

Disease epiphytotics in this test was more severe than that in the screening phase. An average infection of 50% was obtained compared to only 37% in the latter. This is probably the reason why the resistant lines which had infection counts of less than 10% in the screening nursery had a much higher infection in this test. Nevertheless, the susceptible inbreds had a much higher infection count than the resistant lines, thus maintaining a good distinction between the two classes.

Only two phenotypes were obtained in this experiment, the resistant and the susceptible classes. Probably this is inadequate to identify qualitative characters that are controlled by two or more factor pairs. The original plan was to count infected plants at two stages of growth so that more classes could be obtained, but strong winds and heavy rainfall destroyed the plants before the second reading. Nevertheless some interesting information can be obtained from the present results.

The most striking feature of the data is its pronounced trend towards the resistant parent. The F_1 and F_2 are much nearer the resistant than the susceptible parent. In the backcrosses, the resistant phenotype is much more easily recovered than the susceptible phenotype. This behavior can mean any one or both of the following: (1) that resistance is partially dominant over susceptibility, and (2) that the superiority of the crosses in terms of vigor and growth rate caused the "skewed behavior". If the former is true then it is a very good indication that only a few factor pairs control the reaction of corn plants to the disease. If the latter is present, which is very likely as shown by the "over recovery" of resistance even only at the first backcross, not much information can be obtained from the present data. It will be necessary in subsequent inheritance studies to use also single crosses between resistant inbreds and between susceptible inbreds as resistant and susceptible parents, respectively.

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4. The frequency of restorer factors for A, B, S and T sterility inducing plasmatypes in inbred lines of corn in the Philippines.

The survey of pollen restorers for A, B, and S plasmatype was started when the T-cytoplasm was suspected to carry factors that induce susceptibility to some leaf diseases (see item No. 1). Crosses of all standard and promising lines to A158A, A158B, and A158S obtained from the Connecticut Experiment Station were made in the 1961-62 wet season and tested for pollen fertility and reaction to leaf diseases in the 1962 wet season. The percentages of fertile tassels in the F_1 are presented in table 1.

Table 1: Percentage of male fertile plants in F₁ crosses of Philippine inbreds with A, B, S, and/or T sterility-inducing plasmatypes.

Inbreds	Source of Sterility-Inducing Cytoplasm							
	F1111/		A158A		A158B		158S	
	:Fertile: :Tassel : %	Total : plants : examined:	:Fertile: :Tassel : %	Total : plants : examined:	:Fertile: :Tassel : %	Total : plants : examined:	:Fertile: :Tassel : %	Total : plants : examined:
Ph2	43	89	100	50	98	50	96	56
Ph4	100	120	41	54	10	60	53	66
Ph6	100	139	6	64	6	49	18	60
Ph8	100	72	95	37	98	56	91	47
Ph10	0	14	100	43	96	55	80	51
Ph12	2	79	100	44	100	44	100	26
L. 314	27	225	-	-	100	8	-	-
L. 315	26	196	-	-	100	31	-	-
L. 316	100	173	91	34	89	53	92	59
L. 317	100	152	84	31	-	-	-	-
Ph1	12	282	0	67	12	75	74	62
Ph3	20	313	100	77	100	63	100	74
Ph5	100	198	0	64	0	58	-	-
Ph7	100	233	96	48	-	-	-	-
Ph9	0.4	235	99	244	100	204	100	182
Ph11	100	713	0	28	0	28	-	-
Ph13	3	191	100	77	100	59	-	-
Ph15	71	170	100	31	-	-	-	-
Ph17	77	110	100	40	100	66	100	68
Ph19	100	201	100	24	-	-	-	-
Ph21	100	65	0	25	0	27	-	-
F44	4	171	100	12	100	25	100	10
Mean	58.4	188	70.6	55	67.2	56	83.7	64

The plasmatypes T, A, B, and S had an average sterilizing capacity of 41.6, 29.4, 32.8, and 16.3, per cent respectively. It seems that the T-type is more efficient in sterilizing Philippine inbreds or that the frequency of restorer factors for T in these inbreds is much less than those for any of A, B, or S. Also, there is a very striking similarity in the behavior of A, B, and S plasmatypes. Any line that is sterilizable by one is also sterilizable by the other two; and any line that is essentially a restorer for one is also a restorer for all. This could indicate that the same factors can restore the three cytoplasm and/or the three cytoplasm are essentially the same.

It can also be seen from the results that segregation of the restorer factors for A, B, or S within an inbred line occurs very rarely. An inbred is essentially either a restorer or a non-restorer. Very seldom will a sterile plant appear in a restorer line or a fertile plant in a non-restorer. This lack of variability is a disadvantage because one has to grow larger populations to obtain the less frequent desirable segregate.

There is however one big advantage for the A, B or S cytoplasm to warrant their utilization in spite of their apparent inferiority to T in some aspects. Not one had a tendency to increase leaf disease susceptibility in the F₁ progenies of their crosses. Under epiphytotics of Helminthosporium leaf spot, the crosses were definitely as resistant as their original normal inbred parent.

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1. Environmental modification of rf₂ rf₂ sterility.

(ms₁) Rf₁ rf₂ rf₂* appears not to be as completely sterile under all environmental conditions as (ms₁) rf₁ rf₁ Rf₂. Test crosses of plants segregating for both loci gave good sterile versus fertile segregations in Florida in 1961-62 for the test of segregating Rf₁ but gave partial fertiles versus full fertiles for the test of segregating Rf₂. When the same populations were regrown in Iowa in 1962 both loci gave good sterile versus fertile segregations. In the winter of 1962-63 in Florida a similar test once again gave good sterile versus fertile segregations for test crosses of segregating Rf₁ but test crosses

* (ms₁) is used as symbol for Texas (T) cytoplasm.