

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 groups were 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.

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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.

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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.

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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.

The author has been struck by the tendency of some families of light variegated stocks to become lighter and lighter due to an accumulation of Modulators. This is what might be expected if M_p was occasionally multiplying independently of the chromosomes. Since the variegated pericarp material has been maintained in heterozygous condition for many generations with a colorless inbred always used as the male parent, possible differences in reciprocal crosses would not have been apparent.

Various tests have been undertaken to search for cases of the cytoplasmic inheritance of Modulator. A number of reciprocal crosses of variegated x colorless have been made and the resulting ears are now being grown for comparison of variegation grades. Two other experiments are in progress in which variegated seed was treated with heat (as described by Brawn M.G.C. News Letter 35:83-84) or with acriflavine. Both these treatments are known to "cure" some cells of some cytoplasmic elements. The ears grown from the treated seed will be harvested in a few months' time and if any positive results are obtained, the tests will be repeated on a bigger scale next year.

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4. Selection without inbreeding in a South African open-pollinated variety.

An experiment was designed to determine if progress could be made with controlled selection for higher and lower yield in the open-pollinated variety Pretoria Potchefstroom Pearl. The specific aim of the study was to investigate the contribution of additive and nonadditive genetic variation to yield in this variety.

One hundred open-pollinated ears of Pretoria Potch. Pearl were chosen at random and the yield of plants grown from each ear compared. The ten highest and ten lowest yielding lines were selected. A third selection was made of the S_1 progeny of the ten highest yielding S_0 lines. From these, three synthetic selections each consisting of ten families were developed. Each synthetic was tested with Pretoria Potch. Pearl in a yield trial.

The average heritabilities of the High S_0 , Low S_0 , and High S_1 synthetic selections were 0.163, 0.213 and -0.260, respectively.

It may be concluded that little progress can be made using this method in Pretoria Potchefstroom Pearl and that with selection for high yield, interaction plays a more important role in this variety than generally expected, while the contribution of the additive genetic variation is comparatively small.

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