

# **OHIO MR25**

***. . . a pickling cucumber  
highly tolerant  
to mosaic***

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# OHIO MR25, A PICKLING CUCUMBER HIGHLY TOLERANT TO MOSAIC

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Cucumber mosaic can be very destructive in both commercial and home-garden plantings in Ohio. It was the severity of losses from this virus disease, and the resultant decrease in acreage, that were instrumental in the initiation in Ohio of a breeding program to develop resistant, or at least tolerant varieties. The work was begun at Wooster in 1937 (3) when a large number of varieties were screened for resistance to the disease. In 1938 a cooperative experiment was arranged with the Crop Research Department of the H. J. Heinz Company at Bowling Green, Ohio, (4) and further work in screening, breeding, and selection has continued there since that time.

In 1944 a mosaic-tolerant, pickling variety known as Ohio 31 was introduced (4). However, this variety later proved to be very susceptible to bloating in the dill size and because of this was never widely grown for processing. Bloating is a term applied to any separation or even softening of the tissues within the cucumber fruit that may occur during the brining process, whether or not gas pockets are formed. In 1951 another mosaic-tolerant variety bearing the name of Ohio MR17 was announced. This had been carefully selected for resistance to bloating, as well as to mosaic, and outside of the fact that it is slightly longer in ratio to its diameter than a typical processing variety such as National Pickling, it is now considered as a very good commercial variety for use in Ohio. In the meantime, Munger (2) in 1950 introduced two mosaic-resistant varieties, Yorkstate and Niagara. The former is a pickling variety and the latter a slicer. No slicing variety with combined resistance to mosaic and good horticultural type has been developed as yet in the Bowling Green project (4), although several with high tolerance to mosaic have been obtained.

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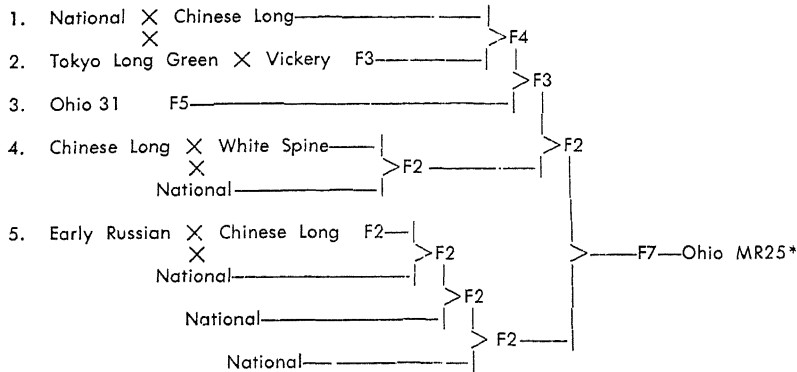
Since 1951, Early Surecrop, Fairbo, Sensation and Foremost SL-1 have been introduced as disease-resistant hybrid varieties. All of these first-generation hybrids have a satisfactory level of mosaic tolerance. Niagara is an open-pollinated variety with a high degree of resistance to mosaic. Other workers have offered varieties resistant to mosaic for trial purposes but none of these have been formally introduced.

Since the introduction of Ohio MR17 in 1951, breeding work has been concentrated in an effort to secure a variety with a high degree of tolerance to mosaic and also to angular leaf spot. Generally speaking, in most cucumber growing areas, mosaic is responsible for greater loss of production than angular leaf spot, yet the losses from the latter disease can be appreciable. Since the introduction of Ohio MR17, that variety has become very popular in many areas where it has been tried, but in some regions it has proved to be even more susceptible to angular leaf spot than National, which is one of its parents. A few reports have been received which indicate that Ohio MR17 may become rather heavily infected with mosaic, but the general consensus of all reports to date indicates that the level of mosaic tolerance is high enough to insure a satisfactory crop. Under conditions of irrigation or heavy rainfall, the fruit of Ohio MR17 may be too long for acceptance by various processors. In recent years the pickle industry has gradually come to accept a slightly longer fruit than formerly and some processors now favor the longer stock.

Resistance to the commoner forms of cucumber mosaic, which are most frequently strains of cucumber virus No. 1, exhibits two general symptom patterns on the foliage. The Tokyo Long Green type, which is typified by Ohio 31, resists the early onslaughts of the disease, only to show visible symptoms at a fairly early period in its development. The Chinese Long pattern of resistance as seen in Ohio MR25, Yorkstate and, for some unexplained reason to a somewhat lesser extent, in Ohio MR17, generally develops as a mild chlorosis after infection occurs, which is in turn followed by partial or nearly complete recovery. However, the resistance of Ohio MR25 has almost invariably exceeded that of any of the recently introduced mosaic-resistant pickling varieties.

Like mosaic symptoms on many other plants, cucumber mosaic is difficult to distinguish under conditions of high incidence of light and temperature. Thus, the symptoms may be masked for variable lengths of time, or, as was the case during the summer of 1953 in many areas of the Midwest, the symptoms frequently do not appear to any extent during an entire season. Little resistance exists in any of these cucumber varieties to tobacco ringspot, a virus disease the symptoms of which closely resemble the common form of cucumber mosaic.

The complete pedigree of Ohio MR25 is as follows:—

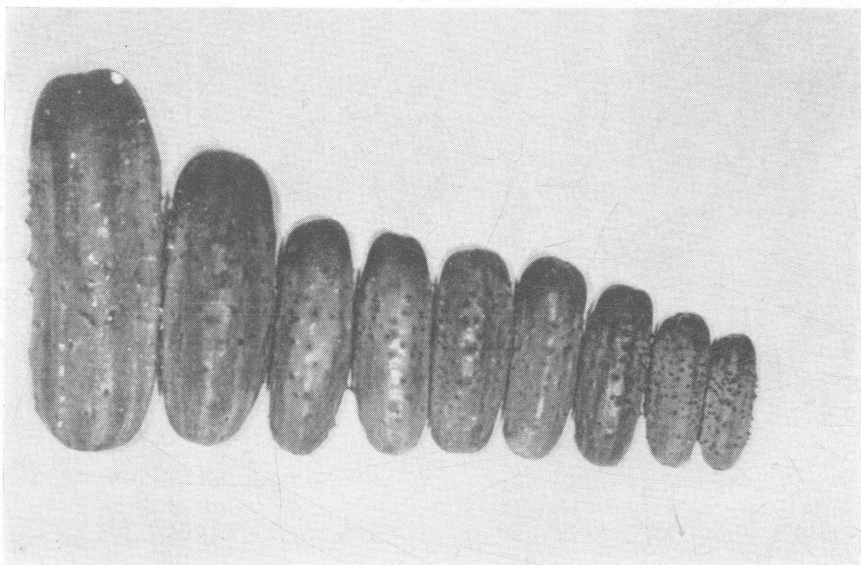


\*In the pedigree outlined here, the crosses indicated as Nos. 1, 2, and 4 were completed by Dr. J. J. Wilson while a member of the Crop Research Dept. of the H. J. Heinz Co., located at Bowling Green, Ohio. The cross designated as No. 5 was made by Dr. H. M. Munger at Cornell University, Ithaca, N. Y. The subsequent combinations,—No. 1 and No. 2 with No. 3, their offspring with No. 4, and the result of these with No. 5, were carried through by Dr. O. S. Cannon, now Plant Pathologist, U. S. Dept. Agr., Logan, Utah, while he was with the H. J. Heinz Co. at Bowling Green, Ohio.

Selections made in the early segregating generations were inbred by the junior author and each progeny line was inoculated at least twice each season with virus inoculum prepared from tobacco leaves previously infected with cucumber virus No. 1. Careful examination was made each season of the fruit and vines of 50 to 200 progeny of each selection that was chosen and the line is now considered to be uniform.

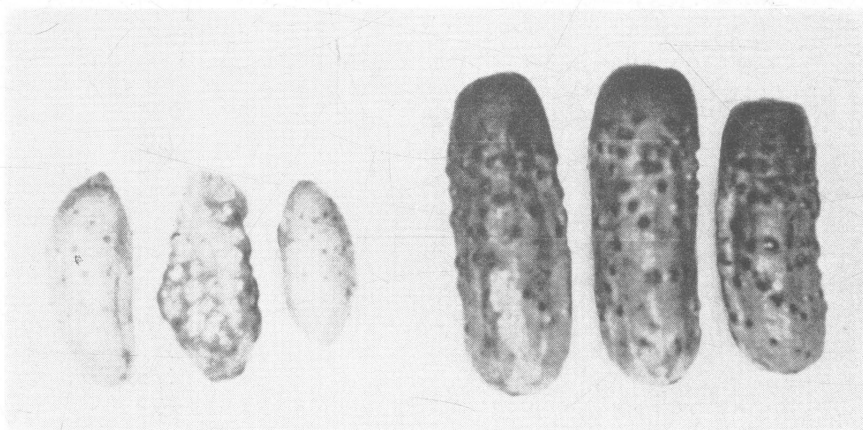
The most outstanding characteristic of Ohio MR25 is its excellent mosaic tolerance. For the past 4 years the plants have grown vigorously and set fruit until frost finally killed the vines in late September or early October. The variety seems also to possess a rather high level of tolerance to angular leaf spot. In heavily-infected areas of Indiana in 1953 where one-half of a field was planted to Ohio MR17 and the other half to Ohio MR25, angular leaf spot was prevalent approximately one week earlier on Ohio MR17 than on Ohio MR25. Under any given set of growing conditions, angular leaf spot commonly appears, and then disappears only to reappear whenever environmental conditions again favor the disease.

Like Ohio MR17, Ohio MR25 is a black-spined variety. It is characterized by symmetrical fruit with good shoulders and rather blunt blossom-ends (see figure 1). Its fruit are somewhat shorter than Ohio MR17. The average length to width ratio of Ohio MR25 is about 2.9 to 1.0, whereas that of Ohio MR17 is about 3.1 to 1.0. When free of the mosaic virus, the foliage of this new variety is slightly lighter



**Fig. 1—Characteristic fruits of the Ohio MR25 cucumber. Note length-diameter ratio and blunt shoulders and blossom ends.**

in color than that of Ohio MR17, but whenever virus infection of both varieties takes place Ohio MR25 is usually somewhat darker than Ohio MR17. The comparative symptoms on the fruit of Ohio MR25 and National are shown in figure 2 in which the former show virtually no symptoms of mosaic infection, whereas the fruit of National were severally mottled and deformed.



**Fig. 2.—Comparative injury by mosaic (Cucumber Virus No. 1) to pickles of National (left) and Ohio MR25 varieties.**

When both varieties are grown under conditions of careful pest control, Ohio MR17 will frequently out-yield Ohio MR25, especially during the first half or two-thirds of the normal harvest period. When these two mosaic-tolerant varieties and the susceptible National were inoculated with six different strains (1) of cucumber Virus No. 1, Ohio MR25 produced a larger crop of pickles with less mottling than did Ohio MR17, as may be seen in Table 1. National produced approximately half of its total yield in the first 3 weeks and by the end of 6 weeks after the first picking the fruits were so severely affected by mosaic that they were no longer worth harvesting. Ohio MR17 and Ohio MR25 were picked over a 9-week period but the former had produced 83 percent of its total yield by the end of the first 6 weeks. Ohio MR25, on the other hand, withstood the stunting and even lethal effects of the disease so well that it produced nearly 40 percent of its total yield during the last third of the 9-week harvest period, and the final yield was nearly 40 percent greater than that of Ohio MR17 and more than double that of National. The data given for the last 2 weeks of harvest are averages from plants inoculated only with the "Wisconsin

**TABLE 1.\*—Average cumulative yields for three cucumber varieties when they were inoculated separately with six different strains of cucumber Virus No. 1. Beginning with September 2 data are given as averages of only two virus strains in two varieties.**

Harvest Dates	Cumulative Yields in Pounds per 100 ft. of Row		
	National Pickling	Ohio MR17	Ohio MR25
July 14 to August 4	155	175	151
August 4 to 21	274	376	377
August 25	286	412	414
August 28	296	453	484
September 2		466	568
September 5		473	586
September 8		482	614
September 11		490	645
September 15	296	495	675
<b>Percent harvested</b>			
In 1st 3 weeks (July 14 to August 4)	50.0	35.3	22.4
In 2nd 3 weeks (August 4 to August 25)	95.0	83.2	61.3
Percent of fruits showing mottling in August 21 and 28 harvests	98.2	23.4	14.4

\*Data computed from artificially inoculated yield trials conducted by Dr. J. C. Walker, Plant Pathology Dept., Univ. of Wisc., Madison, Wisc.

severe strain" and "Price's strain No. 6" of cucumber Virus No. 1. The long harvest period and the lag in coming into full production may be rightfully regarded as a liability rather than an asset so far as the commercial pickle industry is concerned, but it is a very definite indication of resistance to the unfavorable effects of mosaic on yield, and should make the variety particularly valuable to the home gardener.

As mentioned above, the fruits of National in this artificially inoculated series had become so severely deformed and mottled by the disease (see figure 2) within 5 weeks after they began to produce that less than 2 percent were free of the disease during the sixth week (see the last line of Table 1). During the same period about one-fourth of the fruits produced by Ohio MR17 were classed as mottled whereas less than 15 percent of those harvested from the Ohio MR25 plants showed any symptoms of the disease.

Ohio MR25 has an excellent record under irrigation in California, and as was indicated earlier, it also performed very well in Indiana in 1953 wherever angular leaf spot became severe. In view of all this evidence concerning the performance of Ohio MR25 under adverse conditions, the authors believe that this selection should prove very satisfactory to the home gardener, and to any others who would like to have a variety that will continue to produce fruit throughout the growing season, and even until it is killed by frost.

#### LITERATURE CITATIONS

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