

# VEGETABLE CROPS

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## DISEASES OF PEPPER Virus Diseases

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### Virus Diseases of Pepper

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The acreage and value of the New York pepper crop are relatively minor, but peppers are still an important commodity in commercial mixed vegetable and roadside market operations. Virus diseases annually reduce yield and quality of all pepper types including bell, cubanelle, banana, and, occasionally, hot varieties. Cucumber mosaic virus (CMV) is by far the most important pepper virus in New York although tobacco mosaic virus (TMV), tobacco etch virus (TEV), tomato spotted wilt virus (TSWV), and alfalfa mosaic virus (AMV) appear sporadically. Potato virus Y (PVY), pepper mottle virus (PeMV), and TEV occur more regularly in the southern states. How some of

these viruses reach the northern states is unclear. They may move north via migrant aphids, which carry the viruses progressively northward, passing them from one susceptible crop to another along the Atlantic coast. Dissemination from infected transplants produced in southern states has not been demonstrated.

#### Major Pepper Virus

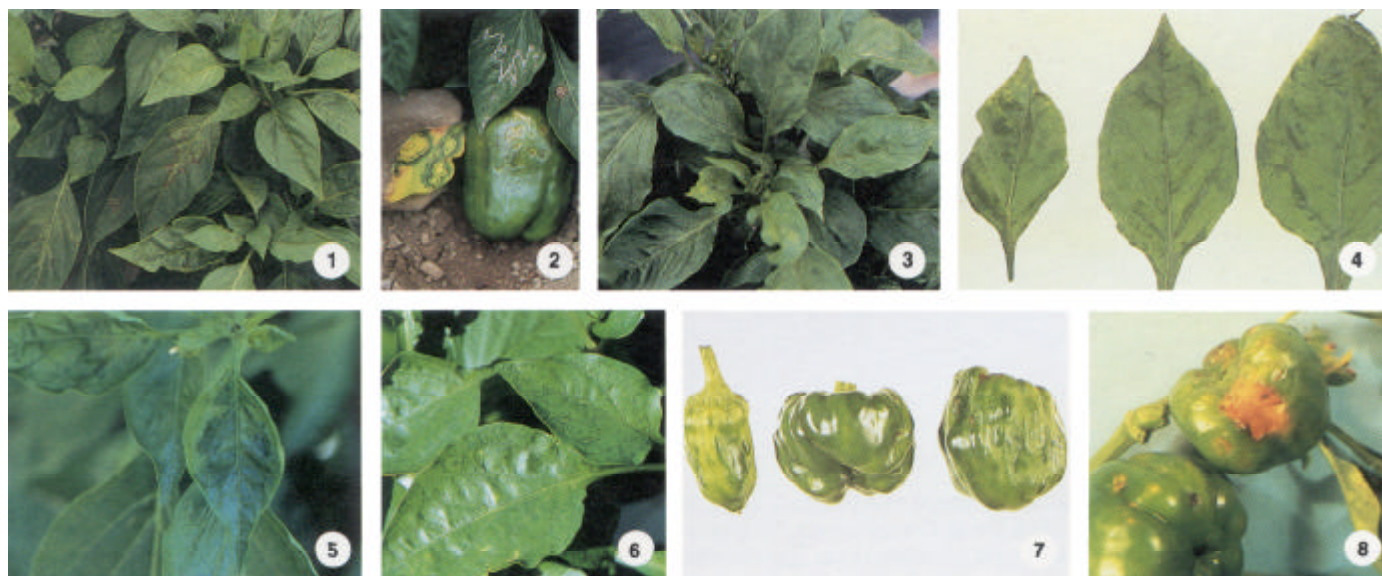
**Cucumber mosaic virus (CMV)** is one of the most important virus diseases of pepper worldwide. The virus exists as a number of strains, but all are apparently capable of infecting pepper and differ only in symptom expression. The age of a plant at the time of infection strongly influences what types of symptoms will be manifested. CMV symptoms can be transitory and often appear on lower, mature leaves as ring-spot or oak-leaf necrotic patterns (fig. 1). Ring-spot symptoms are more prominent on determinate-type peppers. The necrotic symptoms, whether they occur on the foliage or on the fruit (fig. 2), are basically a shock reaction attributed to early virus infection. Sometimes plants adjacent to ring-spotted plants display only a mild to moderate mosaic pattern and

have a general dull appearance (fig. 3). This difference may be influenced by the particular CMV strain involved, but more likely reflects the age at which plants are infected. With early infection, both quality and quantity of fruit produced will be affected.

CMV can infect more than 775 plant species including many weed species (chickweed, milkweed, purslane, etc.). CMV is spread by many aphid species in a nonpersistent manner, meaning that insecticides cannot prevent the spread of this disease. Strategies to delay early infection should be used to enhance yield and reduce the number of cull fruit. Isolate pepper plantings from weedy border areas or grow them next to taller border plantings, such as sweet corn, which can function as a nonsusceptible barrier crop. Mineral oil sprays have been used, primarily in the south in larger commercial pepper operations, to interfere with the transmission of all pepper viruses by aphids. No acceptable level of tolerance to CMV is available in any commercial variety.

#### Minor Pepper Viruses

**Tobacco mosaic virus (TMV)** is generally not a problem for pepper because



most varieties are resistant to the common strains of the virus. Resistance is conferred by a single dominant gene, but two additional factors may be involved. Resistance operates by allowing infection to occur on inoculated leaves, which develop necrotic local lesions and abscise prematurely, thus preventing the virus from spreading systemically. Some strains of TMV, however, can systemically infect pepper and cause a mosaic on the foliage. Those strains are transmitted through seed, and the virus may also be mechanically spread by contact. Growers should be sure to start with healthy transplants.

**Potato virus Y (PVY)** is a common virus among solanaceous crops, infecting potato and tomato in addition to pepper. In southern states PVY ranks as one of the more important vegetable viruses. The symptom most useful for diagnosing PVY infection is a mosaic pattern that develops along the veins, commonly referred to as veinbanding (fig. 4). With early infection, plants are stunted, fruit set is reduced, and fruit express strong mosaic patterns making them unmarketable.

Like CMV, PVY is transmitted by several aphid species, but the green peach aphid is generally considered to be the most important vector. PVY has a limited host range, so elimination of solanaceous weeds bordering the crop would remove one potential source of

inoculum. Because PVY is tuberborne in potato, isolation of peppers from potato plantings would be prudent. Other controls for PVY include choosing resistant varieties, which are presently limited, but should increase in number as more breeding is accomplished; weed control; and other methods outlined under CMV.

**Tobacco etch virus (TEV)** normally occurs along with PVY. However, sporadic occurrence of TEV alone has previously been noted in New York. Typical symptoms consist of broad dark-green mosaic bands along the veins, beginning at the leaf base and often continuing to the tip (fig. 5). The planting of PVY-resistant varieties generally helps control TEV because resistance to both viruses is closely linked; however, there are a few strains of TEV that can infect PVY-resistant varieties. Other control measures have already been noted.

**Pepper mottle virus (PeMV)** bears many characteristics in common with PVY and TEV, including symptom expression. Veinbanding, as seen with PVY, is present, but the mottling is more extensive in interveinal areas and over the entire leaf surface (fig. 6). Fruit mosaic as noted in figure 7 is common for TEV, PVY, and PeMV. PeMV is limited to solanaceous spp., and control measures are those mentioned for other pepper viruses.

**Tomato spotted wilt virus (TSWV)** can cause disease in a wide variety of plants including pepper, tomato, and lettuce. The virus is common in both temperate and subtropical areas of the world. Thrips transmit the virus, but only larvae, and not adults, can acquire the virus. Thus, only adults that fed on infected plants as larvae can transmit the virus and then only after a latent (incubation) period of 4–10 days. This type of transmission is much different from aphid transmission. The virus causes sudden yellowing and browning of the young leaves, which later become necrotic (fig. 8). Fruit formed after infection develop large necrotic blotches.

Use of insecticides to control the vector reduces disease incidence. Elimination of virus reservoirs (weed and ornamental species) near the crop is important but difficult to achieve.

**Alfalfa mosaic virus (AMV)**, or “calico mosaic” as the disease is called when this virus infects potato, can occasionally be recovered from pepper. AMV is aphid transmitted in a nonpersistent manner and produces spectacular white or yellow calico symptoms on solanaceous crops, but milder symptoms on crop reservoirs like alfalfa and clovers. Infection probably causes little damage to pepper. Isolating peppers several feet from alfalfa and other legumes should diminish the chance for infection.

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