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1. Genetic resistance to race T Helminthosporium maydis (Nisk and Miyaki).

Following the severe southern corn leaf blight epiphytotic in 1970, we began a program of screening for genetic resistance to race T within a number of heterogeneous composite populations, ostensibly in T cytoplasm and carrying the Rf_1 and Rf_2 restorer genes. These populations had been assembled around 1960, principally by Basil Tsotsis, originally for the purpose of the extraction of male-sterile restoring lines and had been maintained by open-pollination in isolation while being subjected to mass selection for resistance to race O of H. maydis, among other diseases.

The composites were planted in our 1970-71 Homestead, Fla., winter nursery and inoculated with ground leaf tissue obtained from severely diseased fields (all ensuing nurseries were similarly inoculated). Seed from ears of about 500 relatively resistant plants was bulked and planted in the Thomasboro, Ill., nursery in the summer of 1971. Resistant plants were again selfed and selected ears were shelled individually, and the S_2 progeny were planted, ear-to-row, in the fall of 1971 at Homestead. Resistant lines were again selfed and also crossed by rf_1rf_1 rf_2rf_2 normal male plants. Bulked S_3 and BC_0 progeny of selected S_2 lines were planted in a second winter nursery at Homestead in early 1972; resistant lines were again selfed and the BC_0 crosses were again crossed by normal males, and the resulting S_4 line and BC_1 progeny were planted in the 1972 Thomasboro summer nursery.

Most of the BC_1 lines were completely fertile, indicating that the corresponding S_4 lines were probably in normal cytoplasm. However, nine out of the total 146 BC_1 lines did segregate for sterility, confirming that the corresponding S_4 lines were actually in T cytoplasm (Table 1). In general, the disease reaction of the backcrosses was more severe than that of the S_4 lines which indicates that the resistance is genetic and not cytoplasmic in nature. Disease reaction varied among the S_4 lines; however, lines with scores of 2.0 or less appeared to have a very high degree of resistance. In these lines, both the number and size of lesions was drastically curtailed. The line x backcross interaction evident in the

Table 1

Disease reaction scored on a scale of increasing severity from 1.0 to 9.0 of several S_4 lines and their corresponding backcrosses to normal males. Sterility-fertility reaction of the backcrosses also included.

Pedigree	Disease reaction	No. of plants		
		Fertile	Partial	Sterile
800LMTR-4-S4	2.0	11	2	8
800LMTR-4-S2 x n^2	5.0			
66AMSC-10-S4	1.5	10	1	10
66AMSC-10-S2 x n^2	7.0			
70AC-10-S4	4.5	9	2	7
70AC-10-S2 x n^2	5.0			
400FTR-1-S4	3.0	8	0	15
400FTR-1-S2 x n^2	7.5			
400FTR-5-S4	4.0	9	3	7
400FTR-5-S2 x n^2	8.0			
800FTR-7-S4	3.0	16	2	2
800FTR-7-S2 x n^2	5.0			
800LFTR-5-S4	1.5	12	0	8
800LFTR-5-S2 x n^2	5.0			
800LFTR-6-S4	5.0	12	0	5
800LFTR-6-S2 x n^2	5.0			
1000FTR-7-S4	2.0	14	0	5
1000FTR-7-S2 x n^2	5.0			

data may have been caused from the use of normal males which varied in maturity and possibly in genetic resistance to race T. Our preliminary observation is that the inheritance of resistance is quantitative and mostly additive, though we plan to use this material in further experiments designed to provide more precise genetic information.

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