

But when phenotypic selection is made for strong aleurone pigment reduction due to C2-Idf action among the homozygotes that are unstable, the rate of very dark diffuse types was 11 percent. It thus appears that the modifier is transposing and in addition that the very dark diffuse refers to pericarp striping only. In the aleurone it may be more active. These latter studies are in progress.

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Resistance to European corn borers and sugarcane borers in maize — Resistance to the European corn borer, Ostrinia nubilalis (Hubner), and the sugarcane borer, Diatrea saccharalis (F.), has been confirmed in exotic maize varieties from the world maize germplasm collection of CIMMYT. Advancement in levels of resistance and adaptability to New York growing conditions has been obtained using full sib recurrent selection with alternate cycles in New York and Mexico. Promising lines with resistance to first and second generation O. nubilalis are being developed.

The mechanism for first-generation leaf-feeding resistance appears different from the antibiosis mechanism due to DIMBOA, which is responsible for resistance in most U.S. lines. DIMBOA content was analyzed by a combination of thin-layer chromatography and colorimetric techniques. The exotic lines had DIMBOA levels as low as or lower than susceptible U.S. lines and far below that of resistant U.S. lines, yet their resistance to the borer in the field under conditions of artificial infestation was as high as or higher than the most resistant U.S. lines.

Larvae were reared on artificial diets into which were incorporated ground freeze-dried corn leaves of the various lines to determine if any other antibiosis factor was present in the exotic lines. Larvae reared on exotic lines had lower mortality, higher pupation and equal or faster rates of development than larvae reared on a susceptible, low-DIMBOA line, while larvae reared on a resistant, high-DIMBOA line had greater mortality, lower pupation and a delayed development. This suggests, but does not prove, that there is no other toxic component present in freeze-dried leaves of these exotic maize lines that accounts for their resistance.

Larval feeding preference was tested by giving newly-hatched larvae a choice of feeding on agar discs of freeze-dried leaves of two corn lines. The exotic lines and the resistant, high-DIMBOA line were tested against the susceptible, low-DIMBOA line. In general, larvae did not show any non-preference toward the exotic lines. However, extreme non-preference was evident toward the high-DIMBOA line, with the degree of non-preference roughly proportional to the DIMBOA level in the tissue. This supports the suggestion that resistance in the exotic lines is not conditioned

by the same mechanism as that in the high-DIMBOA lines. Non-preference as a mechanism cannot be ruled out by this study since freeze drying removes any volatiles from the leaves that might be involved in non-preference.

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Male sterile cytoplasm evaluation and development — We initially collected 38 sources of cytoplasmic male sterility and transferred these cytoplasms to a series of inbred lines. By growing one generation a year in New York and two successive generations in Florida we were able to complete the transfer of the cytoplasms to the inbreds in just over two years. By using the HmT toxin-injection technique we were able to rate the resistance to H. maydis race T of all of the inbred-by-cytoplasm combinations in the field in each successive generation without fear of fungal contamination and spread. We also have rated the cytoplasm-by-inbred combinations for fertility restoration reactions. We realized early in our conversion process that many of the cytoplasms we tested could be assigned to three groups (T, C and S groups), as Duvick and Beckett have previously reported, by fertility restoration reactions. We discovered that although many of the cytoplasms fit into the three groups, there was significant variation between cytoplasms within groups, especially within the S group. A characterization and regrouping of the different cytoplasms as well as an evaluation of which cytoplasms seem best suited for hybrid development in each inbred background has been published (Agron. J. 65:654). A total of 247 cytoplasm-by-inbred combinations was released to the public in March, 1974.

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Cryptic lateness in maize — Shaver (MNL 46:24) and Shaver & Prior (MNL 48:24) have described the phenomenon of "cryptic earliness" in maize wherein id/id lines, although having a medium or late phenotype, nevertheless contribute extreme earliness to hybrids when the other parent is Id/Id (normal).

The opposite phenomenon could be called cryptic lateness, where a homozygous recessive line has an early phenotype but contributes lateness to a hybrid when the other parent is normal. Conversions of inbreds to the recessive state could find use in practical seed production because early x late crosses could be made in straightaway plantings. If the incorporated gene is completely recessive, the resulting hybrid would not be changed. If pollen production is good, then the use of a converted, cryptically late male might be preferable to incurring the hazards