

It is evident from the data just presented that the cyto-sterile lines were contrastingly much more infected with the disease than their normal counterparts. Infection was so severe that the plants of the cyto-sterile lines dried up prematurely. Utmost uniformity in reaction was repeatedly observed among the plants of the cyto-sterile populations. It is interesting to note that the normal Philippine inbreds involved, namely, Ph3, Ph9, Ph11 and Ph15, were remarkably resistant to the disease. It would have been difficult to demonstrate cytoplasmic control of susceptibility if the natural inbreds happened to be equally susceptible.

It could also be gleaned from the data that the fertility restoring gene does not have any influence on the expression of susceptibility.

It is hypothesized that the T-cytoplasm carries a factor which is responsible for the induction of extreme susceptibility to *Helminthosporium* leaf spot. Whether the expression is strictly cytoplasmic or partly controlled by genes, as is the case with cytoplasmic male sterility, is still unknown. With our available inbred lines and 52 open-pollinated varieties so far tested against *Ph4T*, no such "resistance restoring" gene has been found.

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2. The effect of the number of resistant parental inbreds on the reaction of the double cross hybrid to downy mildew disease.

An extensive survey of the reaction of corn inbred lines to downy mildew has shown that resistance can be found only among lines of local origin. All introduced lines, so far tested, were susceptible to the disease. Hybrids of diverse parentage, therefore, can not be produced from the resistant inbreds. If diversity were to be achieved some lines from the susceptible class must be used. Thus it became necessary to know the least number of resistant parental lines in order to produce resistant hybrids.

Several double crosses containing from zero to four resistant parental inbreds were produced in 1961. The reaction of these hybrids to downy mildew was evaluated in 1962 wet season under induced epiphytotics of the disease. The results are presented below.

Combinations	: Percentage: : Infection :	Total : Plants :	Number of Crosses
All lines resistant	22 ± 3.2	444	4
3 lines resistant	34 ± 2.9	365	5
2 lines resistant	42 ± 2.6	716	6
1 line resistant	57 ± 3.2	495	4
All lines susceptible	54 ± 3.7	280	3

The results strongly indicate a positive correlation between the degree of damage and the dose of susceptible inbreds involved in the hybrid. For every additional susceptible line, there was a corresponding increase in susceptibility of the double cross. If a highly resistant hybrid were to be produced, therefore, it is necessary to use only parental lines that are resistant to the disease.

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3. Inheritance of the reaction of corn to downy mildew disease.

Immediately after the screening of inbred lines for their reaction to downy mildew, crosses between resistant and susceptible lines, their F_2 , and their backcrosses to both parents were produced. The reaction of these crosses together with that of the parents was tested in a replicated plot in 1962 wet season under epiphytotic of the disease. The results are presented below.

Entries	: Percentage : Infection <u>1/</u> :	Total Plants Examined <u>2/</u>
Resistant parent (R)	33.7 ± 4.0	735
Susceptible parent (S)	84.3 ± 2.4	628
R x S	46.8 ± 2.2	1167
(R x S) Selfed (F_2)	41.5 ± 2.7	991
(R x S) R	24.3 ± 2.2	1024
(R x S) S	62.5 ± 2.8	924

1/ and 2/ - Each figure represents the average and total, respectively, of 44 plots representing 11 crosses each of which was replicated 4 times.