

7. Variable penetrance of mutations resulting from teosinte introgression.

Defective seeds: Bianchi has reported that a defective seed mutant occurring in teosinte derivatives "disappears" when crossed with one of our multiple-gene testers. To determine whether this phenomenon is common, we crossed a single plant of a stock homozygous for defective seeds with a number of inbred strains. In the F₂ endosperm generation there was no segregation for defective seeds in crosses involving the inbreds WMT277 or B10. When the strains used were WMT275, Oh28, 38-11, or C20 part of the F₁ ears did not segregate and the remaining ears had only a few defective seeds. In crosses involving an inbred strain of Wilbur's flint and Ind. P39 only part of the ears were segregating but these had quite a number of defective seeds. In crosses of Hy and A158 all of the F₁ ears were segregating but the former had only a few defective seeds, the latter approximately 25 percent.

Dwarf plants: In a similar experiment we crossed a single plant of a stock homozygous for an extreme dwarf which occurred as a mutant in a teosinte derivative. In the F₂ generation involving an inbred of Wilbur's flint, C103, C106, and WMT275 there was no segregation for dwarf plants. In crosses involving inbreds A158, Ind. P39 and Wf9 there was clear cut segregation of the dwarf character.

Another mutant dwarf, averaging about half the height of normal plants, was crossed on a number of inbred strains. In an F₂ involving Ind. P39 the segregation was normal; in F₂'s involving an inbred strain of Wilbur's flint, Pa70, Osh20, and W23 dwarfs appeared in all progenies but not in normal Mendelian ratios. In a total population of 110 plants only six dwarfs occurred.

A third dwarf, one with slender leaves, was crossed on inbreds Ind. P39, WMT275, and an inbred strain of Wilbur's. Dwarfs appeared in all three F₂ progenies but in low frequencies, five dwarfs in a total population of 67 plants.

Significance: Of the three inbred strains most commonly involved in these crosses, two, Wilbur's and Ind. P39, were crossed by all four mutants and one, WMT275, by three. In the crosses with Wilbur's and WMT275 the mutants failed to reappear in the F₂ or appeared in very low frequencies. In the crosses involving Ind. P39 segregation occurred in all F₂ populations but one of the recessive mutants, slender dwarf, had a low frequency. The results are consistent with the hypothesis that some of the mutants occurring in strains into which teosinte chromosomes have been introduced are not the result of lesions in the hereditary material but are due to blocks of teosinte genes which have deleterious effects in certain

genetic milieus. Whether the mutant expresses itself in one genotype because the inbred involved is already "loaded" with teosinte genes or fails to express itself in another because the inbred strain is relatively free of teosinte genes or is already strongly "buffered" against their effects are questions still unanswered.

P. C. Mangelsdorf

8. Heterosis in tripsacoid derivatives of maize.

The object of this study has been to determine whether the chromosomes or chromosomal segments which contribute to the tripsacoid features of certain races of maize are heterotic or not when in heterozygous combination in the near isogenic background of an inbred A158. For this purpose, all possible crosses were made between strains of A158 which had been modified by introducing chromosomes or chromosomal segments extracted from tripsacoid races of maize from Argentina, Bolivia, Paraguay, Brazil, Venezuela, Nicaragua, Honduras and Mexico. The F_1 plants were grown in the summer of 1960 and heterosis was measured for each intercross in terms of averages of (1) days to anthesis, (2) height of the plant from base to the first tassel branch, (3) length of central spike, and (4) yield of grain. The results, though preliminary, indicate that chromosomes producing tripsacoid effects are usually heterotic when in heterozygous combination. Maximum heterosis has been observed in crosses of Honduras x Brazil, Coroica (Bolivia) x Brazil, Coroica x Argentina, and Honduras x Argentina. However, the combinations Paraguay x Coroica, Coroica x Venezuela, and Honduras x Venezuela are in general deleterious. This may be because the same chromosomes are contributed by each of the parents resulting in nearly homozygous condition.

Evidence is accumulating which shows that these chromosomes, except those extracted from Mexican and Honduras varieties, are the result of direct Tripsacum introgression since teosinte is unknown in the other countries represented by these studies.

S. M. Sehgal

9. A new method for estimating teosinte and Tripsacum introgression into maize.

The method used by Wellhausen et al (1952) to estimate teosinte introgression in races of maize in Mexico was highly subjective and was based upon approximate scores of 0-4 for the induration of rachis and lower glumes. In the present study, a somewhat objective approach