

Cucumber Varieties Evaluated for Resistance to Downy Mildew on Long Island in 2014

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Downy mildew has been a major problem in cucurbit crops, especially cucumbers, in Long Island and elsewhere in the northeast since a new pathogen strain appeared in the USA around 2004. Impact has been great especially for organic producers because they do not use synthetic fungicides and their customers want a continuous supply of cucumbers into the fall, which they have been struggling to do because downy mildew can kill plants. The cost of fungicides needed to manage downy mildew conventionally is a major constraint because cucumbers are not a high value item. The downy mildew fungus exists as pathotypes varying in ability to infect the various cucurbit types. Cucumber is susceptible to all pathotypes and thus is the first crop affected in an area. Premature death of leaf tissue results in reduced fruit quality and quantity. Loss can be quite extensive in cucumber as fruit production declines substantially in severely affected plants, much of the fruit produced is misshapen, and plants die prematurely. Most cucumber varieties have resistance to the old strain of the pathogen. This resistance provides variable, generally limited suppression of the new strain.

A replicated field experiment was conducted at the Long Island Horticultural Research and Extension Center (LIHREC) in 2014. Plants were grown on black plastic mulch with drip irrigation and controlled release fertilizer. Methods are described in detail in a report posted at <http://www.longislandhort.cornell.edu/vegpath/index.html> in the 2014 Annual Project Reports.

Downy mildew appeared in the area much later than in recent years, reflecting reduced occurrence in much of the eastern USA in 2014. Symptoms were first found at LIHREC on 2 Sep 2014 versus 1 Aug 2010, 17 Jul 2011, and 22 Jul 2013. Symptoms were first found in this experiment on 8 Sep. Symptoms were not found through the last assessment on 29 Sep on DMR-NY264, Marketmore 97, and the three PIs (Plant Introductions) evaluated. Marketmore 97 and Ivory Queen, which developed few symptoms in this experiment, have also exhibited good resistance in other evaluations. DMR-NY264 is based on a cross between these two made by Cornell University plant breeders Michael Mazourek and William Holdsworth. They had found the PIs to be a good source of resistance, thus they were included in this experiment to further document this. The two commercially available cucumbers marketed as having resistance to current strains of the downy mildew pathogen, SV4719CS and SV3462CS, had numerically but not significantly less severe symptoms than the two susceptible varieties included for comparison, Straight Eight and Speedway. Similar results were obtained in previous evaluations conducted at LIHREC. Marketmore 76 and Stonewall were included in this experiment because growers in eastern NY had observed these to be affected less by downy mildew than other varieties they were growing. This experiment

has confirmed this. Defoliation, which was due to anthracnose and natural senescence as well as downy mildew, was numerically lowest for DMR-NY264. Most plants were old and past the harvest period when downy mildew developed; therefore yield data obtained reflects yielding ability of the varieties in the absence of downy mildew. DMR-NY264 was the only entry that did not have marketable fruit on the first and second harvest dates (28 July and 4 Aug). Total yield for DMR-NY264 was significantly less than the other entries reflecting the fact its harvest period was not extended to compensate for the fact it began producing fruit later than the others.

In conclusion, first commercial varieties bred to be resistant to current strains of downy mildew pathogen (SV4719CS and SV3462CS) exhibit moderate resistance. A new variety developed at Cornell (DMR-NY264) and some varieties bred to be resistant to old pathogen strains (Marketmore 97, Stonewall, and Ivory Queen) provide more effective suppression. Monsanto Vegetable Seeds (Seminis brand) has just released SV4220CS that they claim has improved resistance. There are plans to evaluate this variety at LIHREC in 2015 as well as new varieties with improved yield from the Cornell breeding program.