differences may persist for many generations. Such differences may be extremely slight and not readily perceptible by ordinary testing of hybrids produced with them. But when they are selfed to attain homozygosity of the genes involved in restoration, these slight differences can be multiplied; for while the differences can segregate in favor of the inbred genotype, they can also segregate and become homozygous for the type of the line from which the restorer genes came. While selection can be practiced, it is difficult to select for combining ability without extensive testing.

The possibility of utilizing the non-segregating restorer(s) (described in the preceding article) to eliminate the necessity of attaining homozygosity of restorers in converted inbred lines is being investigated. This would speed up the conversion by several generations. Not only would this eliminate selfing but also by eliminating selfing prevent the reversion to off-types which could result from selfing too soon. Further, since, with segregating restorers, one can only use the fertile plants for selecting those closest to type for propagation in a conversion program, about half of the land, labor, and costs are spent on sterile plants which will not be used. If the non-segregating restorer lines can be used to start the conversion program, the program could be continued more efficiently.

To date these non-segregating restorers have successfully functioned on M14S, M14DS, A73S, A374S, A158S, and P39S. It is unfortunate that this may only be practical when using the S type cytoplasm.

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1. A bio-assay for corn pollen viability.

A preliminary report (MNL Vol. 31) on the corn pollen longevity studies underway in this department mentioned the use of kernel-set as an assay for pollen viability. The number of kernels present on an ear is influenced by two major factors: a) the number of mature egg cells available for fertilization and b) the number of viable pollen grains available to fertilize them. If factor a) contributes to the variability of the numbers of kernels per ear per treatment, this contribution can be corrected by transforming the data by $\arcsin\sqrt{K/P}$, where K = the number of kernels per ear and P = the number of egg cells present on an ear. Obviously if factor a) does not contribute to the variability in the observed K, the above transformation need not be involved and the data are analyzed in the form K or $\sqrt{K}$. Hence, through the use of

a standard pollination technique, experimental design and subsequent statistical analysis of the data (K), the contribution of the number of mature egg cells per ear to the variability in the numbers of kernels per ear per treatment can be discounted. Thus a bio-assay for viable corn pollen can be developed that possesses only a few restrictions and provides several advantages over existing assays: e.g. germination of pollen on agar. Foremost among the advantages is the production of the succeeding generation. An obvious disadvantage for the application of this bio-assay in some studies is the time required to obtain the data and the infrequency with which the assay can be used. However, in contrast with the other assays available for testing pollen viability, this bio-assay provides a continuity to the research program.

Using this bio-assay, the study of pollen longevity was continued in 1957. The summarized results from these experiments will not be available until a later date. Of interest, however, was an experiment involving the cooperation of Dr. Patterson at Urbana, Illinois, and Drs. Jones and Stinson at New Haven, Connecticut. Pollen, some of which was previously held at -10°C., was shipped to these cooperators and was used successfully in effecting pollinations on the female Oh51A^T x B8. Similar pollinations were made in Ithaca. The seed yield from these three locations will be tested in a yield trial in New York in 1958.

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2. <u>Diepoxybutane as a chemical mutagen in maize</u>.

Experiments were conducted for three seasons to determine the possible mutagenic effects of diepoxybutane, $\underset{\diagdown O \diagup}{CH_2 - CH} - \underset{\diagdown O \diagup}{CH - CH_2}$, on pollen of *Zea mays*. (The term "mutation" unless otherwise specified includes both chromosome breaks and so-called "point" mutations.) Two methods of treatment were used. In one method the cut ends of newly shedding tassels were taken from homozygous multiple dominant stocks and were placed in 0.2 per cent solutions of the chemical for 18 hours. Pollinations were made on homozygous multiple recessive stocks immediately following the treatment. The other method of treatment involved boring a hole in the corn stalk about four inches below the lowest tassel branch. A one dram vial containing 4.5 cc. of 0.2 per cent diepoxybutane (DEB) solution was attached to the stalk and a piece of woven glass wicking was used to introduce the solution into the plants. Pollinations were made for five successive days from each treated and control tassel.

Losses of dominant marker genes in the endosperm of the resulting kernels were used to evaluate the mutagenicity of the DEB. All of the experiments utilized multiple recessive stocks having the chromosome