

Table 4

Cytoplasm-Treatment	Leaching Time (hrs)			
	4	8	12	16
T-toxin	.24*	.23	.51**	.66
T-water	.16	.14**	.32	.33
N-toxin	.28	.34	.33	.29
N-water	.19	.35	.33	.35

*Numbers are ppm Mg⁺⁺ in leachate; mean of five determinations

**Mean of four determinations

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1. Two systems that transform a two-ranked spike into a four-ranked spike.

The eight-rowed ear of maize (four-ranked with paired spikelets) can be derived from the two-ranked spike (distichous) of teosinte and certain variants in maize by two different systems as follows:

1. Condensation alone in which a lack of internode elongation in the rachis forces a primordial slippage or twisting in order to spatially

accommodate the expanding and differentiating cupules and their spikelets. The result is more than two vertical ranks. The degree of condensation varies greatly and appears to be polygenic in inheritance.

2. A direct induction of the decussate spike independent of condensation although frequently combined or superimposed upon it. The inheritance of the directly induced type of decussate spike appears to be simple.

Some northern flints have the directly induced decussate ear with some condensation superimposed upon it, especially at the butt. This decussate trait may be transferred to teosinte at a low-level of condensation in which yoked fruit cases alternate at 90°.

When a mutant gene (tr) for a two-ranked ear found in northern flint was transferred to A158 maize (normally 12 to 16 rowed), the phenotype was eight-rowed, sometimes changing to four-rowed (two-ranked with paired spikelets) near an elongate tip. That these eight-rowed ears are more than two-ranked due to condensation alone is shown in their hybrids with northern flint eight-rowed maize. The hybrids between these two types of eight-rowed maize are 10 to 12 rowed, apparently due to a combination of condensation derived from the tr A158 parent superimposed upon the induced decussate condition from the northern flint parent. Although a sufficiently large F₂ from such hybrids has not been grown to yield the two-ranked condition, it was recovered in an F₃ family from this cross. Emerson and Smith (1950) reported a slight increase in kernel row number from crosses of different eight-rowed inbreds which they described as a "plus increment of hybrid vigor". The increase in row number from 8-rowed X 8-rowed which they obtained was not as great as that in our experiments.

The several two-ranked cobs among the oldest Tehuacán specimens are mostly four-ranked at the base, suggesting that condensation is the basis for the many-ranked condition in these oldest-known specimens of archaeological cobs.

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