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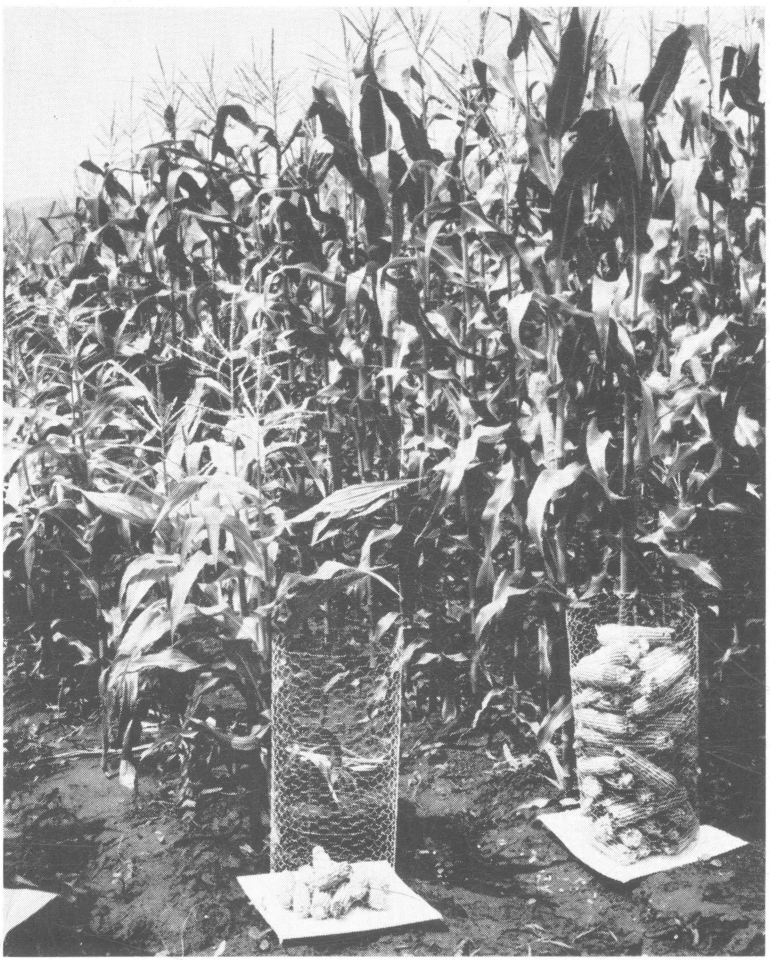

OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER
Wooster, Ohio

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ON THE COVER

Relative yields of maize dwarf mosaic virus susceptible corn at left and resistant corn at right.

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Maize Dwarf Mosaic Virus in Corn Hybrids

W. R. FINDLEY, E. J. DOLLINGER, L. C. SABOE, and A. J. BAXTER[1]

INTRODUCTION

In 1968, corn hybrids were grown on the Vaughters' farm along the Ohio River near Portsmouth, Ohio, for yield and other performance data. This was a cooperative test conducted by the U. S. Department of Agriculture, Ohio Agricultural Research and Development Center, and Ohio Cooperative Extension Service.

The test included 39 hybrids from commercial interests and 5 open-pedigree experimental combinations from the Ohio Agricultural Research and Development Center. An attempt was made to include all hybrids sold in the area as resistant to maize dwarf mosaic virus (MDMV).

EXPERIMENTAL PROCEDURE

On May 22, the test area was fertilized by broadcasting and disking in sufficient fertilizer for a calculated 150-bushel yield goal. Planting was attempted May 23 but was delayed because of heavy rains. A few days later, approximately 10 feet of water flooded the area and an unknown quantity of the fertilizer was lost.

Hybrids were planted June 10 in four replications of two-row plots, with 3-foot isles between tiers of plots. Rows were spaced 40 inches apart and plots, including the isle, were 22 feet long (1/297-acre). Two seeds were planted at spacings approximating 10 inches. Each row of the two-row plots was thinned to 27 plants (16,038 plants per acre).

Emergence and distribution of plants in the plots were uneven due to soil crusting from heavy rains which followed planting. It was not possible to obtain a uniformly distributed plant stand in many plots. In general, however, stands were considered satisfactory.

The planting was kept weed-free by a 4-pound per acre pre-emergence application of atrazine and some hoeing.

Ear height means were determined by measuring all plants in each plot from ground level to the top ear node.

Lodging data were recorded October 17. Plants broken below the lowest ear node were counted as stalk-lodged. Root-lodged plants were leaning 45 degrees or more from upright.

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[1]Research Agronomist, Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture; Professor of Agronomy, Ohio Agricultural Research and Development Center; Extension Agronomist, The Ohio State University, Columbus; and Area Extension Agent, Agronomy, Washington Court House, Ohio.

Each hybrid row was harvested and sampled for moisture. The first two replications and eight entries of the third replication were harvested October 17 and 18. Harvesting was delayed by rain and was completed November 2. All ears in each row were harvested and their weight to the nearest 1/10 pound was recorded. A few entry harvest weights were adjusted for poor stand. Counts of ears harvested excluded ears with less than 4 inches of grain.

Grain for moisture determinations was obtained by shelling two kernel rows from ten randomly selected ears.

Hybrid plot MDMV ratings were made by using a 1-9 scale; 1.0 indicated no visible virus symptoms and 9.0 complete susceptibility. Plant stunting was not associated with virus ratings of 3.0 or less. Ratings of 4-9 indicated increasing degrees of stunting and ratings of 6-9 increasing effects of the virus on ear shoot development. Plants which rated 9.0 were severely stunted and had little or no ear shoot development.

FINDINGS

Incidence of MDMV was high. Average performance of all hybrids tested is given in Table 1.

By July 8, MDMV symptoms were evident in plants of the more susceptible hybrids. Many hybrids appeared free of MDMV symptoms as late as August 20. On August 28 and September 11 when the plots were rated, a high incidence of MDMV was found in surrounding, susceptible corn.

Agreement between hybrid row data was good. Therefore, the statistical analysis was computed by using the two-row plot sums.

Favorable weather conditions prevailed throughout the growing season and test uniformity was satisfactory. The yield per acre coefficient of variation value was 8.72 percent.

Least significant differences (L.S.D.) at the 5 percent probability level were computed for yields and MDMV ratings. This value is useful in interpreting the results because it indicates the magnitude of the difference calculated to be real and not due to chance alone 19 times in 20. Comparisons using the least significant difference are most meaningful when made with a common standard.

Correlation coefficients between yields and the August 28 and September 11 MDMV ratings were —0.52 and —0.77, respectively. These values are significant at the 1 percent probability level, indicating that hybrid susceptibility to MDMV is highly correlated to high yield loss where the disease occurs. Perfect correlations of 1.00 rarely occur; however, failure to obtain a better relationship between yield and

MDMV rating may be due in part to imperfections in the rating scheme. Most of the discrepancy reflects tolerance of certain hybrids to virus infection.

It should be emphasized that the data are for 1 year. Discounting MDMV effects, soil fertility and other growing conditions make some parts of a test plot more productive than others. A hybrid may rank high for yield only because it happened to be planted on a favored spot in the field. Planting each hybrid in four different places in the field partially equalizes such differences. However, chance still plays a part in determining yields and causes some differences not inherent in the hybrids themselves. It is possible that location effects caused small differences in the MDMV reactions of certain hybrids. For these reasons, data for 2 or more years are considered more reliable.

Obviously, low yielding hybrids which rated susceptible to MDMV should not be grown where the disease occurs. It is not possible to predict accurately the performance under different growing conditions of those hybrids which had better than average yields, standability and MDMV ratings.

TABLE 1.—Average Performance of Corn Hybrids Grown in Four Replications Near Portsmouth, Ohio, in 1968.

Hybrid No. or Pedigree	Yield per Acre	Moisture at Harvest	Stand	Lodging		Days to Halt Silk	Ear Ht.	Ears per 100 Plants	MDMV Rating	MDMV Rating
				Stalk	Root					
	Bu.	%	%	%	%	No.	In.	No.	8-28	9-11
Funk Bros. 21821	102.9	31.3	97	7	1	61	46	99	3.5	2.8
Funk Bros. G-4660	92.0	34.9	96	18	1	65	52	118	2.3	2.5
Funk Bros. G-4761	93.7	40.7	98	0	0	65	46	108	1.5	2.5
Funk Bros. 18472	81.6	29.1	96	6	1	61	39	101	1.8	3.3
Martin 400M	67.8	25.2	95	19	2	62	41	102	4.0	5.3
Pioneer 3182 (X4482A)	96.0	34.8	95	13	0	66	49	101	3.3	2.5
Pioneer 3188 (X521B)	101.1	34.4	100	5	0	65	46	98	3.0	2.3
Pioneer X5475	125.9	36.5	98	8	0	63	50	107	1.8	1.3
Ruff ERX1258	74.4	33.7	94	11	2	64	46	99	3.8	3.8
Ruff RX1260	84.2	32.5	96	15	1	64	47	94	4.0	3.8
Ruff RW22	80.9	40.5	96	11	4	66	49	100	2.3	3.5
Ruff RW24	83.2	39.1	96	9	0	66	46	104	3.3	3.8
DeKalb XL72	83.3	33.4	94	11	0	63	41	105	1.0	2.5
DeKalb XL372	70.9	33.0	99	25	1	63	38	100	2.3	4.3
DeKalb XT872	86.1	33.8	96	23	0	64	43	99	1.8	4.0
DeKalb XL342	73.5	30.4	95	34	0	62	41	111	3.8	5.3
DeKalb 88511	96.8	32.7	93	6	1	61	44	103	3.5	4.3
DeKalb 88147	115.4	33.2	100	13	0	63	48	108	1.0	1.5
Hiser VR850	91.3	31.6	97	17	1	64	46	109	3.0	4.0
Hiser H832	70.7	31.4	90	15	1	63	43	99	4.3	5.3
Moews SM738	56.4	32.0	93	32	2	66	41	89	5.0	7.0
Moews SM77ST	97.7	34.4	95	9	2	65	46	97	3.0	3.0
Moews SM77STA	96.1	31.9	97	17	4	63	46	95	2.8	2.8
Moews Exp. 838	61.0	32.7	93	16	2	66	43	89	4.8	6.3

TABLE 1 (Continued).—Average Performance of Corn Hybrids Grown in Four Replications Near Portsmouth, Ohio, in 1968.

Hybrid No. or Pedigree	Yield per Acre	Moisture at Harvest	Stand	Lodging		Days to Halt Silk	Ear Ht.	Ears per 100 Plants	MDMV Rating	MDMV Rating
				Stalk	Root					
	Bu.	%	%	%	%	No.	In.	No.	8-28	9-11
PAG SX17	106.1	36.8	97	9	0	66	51	106	2.3	2.3
PAG 439	100.8	33.4	97	19	1	64	47	98	3.0	3.3
Landmark C897XX	91.9	32.2	96	12	5	64	46	102	3.0	2.8
Wishnand 835	103.3	32.6	93	16	3	63	47	104	2.3	4.0
Wishnand 807	98.9	32.0	94	14	5	63	49	103	2.0	2.5
Wishnand 850	86.3	30.9	96	19	2	65	46	99	3.5	3.5
Mitchell Farms C/F95	61.5	32.0	94	23	1	65	41	95	5.0	7.0
Mitchell Farms C/F116	69.6	31.6	96	42	1	62	43	107	4.5	5.5
Mitchell Farms C/F128	64.1	30.9	96	40	2	67	41	87	4.8	5.8
Mitchell Farms C/F183W	77.4	37.1	93	17	1	65	47	96	3.0	4.0
Mitchell Farms C/F85	73.7	31.3	99	10	0	65	41	95	4.5	6.0
Crow's 825	88.1	30.4	97	25	2	65	46	95	2.8	3.0
Kenworthy K411	87.2	32.4	95	13	2	63	44	99	3.3	3.8
Kenworthy K465	77.6	33.5	90	21	3	66	49	95	3.8	4.3
Kenworthy K500X	63.2	32.1	100	12	3	64	42	94	4.5	5.5
(Cl.38B x Va35) (Mo12 x Oh7B)	105.8	34.5	98	4	1	63	48	104	1.0	2.5
(N7B x Mo12) (B37 x Oh514)	100.1	32.6	95	17	1	62	49	112	3.0	3.0
(N7B x Mo12) (Va35 x Pa405)	103.0	29.8	99	15	0	63	47	109	2.0	2.3
(N7B x Oh514) (Va35 x Pa405)	97.2	29.2	93	13	8	62	42	114	2.0	2.5
Oh514 x N7B	78.5	33.1	91	26	7	64	50	123	1.0	2.5
L.S.D. (5 % level)	10.5								1.41	1.16
Coefficient of Variation	8.72									

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North Central Branch, Vickery, Erie County: 335 acres

Northwestern Branch, Hoytville, Wood County: 247 acres

Southeastern Branch, Carpenter, Meigs County: 330 acres

Southern Branch, Ripley, Brown County: 275 acres

Vegetable Crops Branch, Marietta, Washington County: 20 acres

Western Branch, South Charleston, Clark County: 428 acres