PIONEER HI-BRED CORN COMPANY
Johnston, Iowa

1. Interactions between maize genotypes and teosinte cytoplasm.

The inbreds WF9 and C106 have been backcrossed 5 times, as males, into 10 different cytoplasmic sources. The 10 include 5 exotic open-pollinated varieties of maize, 4 inbred lines of maize, and a strain of "Florida" teosinte. One plant of each cytoplasmic source was used as source of cytoplasm for backcrossing to both WF9 and C106. At the fifth backcross all 9 of the strains with maize cytoplasm were identical in appearance to their pollinator parent. However, the C106 with teosinte cytoplasm and the WF9 with teosinte cytoplasm were markedly reduced in vigor throughout the growing season and produced plants with slenderer culms, narrower leaves, fewer internodes, fewer tassel branches and both strains were about a week late in flowering, compared to their pollinator parent. In general, the effect resembled that reported for teosinte cytoplasm by Mazoti (Rev. de Invest. Agric., 1954). Both strains also were partially female sterile; that is, no ears had more than a scattering of kernels, even when pollinated with plentiful supplies of fertile pollen. In addition, the WF9 in teosinte cytoplasm was completely pollen sterile. This may have been only an effect of reduced vigor on the naturally poor pollen shedding abilities of WF9. On the other hand, it may be that the teosinte cytoplasm used here has an interaction with certain genotypes which results in pollen sterility, independently of vigor effects. Appropriate crosses to test this hypothesis are being made.

D. N. Duvick

2. Rapid recurrent and reciprocal selection.

In Newsletter #33 p. 95 a modification of recurrent and reciprocal selection is described which utilizes simply inherited kernel characteristics displaying incomplete dominance to reduce the number of generations required to complete a cycle of selection. Since that time progress has been made on two studies associated with the scheme.

Seven white (A34, A177, A188, Ky27, NY2, 4Co.82, and 33-16) and seven yellow (A334, A375, NY3, Oh40B, Oh51A, Os420, and W25) inbred lines representing virtually 14 different open pollinated varieties were used in the studies.

A. The 98 possible crosses (including reciprocals) among the two groups were made and observed to examine the complexities of separating 3/3 yellow, 2/3 yellow-1/3 white, 2/3 white-1/3 yellow, 3/3 white endosperms necessary to segregate intercrossed from testorossed seed via the previously described scheme.

Use of an Agtron Color Control Instrument (courtesy of Kurth Malting Co.) indicated perceptible differences in endosperm color between reciprocals of a given cross but was generally ineffective over the range of all the material studied. The writer's observation was that some 2/3 yellow-1/3 white endosperms were more yellow than other 3/3 yellow (viz. Oh51A crosses compared to Oh40B selfed, for example). All 2/3 white-1/3 yellow vs. 3/3 white differences appeared sufficient for separation. Evidently a recurrent selection program would be feasible

while a reciprocal selection program would present difficulties in separating kernel colors if a broad range of material were used.

As the scheme was previously outlined, the seed parent of the final hybrid would be used as a pollinator in the intercrossing and testcrossing block during selection; therefore, a desirable yellow seed parent could be the tester for a heterogeneous group of white endosperm material with no problems in seed color separation expected.

B. The 21 possible yellow x yellow, 21 possible white x white and 49 possible yellow x white crosses were grown in micro-tests to determine the relative merit of the three groups of germ plasm. The material was grown at a harvested stand of 13M plants per acre and averaged approximately 95 bu/acre. In terms of yellow x yellow equals 100%, white x white yielded 97%, and yellow x white yielded 103%. The differences among groupswere statistically significant. Evidently a "built-in" increase in heterosis could be expected in a yellow x white program probably due to the genetic divergence between these groups.

A. Forrest Troyer

UNIVERSITY OF PRETORIA
and
TRANSVAAL REGION, DEPARTMENT OF AGRICULTURE
Pretoria, Republic of South Africa

1. Disease resistance of Mex 155.

The maize line Mex 155 (selected lines 86, 152 and 156), found to be highly resistant to Helminthosporium leaf blight at Pretoria in the Republic of South Africa, is reported to be highly resistant to leaf blight in France. Mex 155 is also highly resistant to downy mildew (Sclerospora sorghi) in the Republic of South Africa. It has a long growing season and good combining ability.

P. M. le Roux
Department of Plant Pathology

2. Seed treatment with organic mercury fungicides discontinued.

Organic mercury fungicides used as standard seed treatment are being replaced by Captan 75. Captan 75 is the only fungicide recommended for use on maize seed at present in the Republic of South Africa.

P. M. le Roux
Department of Plant Pathology

3. Are controlling elements episomic?

Controlling elements in maize are unique in that they can move spontaneously to a number of positions throughout the genome. The similarity of this behavior to that of episomic elements in bacteria has been pointed out by various authors. Episomic elements differ from controlling elements in that, in addition to occupying various chromosomal sites, they may also behave as cytoplasmic particles.