

The results from our study suggest that the multiple aleurone layering character is controlled by a few genes, possibly two with partial dominance where both dominant genes are necessary.

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Relation of hydroxamic acid concentration (DIMBOA) to resistance to the corn leaf aphid

In 1959, the cyclic hydroxamic acid 2,4-dihydroxy-7-methoxy-1,4-benzoxazin-3-one (DIMBOA) was first reported in maize and has since been directly implicated in resistance to several pathogens and insects. DIMBOA occurs naturally in the glucosidic form and is converted to the toxic aglucone through mycelial penetration or insect injury.

The objective of this study was to correlate DIMBOA concentration with resistance to the corn leaf aphid, *Rhopalosiphum maidis* (Fitch), through bioassay and field experiments. The bioassay experiment was performed to test toxic effects of DIMBOA on the corn leaf aphid. An artificial diet consisting mainly of a mixture of amino acids and vitamins was prepared for use in the bioassay. To the diet were added various amounts of DIMBOA (0.1, 0.25, and 0.5 mg/g diet) to give concentrations similar to those found in host plant tissue. Control diets contained no DIMBOA. Approximately 15 first instar apterous aphid nymphs were fed the diets through a Parafilm membrane. Mortality counts were recorded every 48 hours for 12 days.

In field trials twelve inbred lines of corn were evaluated for corn leaf aphid resistance under natural infestation. Aphid damage was evaluated at the mid-silking stage using a visual rating scale and an index system. Index values, indicating severity of aphid infestation, were compared to concentrations of DIMBOA found in each line using a colorimetric procedure based upon the reaction of DIMBOA with $FeCl_3$.

Results from the aphid bioassay demonstrated significant effects of DIMBOA on aphid mortality. DIMBOA concentrations of 0.1, 0.25, and 0.5 mg/g diet produced 5.1, 12.8, and 20.5 percent mortality, respectively, using Abbott's formula. Aphid index values from the field data ranged from 15.0 to 65.0, representing mild and severe damage, respectively. DIMBOA concentrations in plants at the fifth to sixth leaf stage ranged from 0.03 to 1.48 mg/g fresh weight. A significant correlation ($r = -0.72$, $df. = 34$) was obtained between these two traits, indicating that inbred lines containing a high concentration of DIMBOA generally have improved resistance to the corn leaf aphid.

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Localization of factors controlling the Texas type of cytoplasmic male sterility

The location of the factors responsible for the Texas type (*cms-T*) of cytoplasmic male sterility is unknown. Recent studies (e.g., Science 173:67, 1971; Phytopathology 63:1357, 1973) have shown differences in the response of mitochondria from maize with normal and "Texas" cytoplasm when challenged by toxins produced by race T of *Helminthosporium maydis* Nisikato and Miyake (southern corn leaf blight) and *Phyllosticta maydis* Arny and Nelson (yellow leaf blight). Since these studies suggest the involvement of mitochondria, mitochondrial DNA (mtDNA) must be considered as a possible site of factors responsible for traits associated with *cms-T*.