

6. The lack of a teosinte-like fourth chromosome complex in tripsacum.

A segment on chromosome 4, estimated to include the whole short arm, as marked by Su₁ locus, is essential to the development of the female spike of teosinte (Mangelsdorf and Reeves, 1949; Rogers, 1950). It controls an inclination of the spikelets toward the cupule, an induration of the outer glume and the development of a rachis abscission layer.

The homozygous addition stock for the Su marked chromosome (Td7) derived from Tripsacum dactyloides has none of the above-mentioned effects of teosinte's fourth chromosome nor did the hybrid of this 20+2 stock with the TB4b tester involving the Su₁ region reveal any of these teosinte characters in a population of 36 plants.

Furthermore the Td7 chromosome marked by Su₁ does not carry 5 other loci (la, gl₃, bm₃, ra₃, j₂) borne on maize chromosome 4. Another tripsacum chromosome (Tf13) derived from T. floridanum, a species closely related to T. dactyloides, is marked by the Gl₃ locus, but does not carry any of the other fourth chromosome loci of maize. Various other unidentified tripsacum chromosomes carry dominant alleles to the la, bm₃, ra₃, and j₂ markers on the fourth chromosome of maize.

On the basis of the above facts, the hypothesis that Tripsacum dactyloides contributed this fourth chromosome segment during a creation of teosinte from maize would seem to be invalid.

In view of the 9 chromosome base for the more distant relatives of maize, i.e. Manisuris and Tripsacum, it seems possible that Zea (teosinte and maize) is 9+1 and that the fourth chromosome could represent the extra pair which was assembled during a divergence from 9 chromosome Andropogonoid stock. It is possible that another species of tripsacum carries a linkage group more similar to Zea 4 from which such an addition chromosome was derived. We have already experimentally added homozygous chromosome pairs from tripsacum to maize in true breeding stocks (20+2). One of these (Td7) carries the Su₁ locus near the centromere as on Zea 4.

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