6. Archaeological evidence of the effect of teosinte (or Tripsacum) introgression on maize.

A study has been made of the effects of teosinte (or Tripsacum) germplasm on the characteristics of two populations of prehistoric maize. The material, dated at 500 to 700 years, was excavated by Mr. Lloyd Pearson from the Montezuma Castle (1440 cobs) an

d Tonto (1920 cobs) National Monuments in Arizona. Some of the specimens are so highly tripsacoid that they appear to be the immediate products of hybridization with either teosinte or Tripsacum. Some of them can be matched almost exactly with modern specimens of maize-teosinte hybrids. Since maize is known to hybridize regularly with teosinte in Mexico, it is assumed for the purpose of this discussion that the introgression involved is from teosinte.

An arbitrary key of five grades, based on the degree of induration of the tissues and the frequency of single and paired pistillate spikelets was used to measure the degree of teosinte introgression. This key was found to be reliable when tested on modern inbred maize with various known numbers of chromosome substitutions from teosinte and by determinations of specific gravity of the cobs. All scoring was done by one person. Scores were correlated by the use of key-sort cards with other morphological features of which length and diameter proved to be of special interest.

In the Montezuma Castle material there was a definite curvelinear [sic] correlation between teosinte introgression and cob length -- the most tripsacoid cobs being either the shortest or longest in the population. The shorter cobs are interpreted as being the result of the homozygous expression of teosinte germplasm while the longer ones are assumed to be the product of teosinte-maize heterosis. Teosinte introgression had no significant effect on cob diameter in this population.

In the cobs from Tonto Cave teosinte introgression was negatively correlated with cob length while there was a positive correlation with cob diameter. These differences between Montezuma Castle and Tonto maize might be attributed to different fractions of teosinte germplasm, perhaps different chromosomes, involved in these two populations. This is suggested because similar differences exist in various modern teosinte-maize derivatives.

Tho material from both sites supports the theory that fasciation (flattening) had a role in the evolution of extreme polystichy of the ear. As in modern maize, the proportion of fasciated cobs increased with kernel row number. The archaeological material differed from modern maize in that fasciation was more prevalent in the lower row-number classes. In the material studied, teosinte introgression was not significantly related to fasciation.

Several long-glumed types of cobs occurred in these populations. One of them from Montezuma Castle is the first archaeological cob known to duplicate the extreme form of modern tunicate maize. The fact that this specimen was also tripsacoid has stimulated efforts to determine if teosinte germplasm had a role in the origin of the highest tunicate allele, Tu.

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