

OHIO MR-200

**- a mosaic-tolerant
slicer-type cucumber**

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OHIO MR-200, A MOSAIC-TOLERANT, SLICER-TYPE CUCUMBER

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During the past 12 years three pickling-type cucumber varieties tolerant to "Cucumber Mosaic Virus No. 1" have been introduced by the Ohio Experiment Station in a breeding program conducted in cooperation with the Crop Research Department of the H. J. Heinz Company at Bowling Green, Ohio (3, 4, 5). This program was begun in 1938 and, although primary emphasis was placed on the development of varieties of the pickling type, numerous crosses and selections were made each year in an effort to obtain a slicer that combined mosaic resistance with good horticultural type. Resistance, or more correctly speaking "tolerance," proved to be much easier to develop than was satisfactory shape, color and size.

During the 15 or more years that this cooperative effort has been continued, the Stokes Seed Company of Canada has introduced a mosaic-tolerant, first-generation hybrid of the slicer type, and Dr. H. M. Munger of the New York Experiment Station developed a slicer variety, known as Niagara, with resistance to mosaic (1).

Ohio MR-200 represents the outgrowth of a program begun over a quarter of a century ago by Dr. O. H. Elmer of Kansas State College (1). An examination of its complicated pedigree reveals the fact that the varieties Chinese Long, Ohio 31 (Tokyo Long Green \times National), Straight Eight and Niagara (Cubit \times Elmer 19-B) were all sources of germ plasm for this new selection. Although Tokyo Long Green was one of the ancestors of the present selection, the basic pattern of its tolerance to mosaic more nearly resembles Chinese Long and some of its descendants such as Ohio MR-17 and Ohio MR-25. Whereas the level of tolerance of Ohio MR-200 is appreciably above that of Ohio MR-17, it is possibly slightly inferior to Ohio MR-25 in this respect.

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Fig. 1A.—Comparative vine growth of Ohio MR-200 (left), Marketer (center) and Burpee Hybrid (right) at Bowling Green in 1956.



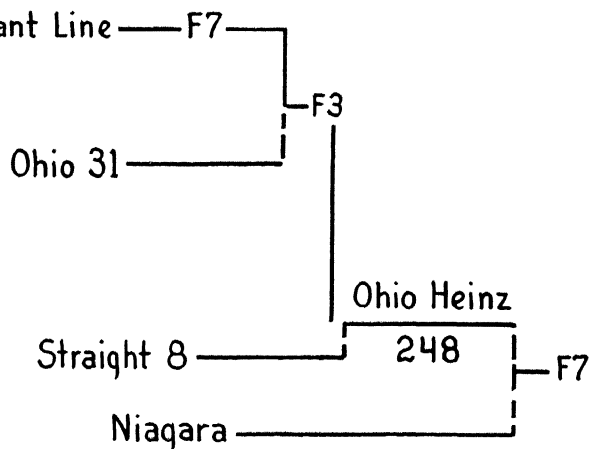
Fig. 1B.—Comparative stunting effect of cucumber mosaic virus on Marketer and Ohio MR-200.

About 20 years ago seed of White Spine Mosaic Resistant Line (19-B-6-4-1-1-9-14-6) was obtained from Dr. O. H. Elmer of Kansas State College and this was crossed with Chinese Long by Dr. J. J. Wilson of the H. J. Heinz Company. He later crossed the F7 resulting from this cross with Ohio-31. Dr. O. S. Cannon, who succeeded J. J. Wilson at Bowling Green, crossed Straight 8 with the F3 that resulted from the previous cross. In 1950 one of the junior authors, C. A. John, Crop Research Department of the H. J. Heinz Company, crossed Niagara with the F6 of the last cross which had been under test for several years as Ohio-Heinz-248. This Ohio-Heinz-248 parent usually produced a straight fruit but had poor color. Niagara had good color but produced a rather large percentage of crooked fruits.

During the developmental work on Ohio MR-200, each segregating generation was inoculated twice with the cucumber mosaic virus. For a number of years this virus (Cucumber Mosaic Virus No. 1) was obtained each year from Dr. S. P. Doolittle of the U. S. Department of Agriculture but more recently (for the past 6 years) it has been furnished by the Department of Plant Pathology of the University of Wisconsin where work has been going on in the development of cucumber varieties resistant to both scab (*Cladosporium cucumerinum* Ell. & Arth.) and mosaic (2).

The complete pedigree of Ohio MR-200 is as follows:

Chinese Long X White Spine



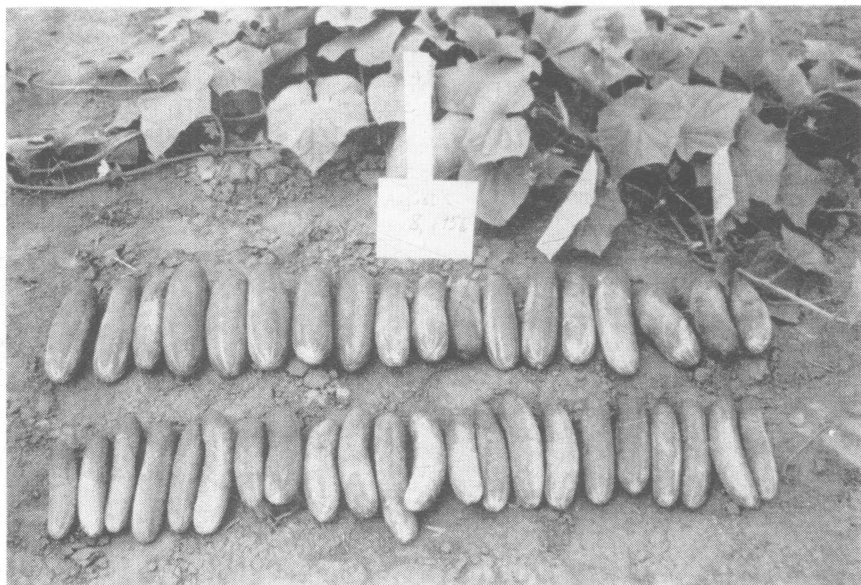


Fig. 2A.—Fruits of Burpee Hybrid in one harvest at Bowling Green in 1956. Note too large size of some, light color, comparatively poor shape of others.



Fig. 2B.—Fruits of Ohio MR-200 in same harvest. Note fewer large fruits and generally better color and shape.

In 1951 one hundred and seventy-eight F2 progeny were inbred and the fruit rated for color and straightness. Of these only five were selected for further study and advancement. In 1952 over 900 plants were hand pollinated, and from this number one was selected which proved to be worthy of increase. Most of those that were discarded at this point had excellent mosaic resistance and attractive vines but produced slightly to quite crooked fruit.

In 1956 field experiments were conducted at Bowling Green and at Wooster to compare Ohio MR-200 with two other slicer-type cucumbers that are commonly planted by growers. These were Marketer and Burpee Hybrid. At Bowling Green the plants of the three varieties were artificially inoculated with the mosaic virus. The data relative to this planting are presented in Table 1.

TABLE 1.—Comparative yield of three slicing cucumber varieties artificially inoculated with Cucumber Mosaic Virus No. 1 at Bowling Green, Ohio, in 1956

Variety	Number of fruits	Average weight of marketable fruit in pounds	Percent of fruits showing mosaic infection	Fruit Shape (Percent of each class)				
				Straight	Slightly curved	Considerably curved	Over-size	Ill-shaped
Burpee Hybrid	264	.44	22.3	33.0	16.3	18.2	22.0	10.6
Ohio MR-200	219	.38	9.1	27.8	20.5	20.1	20.2	11.4
Marketer	112	.29	59.8	37.5	12.5	17.0	12.5	20.5

Marketer proved to be very susceptible to mosaic and as a result the vines and fruit failed to reach their normal size, see Fig. 1A & B. Also, only about half as many fruits were harvested as from the other two varieties, and the percentage of those deformed by mosaic was much larger. Burpee Hybrid produced more fruits than did Ohio MR-200 but they were of definitely poorer color. Also many of the Burpee Hybrid fruits were too large or ill-shaped for sale, see Fig. 2A & B.

The same three varieties were grown at Wooster in 1956 for a comparative test of yield, susceptibility to damage by mosaic as it occurred without artificial inoculation, and the weight and general appearance

of the fruit. The data relative to this planting are given in Table 2. In this experiment, Marketer produced the largest crop, both in weight and number of fruits. There were only slightly more culls in Marketer than in the other two varieties. Also the fruits of Marketer, as well as those of Ohio MR-200, were of better size (smaller in both dimensions) than was Burpee Hybrid which produced many that were oversize in a 2 and 3-day picking schedule, see Figs. 3 & 4. Ohio MR-200 may have been slightly more susceptible to bacterial wilt than were the other two varieties, but it showed only one-tenth as much mosaic. It was also observed that Ohio MR-200 was somewhat more susceptible to spray

TABLE 2.—Yield and disease data for three slicing cucumber varieties grown at Wooster, Ohio in 1956

Date of picking	Ohio MR-200		Marketer		Burpee Hybrid	
	Number	Weight lbs.	Number	Weight lbs.	Number	Weight lbs.
July 27	54	42	23	18	57	51
July 30	201	169	182	140	231	203
August 2	265	217	265	200	219	175
Totals	520	428	470	358	507	429
August 6	353	284	581	442	306	263
August 10	201	141	338	214	384	287
August 13	407	312	487	371	426	379
Totals	961	737	1406	1027	1116	929
August 15	218	144	495	330	278	213
August 20	573	423	963	644	568	556
August 23	291	146	379	193	322	233
August 27	295	154	415	193	211	192
August 31	510	259	749	365	628	406
Totals	1887	1126	3001	1725	2007	1600
Grand Totals	3368	2291	4877	3110	3630	2958
Ave. Wt. per fruit		0.68		0.64		0.81
Percent cull fruits		21.1		22.2		19.1*
Percent bacterial wilt		6.2		2.0		2.3
Percent mosaic		0.2		2.7		2.0

*Not including oversize which made up 6.2% of the total.

injury than were Marketer and Burpee Hybrid, and this was one of the reasons why it did not yield as well in this experiment (an experiment including five different fungicide-insecticide combinations was superimposed on these variety trials with two spray replicates on each).

CONCLUSIONS

Consideration of the data from both Wooster (naturally occurring infection with mosaic) and Bowling Green (artificially inoculated) indicates the following:

1. Ohio MR-200 will not equal Marketer in yield in the absence of mosaic, but it will approximately equal Burpee Hybrid in number of fruits—if not in weight.
2. It is slightly earlier than either Marketer or Burpee Hybrid.
3. It is somewhat more susceptible to the phytotoxic (injurious) effects of fungicide-insecticide spray mixtures.



Fig. 3.—Comparative shape, size and color of representative samples of the fruits of Ohio MR-200 (1), Marketer (2), and Burpee Hybrid (3), as grown at Wooster in 1956.

4. Ohio MR-200 and Marketer are very similar in fruit size and general appearance, both being more suitable for the market in this respect than is Burpee Hybrid which often tends to grow too large and to be somewhat grey in color.
5. Ohio MR-200 is less likely to taper at the stem end than is Marketer.
6. The outstanding feature of Ohio MR-200 in contrast to Marketer is, of course, its ability to maintain normal vine growth and fruit appearance in spite of the presence of the cucumber mosaic virus in the planting and in the plant itself, whereas Marketer vines (and many other commercial varieties which possess no tolerance to mosaic) become stunted and fail to produce a normal crop of marketable fruit. Burpee Hybrid possesses some degree of resistance to the mosaic virus.
7. Because of this mosaic tolerance, Ohio MR-200 is recommended for planting in those areas in Ohio, and perhaps elsewhere, where losses from mosaic commonly occur in the production of cucumbers for the slicer trade.

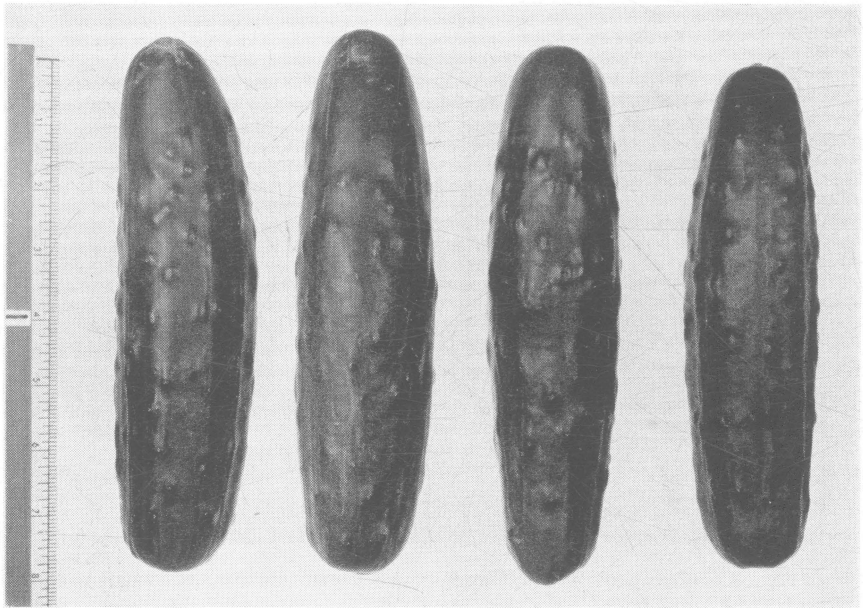


Fig. 4.—Ohio MR-200 as grown at Wooster in 1956. Note blunt stem ends and uniformly dark color.

LITERATURE CITATIONS

1. Munger, H. M. 1950. Two new mosaic-resistant cucumbers. *Farm Res.* 16 (4): p. 13.
2. Walker, J. C. and C. F. Pierson. 1955. Two new cucumber varieties resistant to scab and mosaic. *Phytopath.* 45: 451-453.
3. Wilson, J. D. and J. J. Wilson. 1944. A mosaic-resistant, pickling-type cucumber. *Ohio Agr. Exp. Sta. Bimo. Bull.* 29 (227): 110-113.
4. Wilson, J. D. Ohio MR-17, a new mosaic-tolerant pickling cucumber. *Ohio Agr. Exp. Sta. Res. Circ.* 10: 1-8.
5. Wilson, J. D., C. A. John and Ferris Myrice. 1954. Ohio MR-25, a pickling cucumber highly tolerant to mosaic. *Ohio Agr. Exp. Sta. Res. Circ.* 25: 1-8.