UNIVERSITY OF GEORGIA
Department of Agronomy, Athens, Georgia

## Cytoplasmic effects on chloroplast and mitochondrial development in a maize inbred

The nuclear genotype of inbred CI 21 (Athens) was transferred to the cytoplasm of inbred GA 199 through a backcross program. This cytoplasm/genotype combination was then compared under a Siemens 101 electron microscope with that of inbred CI 21 (Athens) in its own cytoplasm.

Leaves of five-day-old seedlings from each of the two sources of cytoplasm were fixed in Chang's cocktail solution and embedded in blocks of epon, araldite resin at 50 C. The blocks were sectioned on a Reichert microtome.

The cells of CI 21 (Athens) with its own genotype showed matured plastids at 11,000 X, whereas cells of the CI 21 (Athens) genotype in GA 199 cytoplasm did not exhibit any plastids in the five-day-old seedlings. Mitochondria were present in both cytoplasms.

A. P. Rao and A. A. Fleming

## Differential preferences of raccoons for maize cultivars

Fourteen maize hybrids, classified as early-season maturity at Athens, Georgia, were evaluated for palatability by raccoons from the surrounding woods. Evaluations were made at the "roasting ear" stage on August 10 by counting the number of plants damaged by the raccoons.

The raccoons selected in "cafeteria style" certain entries upon which to feed; they clearly preferred one entry. The average number of damaged plants/plot for this entry was 16.6 (64%) compared to the next most preferred entry, which had 2.7 damaged plants/plot (10%). Five entries had no damage. The 14 entries in the experiment were placed into three groups of significant differences based on Duncan's Multiple Range Test at the 5% level.

The yield of dry corn was greatly reduced for the entry having the most damage. The yield was only 46% of the overall average yield of all entries in the experiment.

A. A. Fleming and C. E. Simmons, Jr.

UNIVERSITY OF HAWAII
Department of Horticulture, Honolulu, Hawaii

## The genetics of resistance to the corn leaf aphid, Rhopalosiphum maidis (Fitch)

We continue to work on the genetics of resistance to the corn leaf aphid, Rhopalosiphum maidis (Fitch) (see MGNL 48:37-38). To achieve greater control of the aphid predators and parasites of Hawaii, most experiments are now conducted in greenhouses. The plants are grown in 6" pots and rated during development; plants on which the uppermost leaves and tassel are not infested or are very lightly infested are scored as resistant, while those that are moderately to severely infested are considered susceptible.

Materials worked on in this report were lines from our segregating AA8sh2 population. A cross between resistant line 3660 and susceptible line 3655, its backcrosses, the $F_2$ and the two parental lines were grown and rated at tassling. The results are summarized in Table 1.

The $F_1$ was susceptible, demonstrating the recessive nature of the resistance. Backcross data point to monogenic inheritance, though three plants in the susceptible-parent BC were classified as resistant where there should have been none; these were attributed to 'escapes.' Chi-square for the $F_2$ generation was 0.0919, which was not significant, indicating a good fit to 3:1 ratio.

Table 1. Results of ratings of aphid reactions in the AA8sh2 population.

| Entry | Generation | Total Rated | Observed Res. | Observed Susc. | Expected Ratio Res:Susc |
|---|---|---|---|---|---|
| Resistant 3660 | $P_1$ | 10 | 10 | 0 | All resistant |
| Susceptible 3655 | $P_2$ | 10 | 0 | 10 | All susceptible |
| 3660 x 3655 | $F_1$ | 10 | 0 | 10 | All susceptible |
| (3660x3655) x 3660 | $B_1$ | 20 | 9 | 11 | 1 : 1 |
| (3660x3655) x 3655 | $B_2$ | 20 | 3 | 17 | All susceptible |
| (3660x3655) selfed | $F_2$ | 58 | 16 | 42 | 1: 3 |

This and other evidence has confirmed our previous report that the genetics of resistance to the corn leaf aphid in the AA8sh2 population is monogenic and recessive. In accordance with our previously designated symbol aph, the genotype for resistant line 3660 is aph/aph and that of the susceptible line 3655 is Aph/Aph.

Siew-Hoong Chang and James L. Brewbaker

## Benzoxazolinones in teosinte and Tripsacum

The occurrence of the benzoxazolinones in corn is well known. Three known analogs, 2(3)-benzoxazolinone (BOA), 6-methoxy-2(3)-benzoxazolinone (MBOA) and 6,7-dimethoxy-2(3)-benzoxazolinone (dimethoxy-BOA), are present in corn. These compounds and their precursor hydroxamic acids, notably 2,4-hydroxy-7-methoxy-2H-1,4-benzoxazin-3(4H)-one (DIMBOA), have been reported as insect and disease resistance factors in corn and wheat.

Using the highly specific gas-liquid chromatography procedure for the detection of benzoxazolinones developed in our laboratory (Tang et al., Phytochem., 1975), some analogs of this group of unique compounds were found in all three races of teosinte (Zea mexicana(Schrader) Kuntze) and three species of Tripsacum tested. Except in one case, only 0.1-0.2 gm fresh weight of shoots of 14- to 20-day-old seedlings were used in each determination; the mature leaves of Tripsacum laxum were assayed, as seedlings were not available. MBOA and dimethoxy-BOA were detected in the teosinte races from Balsas, Chalco and Jutiapa. However, BOA was not detected. MBOA was found in Tripsacum dactyloides(2N), T. dactyloides(4N), T. floridanum and T. laxum. A closer examination of T. dactyloides(2N) showed that all the three analogs, BOA, MBOA and dimethoxy-BOA, were present.

Based on the results of these samples, it appears that the benzoxazolinones are well distributed in teosinte and in the Tripsacum complexes. This finding strengthens past evidence of the close taxonomic relationships of corn, teosinte and Tripsacum. Studies of the distribution and concentration of the analogs in appropriate interspecific crosses may help further our understanding of the origins of corn.

Siew-Hoong Chang, James L. Brewbaker and Chung-Shih Tang