" or embryo usually escaped damage. Such seeds could then be dipped in weak IKI solution, and rapidly spread upon an absorbent material to dry while being classified for wx. Searching for mutant kernels was as simple as looking for a red-brown ball among many black ones. Small batches were stained at a time, after rinsing away the loose dust, and immediately searched for mutants since the contrast between wx and Wx kernels is best just after staining.

It should be emphasized that the usefulness of the method depends upon having kernels in which the germ is recessed. This was the case in well-pollinated ears of M14, but is not true of many other inbred lines. From a practical point of view, even with M14 the method will be found unsatisfactory unless full sets of seed are obtained so that resulting kernels will be flat instead of round. Perhaps isolation-detasseling production of subject kernels is the most practical way of obtaining the needed numbers and quality of seed.

D. L. Shaver

5. id maize.

Several attempts have been made to mate id/id plants carrying a newly found id gene (Shaver, MNL 31:94) with id/id plants having the classical C30 id allele (Galinat and Naylor, AJB 38:38-47). Various manipulations of photoperiod have succeeded in inducing flowering, but the small ears produced have always been barren. Since it seemed impossible to mate homozygous id plants, an alternative procedure was employed, that of mating normal plants in segregating families from the two id sources. Of 16 ear progenies so obtained and grown in Florida this winter, 7 segregated for the id phenotype, indicating that the id genes from the two sources are allelic. It is interesting that the id/id plants, planted November 10, 1963, were not induced to flower as of January 28, 1964, in spite of the fact that they were grown in a regime which induces teosinte (the interval between sunrise and sunset on December 21 being only  $10\frac{1}{2}$  hours). This experience agrees with observations in Florida a year ago. Homozygous id/id plants, seeded October 15, 1962, were not induced as of March 10, 1963, at Princeton, Florida.

D. L. Shaver

6. Relative biological efficiency of monoenergetic fast neutrons on chromosomes in maize.

Investigations on the relative biological effectiveness (RBE) of densely ionizing radiations (with high LET, rate of linear energy transfer) are of importance in both fundamental and applied radiobiology. The difficulty in determining RBE on the basis of chromosomal exchanges or 2-break aberrations is that the dose-response curves differ for radiations of different LET and dose rate. Maize seeds of Yg<sub>2</sub>/yg<sub>2</sub> genotype were used to study the RBE of fast neutrons vs. X rays.

The maize material used in these experiments has the advantage for RBE studies of yielding a basically first order dose-response curve ( $Y = \alpha + \beta D$ ) with low (X rays) as well as with high (fast neutron) LET radiations. The frequency of yellow-green ( $yg_2$ ) sectors in leaves 3, 4 and 5 of young plants grown from irradiated  $Yg_2/yg_2$  seeds served as a quantitative measure of response. The mutant sectors are believed to be due mostly to simple chromosome breakage and deletion. An exposure apparatus was used which produced essentially equal dose rates in five rings of seeds placed so as to intercept neutrons of 0.43, 0.65, 1.00, 1.50 and 1.80 MeV. Dose average LET values for these energies are 72, 67, 58, 57.5 and 42.5 keV/ $\mu$ , respectively.

Two experiments were performed at dosages that gave responses which were linear, below saturation levels, and overlapping in range for X rays and neutrons. These ranges in dosages were 32.8 to 126.4 rads of neutrons and 1,500 to 15,600 rads of 250 kvp X rays.

RBE values, calculated from relative slopes ( $\alpha$ ) of linear regression lines for N and X, ranged from 42 to 135 (average 78) in Experiment 1 and from 48 to 106 (average 68) in Experiment 2. Monoenergetic fast neutrons of 0.43 MeV were the most efficient in producing  $yg_2$  sectors as shown by the yield of sectors per krad and highest RBE values.

The RBE values obtained in these experiments are higher than commonly reported and in the neighborhood of those found by Neary *et al.* (Int. J. Rad. Biol. 6:127) for plant chromosomes when the dose-squared term of low LET radiation response is minimized. With regard to maximum permissible levels of radiation for man, these results suggest the alternatives that either chromosome breaks in plants have a much higher RBE than comparable reactions in man and need not be considered, or that the problem of chromosome damage *per se* in human tissues be reexamined after exposure to high LET radiations and/or low LET radiations at low doses or dose rates.

H. H. Smith

#### 7. Relative biological efficiency of muons and $\pi^-$ mesons.

Until recently meson beams of sufficient intensity for cytogenetic studies have not been available. The Alternating Gradient Synchrotron (AGS) at the Brookhaven National Laboratory now produces almost pure  $\pi^-$  meson and muon ( $\mu^-$  particle) beams suitable for use in biological experiments. The mesons were generated in the AGS by bombarding a beryllium target with highly accelerated protons of about 28 BeV energy.

Dormant seeds of  $Yg_2/yg_2$  maize were exposed in two experiments: (1) to 1,275 rads of nearly pure muons; and (2) to 3,360 rads, comprising about 2,060 rads of muons and about 1,300 rads of  $\pi^-$  mesons. To compare these effects with those of better known radiations, seeds of the same material were treated with 250 kvp X rays. The frequency of  $yg_2$  sectors was scored in leaves, 3, 4, 5 and 6 of the seedlings.