

Cross	No. of plants observed		Expected ratio	P value
	Res.	Susc.		
(W64A x LP) x W64A	30	29	1:1	0.80-0.90
Tx 325 x W37A F ₂	147	46	3:1	0.70-0.80
NC13 x W37A F ₂	150	45	3:1	0.50-0.70
(Field Data)				
B10 x GE440 F ₂	202	60	3:1	0.30-0.50
Oh41 x GE440 F ₂	187	68	3:1	0.50-0.70
B10 x LP F ₂	157	54	3:1	0.80-0.90
Oh41 x LP F ₂	186	63	3:1	0.90-0.95
(Oh07A x GE440) x Oh07A	92	97	1:1	0.70-0.80
(W22R x GE440) x W22R	97	110	1:1	0.30-0.50
(Oh07A x LP) x Oh07A	96	87	1:1	0.50-0.70
(W22R x LP) x W22R	102	98	1:1	0.70-0.80

a/ LP = Ladyfinger popcorn

To determine the relationship of the genes for resistance in the 3 resistant sources, the cross W37A x GE440 was advanced to the F₂ generation and the cross GE440 x Ladyfinger popcorn was crossed reciprocally with the susceptible hybrids Hy2 x Oh07 and WF9 x W22R as well as advanced to the F₂ generation. The genes in the 3 resistant sources appear to be identical, alleles, or very closely linked as indicated by the following data:

Cross	Number of plants in the greenhouse		Number of plants in the field	
	Res.	Susc.	Res.	Susc.
W37A x GE440	300	0		
GE440 x LP ^{a/} F ₂	110	0	297	0
(GE440 x LP) x (Hy2 x Oh07)	113	0	233	0
(Hy2 x Oh07) x (GE440 x LP)	112	0	240	0
(GE440 x LP) x (WF9 x W22R)	424	0	210	0
(WF9 x W22R) x (GE440 x LP)	109	0	229	0

a/ LP = Ladyfinger popcorn

constitution. If some of the seedlings are found to be backcrosses to corn, it may be possible to transfer Tripsacum germplasm to corn without developing amphiploids to obtain fertility.

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1. Monogenic resistance to northern corn leaf blight, *Helminthosporium turcicum* Pass.

A type of resistance to *Helminthosporium turcicum* unlike that previously recognized and used in corn breeding programs has been observed in inbred GE440, Ladyfinger popcorn, inbred W37A, and a few other corn selections. This resistance, instead of being expressed only as a reduction in lesion number, is manifested by a different lesion type. The lesions on homozygous or heterozygous resistant plants are characterized by chlorosis, reduction in size, absence of wilting in the lesion, delay of leaf killing, and almost complete inhibition of fungus reproduction. The centers of lesions eventually die but a light green border always persists around the tan center until late in the season. This resistance is also expressed in the seedling stage.

The inheritance of resistance was studied in the F_2 and/or back-cross populations involving the 3 sources of resistance and several susceptible inbreds. The following data indicate that resistance is due to a single dominant gene in each of the 3 sources:

Cross	No. of plants observed		Expected ratio	P value
	Res.	Susc.		
(Greenhouse data)				
B14 x GE440 F_2	176	65	3:1	0.30-0.50
(B14 x GE440) x B14	52	62	1:1	0.30-0.50
187-2 x GE440 F_2	93	24	3:1	0.20-0.30
(187-2 x GE440) x 187-2	61	53	1:1	0.30-0.50
W22R x LP ₂ F_2	83	26	3:1	0.70-0.80
(W22R x LP) x W22R	54	55	1:1	0.90-0.95
W64A x LP F_2	81	29	3:1	0.70-0.80

It is suggested that the symbol Ht be used to designate the dominant gene in inbred GE₄₄O for chlorotic-lesion resistance to Helminthosporium turcicum. Up to this time, the genes in GE₄₄O, W37A, and Ladyfinger popcorn cannot be distinguished genetically or by disease tests.

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2. Location of a dominant gene in maize for resistance to Helminthosporium turcicum.

Homozygous resistant selections of GE₄₄O and Ladyfinger were crossed to a series of chromosome rearrangements marked with closely-linked endosperm or seedling traits. The F₁'s (all resistant) were then testcrossed to susceptible stocks recessive for the appropriate genetic markers.

Classification of the testcross progenies is being carried out in the greenhouse this winter. Seed are planted in soil in flats, and the seedlings are artificially inoculated about three weeks after planting. Plants are scored for disease reaction at about five weeks of age.

In two series of plantings which have been run, tests have been made of 24 rearrangements, which together mark one or more regions in each of the ten chromosomes. In all cases, evidence for linkage has been negative or inconclusive, with the exception of Inv 2a, which gave the following results:

$\frac{gl_2 \text{ Inv } 2a \text{ ht}}{+ \quad + \quad Ht}$	X	$gl_2 \text{ ht}$	
<u>Classes</u>		<u>Number</u>	
$gl_2 \text{ ht}$		300	
$gl_2 \text{ Ht}$		56	
+ ht		63	Recombination = 119/709 = 16.8%
+ Ht		290	
Total		<u>709</u>	

Additional testcross progenies involving Inv 2a, T 2-6b, and T 2-10b are now being grown to provide further linkage data.

It is planned that homozygous resistant selections will be crossed to Chromosome 2 genetic testers in the current winter greenhouse generation as the first step in mapping the gene for resistance.

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