cytoplasmically male sterile. To date no sterile individuals have been obtained that can be considered to be the result of an induced cytoplasmic mutation.

It was proposed by the author (MNL 47:35-37) that nuclear fertility restorer genes in the material that was treated with the mutagen may disguise an induced cytoplasmic male sterile, i.e., a sterile cytoplasm may be induced with a mutagen but still produce fertile plants due to the presence of nuclear restorer genes. In previously reported research the inbred A632 was used; according to Gracen and Grogan (MNL 48:20-23) and Gracen (personal communication), this inbred has restorer genes for many different sterile cytoplasms. If this inbred carries restorer genes for many of the known sterile cytoplasms, it might also carry restorer genes for sterile cytoplasms that might be induced with chemical agents. To examine this idea, an inbred that does not restore many sterile cytoplasms should be chosen; the inbred W59M was suggested by Gracen.

In an effort to continue this research and examine these theories, during the past summer the inbred W59M was treated with streptomycin and ethidium bromide according to procedures previously published (MNL 47:35-37).

Robert W. Briggs

<u>Use of a genetic marker to make self- and cross-pollinations on the same ear</u>

A procedure which makes it possible to make self- and cross-pollinations on the same ear by using purple aleurone markers was employed to carry out a form of full-sib reciprocal recurrent selection. Full-sib reciprocal recurrent selection is a breeding procedure in which the second ears from individual plants in two populations are self-pollinated, and reciprocal crosses are made on the top ears of the paired plants. At least one member of each crossed pair must be prolific so that crossed seed and selfed seed of both parent plants is obtained. Procedures for sull-sib reciprocal recurrent selection have been described by Hallauer (Crop Sci. 7:192, 1967), Hallauer (Egypt. J. Genet. Cytol. 2:84, 1973) and Lonnquist and Williams (Crop Sci. 7:369, 1967).

Full-sib reciprocal recurrent selection is an excellent breeding procedure but it requires that at least one parent be prolific; and many maize populations are not strongly prolific. A procedure has been developed this past summer which allows this breeding technique to be applied to nonprolific strains of maize. The procedure basically consists of self-pollinating a number of plants in each population, crossing these same shoots with an aleurone marker stock and then reciprocally crossing the plants from the two populations. The first silks available develop from the basal end of the female inflorescence. Thus, the self-pollinated seeds would be at the base of the ear, the purple aleurone kernels in the middle of the ear, and the cross pollinated kernels at the tip of the ear; the purple aleurone kernels would separate the selfed and crossed kernels on each ear. The plant is self-pollinated before it is cross-pollinated since maize is basically protandrous, and in many cases viable pollen would not be present for self-pollinations if the cross-pollinations were made first.

In the field the plants were self-pollinated as soon as silks were present; on the next day the self-pollinated ears were crossed with <u>A</u> <u>C</u> <u>R-nj</u> pollen. Two more days elapsed before plants from the two populations were crossed reciprocally.

Only a small amount of selfed seed is required to recombine selections in order to initiate another cycle of selection. However, relatively large amounts of crossed seed are needed to perform replicated yield trials. The amount of seed needed depends on the number of kernels in one replication and the number of replications tested. The number of crossed seeds and the frequency of ears by number class were:

Number	Frequency
50-75	3
76-100	10
101-125	6
126-150	20
151-175	8
176-200	11
201-225	7
226-250	5
251-275	5
276-300	9
301-325	1
326-350	
351-375	
376-400	
401-425	1
Total	86

The amount of seed on the crossed portion of the ear ranged from 54-401 kernels; a total of 86 ears were obtained in which both selfed and crossed seed were available. The seed from the reciprocally crossed plants was bulked.

Approximately 500 plants in each population were available to make the reciprocal full sibs. The two populations were the F_2 generation from single crosses which differed in average pollen date by 4.6 days and in silk date by 3.2 days. Populations that produced pollen and silks closer together undoubtedly would have increased the success of this scheme. At the suggestion of Dr. J. H. Lonnquist only every other row was planted in order to reduce the population stress as much as possible and to encourage development of a large ear; after germination the seedlings were thinned to one plant every 18 inches (45 cm). When shoot bagging and pollinating was carried out, no leaves were removed in an attempt to facilitate maximum ear development. Just before the reciprocal crosses were made, the silks were trimmed with a scissors to a uniform length in an attempt to expose fresh silks and in hopes of obtaining a distinct line between the purple aleurone kernels and the crossed seeds.

<u>A C R-nj</u> pollen was used because it was available at the time the marker pollen was needed; regular <u>A C R</u> pollen would be satisfactory. Furthermore, <u>A B Pl</u> markers may facilitate the separation of any seed mixture in the next generation.

Long-eared strains would certainly facilitate the success of this modified reciprocal recurrent full-sib scheme, even more than would strains with a high kernel row number. One of the biggest problems other than a lack of cross-pollinated seed was that the selfed kernels at the base of the ear were often mixed with the purple aleurone kernels. When this occurred, the yellow kernels at the base of the ear were hand-shelled and saved as the self-pollinated kernels; in most cases, however, the crossed seed was nicely separated by a distinct line from the purple aleurone kernels. The main problem was that the self-pollinated kernels and purple aleurone kernels comprised too much of the total length of the ear.

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