

VEGETABLE CROPS

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Virus Diseases of Cucurbits

by T. A. Zitter and M. T. Banik
Dept. of Plant Pathology
Cornell University
and R. Provvidenti
Dept. of Plant Pathology
New York State Agricultural
Experiment Station, Geneva

Viruses are the most common causes of diseases affecting cucurbits in New York. These diseases result in losses through reduction in growth and yield and are responsible for distortion and

mottling of fruit, making the product unmarketable. A complex of viruses is able to infect cucurbits, a plant group that includes cucumber, melon, squash, pumpkins, and watermelon. The most important viruses are cucumber mosaic (CMV), squash mosaic (SqMV), watermelon mosaic 1 (WMV-1), watermelon mosaic 2 (WMV-2), and zucchini yellow mosaic (ZYMV). With the exception of SqMV, which is seedborne in melon and transmitted by beetles, the other major viruses are transmitted by several aphid species in a nonpersistent manner.

and squash in New York. The virus is seedborne in muskmelon and is spread in nature principally by the spotted and striped cucumber beetles. The virus is carried within the seed and cannot be eliminated by hot water or chemical treatment with trisodium phosphate.

Symptoms consist of pronounced chlorotic mottle, green veinbanding, and distortion of leaves of young seedlings. On mature plants, leaves show intense dark green mosaic, blistering, and hardening, suggestive of a hormonal herbicide effect (fig. 1). Infected fruit coming from such plants show a strong mottled pattern with a lack of netting on melons (fig. 2). Control measures include selection of disease-free seed and cucumber beetle control.

Major Cucurbit Viruses

Squash mosaic virus (SqMV) can cause an important disease of melons



Cucumber mosaic virus (CMV) is probably the most widely distributed and important virus disease of cucurbits in New York. The virus overwinters in many perennial weed sources especially attractive to aphids when weed growth resumes in the spring. Early infection of squash and melons is particularly common. Aphids are the main and most efficient method of virus spread. Summer squash displays severe downward cupping along the midvein and leaf reduction from which the plants fail to recover (fig. 3). Color breaking of squash fruit is usually seen, but is not unique for this virus; other viruses causing this symptom include watermelon mosaic viruses 1 and 2, squash mosaic virus, and zucchini yellow mosaic virus. Early decline of muskmelon vines is usually attributed to CMV infection and should not be confused with collapse or "sudden wilt," which is a more complex disease and a plant-stress-related syndrome. CMV may be seedborne to a limited extent in some crops and weeds such as common chickweed (*Stellaria media*). Good CMV-resistant (actually tolerant since plants are infected by the virus) cucumber varieties are commercially available and produce a high percentage of unmottled fruit. All other commercially grown cucurbits are susceptible to CMV, although in yellow summer squash varieties that also carry a "precocious yellow gene," this gene serves to mask the color breaking common with cucurbit viruses (see discussion under WMV-2).

Watermelon mosaic virus 2 (WMV-2) is the second most important cucurbit virus in New York. This virus can infect and produce symptoms on all commercially grown cucurbits. This aphid-transmitted virus causes milder symptoms on the foliage of most infected plants like

squash (fig. 4), and growers have seen a lessening of foliar symptoms following fertilization. Fruit distortion and color breaking are still a problem on varieties like yellow straight-neck squash (fig. 5). Use of varieties such as 'Multipik' (fig. 6) can prolong the harvest period because the fruit are marketable in spite of foliar symptoms. The host range for WMV-2 is not limited to cucurbits, thus opening the possible overwintering of this virus in several leguminous species such as clover. Mixed infections of cucurbits with CMV and WMV-2 are common by the end of the season.

Watermelon mosaic virus 1 (WMV-1) is aphid transmitted, and infection is limited to cucurbits. Although more common in the southern and western regions of the United States, this virus has been recovered in New York several times since it first occurred in epidemic proportions in 1969. This virus is capable of infecting all commercial cucurbit crops. The foliage of affected plants shows strong mosaic, distortion, and deep leaf serration (fig. 7). Fruits are also malformed with knobby overgrowth (fig. 8).

Zucchini yellow mosaic virus (ZYMV) is a recently described virus disease of cucurbits, first identified in Europe in 1981. It has since been reported from most southern and southwestern states and was found in New York State in 1983. The virus has characteristics very similar to WMV-1 and WMV-2 (nonpersistent aphid transmission, etc.), and like WMV-2, its host range is not limited to cucurbits. Currently, none of the genetic factors that confer resistance to WMV-1 or WMV-2 are able to control ZYMV, but other resistance sources have been identified. Muskmelon, watermelon, and squash are severely affected by ZYMV. Foliar

symptoms consist of a prominent yellow mosaic, necrosis, distortion, and stunting. Fruits remain small, greatly malformed, and green mottled, including fruit of the variety 'Multipik' (fig. 9). It is too early to tell which weed hosts may serve to overwinter this virus in New York.

Minor Cucurbit Viruses or Disease Agents

Tobacco ringspot virus (TRSV) is mainly transmitted by nematodes (*Xiphinema americanum*). Melons and cucumbers are most commonly affected by this virus. The virus has been known on rare occasions to be seedborne in cucurbits. The newly infected leaves show a very bright mosaic with plant stunting (fig. 10), but subsequent leaves are reduced in size and develop a dark green color.

Tomato ringspot virus (TmRSV) causes severe damage to summer and winter squash, but shows only mild symptoms in the other cultivated cucurbits. Like TRSV, TmRSV is nematode transmitted and can be overwintered on many weed species without expressing symptoms.

Clover yellow vein virus (CYVV) is an aphid-transmitted virus that can infect summer squash and was previously considered to be the severe strain of bean yellow mosaic virus. The virus produces a yellow specking on the foliage of infected plants.

Aster yellow mycoplasma (AY), formerly thought to be caused by a virus, has been recovered from infected squash in the state. This leafhopper-transmitted disease organism causes plants to become yellowed and stunted (fig. II).

Quantity discount available.