

<u>Group</u>	<u>Description</u>	<u>Per cent infection</u>
IV	Moderately infected	30 - 69
V	Highly infected	70 - 89
VI	Very highly infected	90 - 99
VII	Totally infected	100

Six inbred lines (five white flint inbreds and one yellow flint inbred) were found totally free from downy mildew infection. Similar results were obtained for two seasons. It seems that "near immunity" is easier to get among white-endosperm lines than among yellow-endosperm inbred lines.

The test for specific combining ability of the resistant lines is the next step to be undertaken. This season these inbred lines will be crossed with the high combining parental single crosses that are involved in the Philippine hybrids.

Crosses between resistant and susceptible inbred lines were being made this season to study the mode of inheritance of resistance to downy mildew.

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1. Characterization of sterility-inducing cytoplasm.

The WF9 genotype has been transferred by backcrossing to 12 separate isolations of sterile cytoplasm. WF9 is sterile, or nearly so, in all of these cytoplasm. Each type of sterile WF9 was crossed to 4 inbred lines: BH2, CE1, F5DD1 and C25-13. Pollen fertility of these F₁ hybrids at Johnston, Iowa in 1957 is shown in the table on the next page.

On the basis of these results it would seem that each of the new sources of sterile cytoplasm is identical either to the USDA or to the Texas type of sterile cytoplasm. It is possible, of course, that crosses with some other inbred may differentiate some of these cytoplasm from the type with which they now seem to be identical. If they cannot be so differentiated, however, it would seem that (1) only two possible types of "mutation" of normal cytoplasm to a sterility inducing type have been found, among 12 separate isolations, or (2) the two types of sterile cytoplasm trace back to two separate introductions of foreign cytoplasm (as from closely related species) into the maize genotype.

<u>Cytoplasm</u>	<u>Male Parent</u>				<u>Origin of Cytoplasm</u>
	<u>BH2</u>	<u>CE1</u>	<u>F5DD1</u>	<u>C25-13</u>	
<u>Pollen Fertility</u>					
USDA (Jones)	F*	F	S	S	Teopod x iojap
Texas (Jones)	F	S	F	S	Golden June
Texas (Rogers)	F	S	F	S	Golden June
No. 4	F	F	S	S	ERF Composite (Pioneer)
No. 5	F	F	S	S	Honey June
No. 6	-**	F	S	S	BRC Composite (Pioneer)
No. 7	F	F	S	S	BRC
No. 8	F	F	S	S	BRC
No. 9	-	S	F	-	BRC
No. 10	F	F	S	S	BRC
No. 11	-	S	F	-	BRC
No. 12	F	S	F	S	BRC
No. 13	-	F	S	-	BRC

*F - fertile, S - sterile

** Cross not grown

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2. An extreme nuclear-cytoplasmic interaction.

In a set of some twenty pop corn F₁ hybrids grown in yield test in Ohio in 1955 it was observed that each of two hybrids resulted in zero yield while the average yield of the remaining hybrids in the test was approximately 65 bushels per acre. To those accustomed to expect heterosis in F₁ crosses of unrelated lines, this is an exceptional phenomenon. These two crosses had one inbred line (P2-5-1-X) in common and in both crosses P2-5-1-X was used as the maternal parent. The following year P2-5-1-X was crossed reciprocally with four unrelated lines, two of which were dents and two pops. The resulting hybrids were compared in observation plantings in 1957. In all cases, hybrids involving P2-5-1-X as a seed parent were completely devoid of vigor, i.e., they exhibited less vigor than the weaker of the inbred parents; the leaves were characterized by an abnormal striping (resembling somewhat certain virus effects) and most of the plants were partially pollen sterile. Reciprocal crosses, on the other hand, exhibited normal hybrid vigor and phenotype. Thus, on the basis of these limited data, it would seem that P2-5-1-X is characterized by cytoplasm which is highly incompatible with nuclei of the strains with which it has been tested. It is, therefore, another example of cytoplasmic inheritance but one with drastic