

2. The location and penetrance of a gene (tr) for two-ranked (distichous) spike from Tripsacum.

One of the phenotypic effects of Tripsacum chromosome Tr9 when transferred to maize that was observed first in an interchange derivation of this chromosome by Maguire (1961) is that of reducing the number of kernel rows on the ear. When we recently altered the background of our chromosome 2 tester gene stock to that of 8-rowed or 4 ranked ear, the effect of the extra alien chromosome Tr9 in reducing kernel row number was manifested as a change to the four-ranked or two-ranked spike, a taxonomic trait of both Tripsacum and teosinte which distinguishes, in part, these relatives from maize. This evidence suggests a gene for two-ranks in Tr9 which is only able to express itself when the maize background is fixed at a low degree of floral compaction (condensation). The basic change controlled by this gene on Tr9 appears to be distichous vs decussate spike.

Because the long arm of Tr9 is known to carry at least 6 loci in common with the short arm of maize M2, a linkage test for a tr mutant gene out of northern flint was made with the M2 marker genes lg₁ gl₂ v₄. In each case the F₂ repulsion phase data indicated independent assortment with the tr gene. Because Tr9 is also known to have pairing affinity with M10, a linkage analysis of tr with chromosome 10 markers is being made.

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3. A formula for giant ears in maize.

Ears up to 22 inches long when wet and grown at wide spacing in Waltham, Massachusetts have been developed from the following combination of characteristics.

1. Heterozygosity for teosinte chromosome 9. A factor on this chromosome elongates the rachis internodes in the upper half of the ear and, thereby, eliminates a fasciated tip by allowing interlocking of cupules and spikelets. In highly condensed ears of certain North American corn, the surface area necessary for development of many rows near the ear tip comes from a flattening (fasciation) of the rachis.
2. Homozygosity for fasciation (high condensation) of the ear. This causes the cob to be highly vascularized at its base.