

CUCURBIT VIRAL DISEASES

Most common viral diseases of cucurbits in Illinois are cucumber mosaic (*Cucumber mosaic virus*), papaya ringspot (*Papaya ringspot virus*), squash mosaic (*Squash mosaic virus*), watermelon mosaic (*Watermelon mosaic virus*), and zucchini yellow mosaic (*Zucchini yellow mosaic virus*). Depending on the time of infection, viral diseases could cause up to 100% yield losses in cucurbit fields in Illinois.

Statewide surveys and laboratory and greenhouse tests conducted during 2004-2006 showed that *Watermelon mosaic virus* (WMV) was the most prevalent virus in commercial gourd, pumpkin, and squash fields in Illinois. *Squash mosaic virus* (SqMV) was the second most prevalent virus in commercial gourd, pumpkin, and squash fields. SqMV was detected in more counties than any other five viruses. *Cucumber mosaic virus* (CMV), *Papaya ringspot virus* (PRSV), and *Zucchini yellow mosaic virus* (ZYMV) were less prevalent in commercial gourd, pumpkin, and squash fields.

All five viruses were present alone and mixed in the samples tested. Earlier in the growing seasons (July and early August), single-virus infections were detected. Mixed infections were more common from mid-August until the end of the growing season in October. Dual infection of WMV and SqMV was the most prevalent mixed virus infection detected in the fields. Most viruses infecting pumpkin and squash showed similar symptoms. The most common symptoms observed in the commercial fields and in the greenhouse studies were light- and dark-green mosaic, puckering, veinbanding, veinclearing, and deformation of leaves of gourd, pumpkin, and squash. Severe symptoms included fernleaf and shoestring on leaves and color breaking and deformation of fruit.



Figure 1. *Cucumber mosaic (CMV) on cucumber fruit.*

Intensive laboratory, greenhouse, and field studies showed that accurate identification of cucumber mosaic (CMV), papaya ringspot (PRSV), squash mosaic (SqMV), watermelon mosaic (WMV), and zucchini yellow mosaic (ZYMV) from each other based on symptoms is not reliable. Accurate identification of these virus diseases requires using enzyme-linked immunosorbent assay (ELISA) or nucleic acid-based tests.

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Cucumber mosaic virus (CMV).

CMV causes foliar mosaic and mottled fruit (Figure 1). CMV can infect about 800 plant species, including many vegetable crops, ornamentals, and woody plants. Many weeds and cultivated crops are reservoirs of this virus. CMV is transmitted by more than 60 aphid species. Planting resistant cultivars can control CMV. Eradication of weed hosts is often impossible. The use of insecticides is useful, but it cannot completely prevent the spread of the virus.



Figure 2. Papaya ringspot (PRSV) on squash fruit.

Papaya ringspot virus (PRSV). PRSV causes plant stunting, mosaic and fern-leaf appearance on foliage, and color breaking and malformation on fruit (Figure 2). The natural host range of PRSV is confined to the Cucurbitaceae. PRSV is transmitted by more than 20 aphid species. To control this disease, resistant/tolerant cultivars should be planted. Application of insecticides controls aphid but is ineffective for complete control of papaya ringspot.



Figure 3. Squash mosaic (SqMV) of melon. (Courtesy R. Providenti).

Squash mosaic virus (SqMV). SqMV causes veinbanding, mosaic (Figure 3), mottling, and blister on foliage. Plants are often stunted, producing malformed and mottled fruit. SqMV is a seed-borne pathogen. This virus is transmitted by the striped and spotted cucumber beetles. Use of virus-free seed is an important control measure. Spread of the virus can be reduced by controlling beetle vectors by using insecticides.



Figure 4. Watermelon mosaic (WMV) on squash foliage and fruit.

Watermelon mosaic virus (WMV).

WMV infects most of the cucurbits and many leguminous species. WMV causes green mosaic, leaf rugosity, green veinbanding, chlorotic rings, and malformation on foliage, and green ringspots and mottling on fruit (Figure 4). WMV is spread by more than 20

aphid species. The use of resistant cultivars can control WMV. The use of Insecticides, however, cannot completely prevent spread of this virus.

Zucchini yellow mosaic virus (ZYMV). ZYMV is one of the most economically important diseases of cucurbit crops. When crops are infected before fruit set, total yield losses may occur. ZYMV causes yellow mosaic, extreme fernlike appearance of leaf tissue (Figure 5), and bumpy and mottled fruit. ZYMV is spread by several aphid species. Strategies to reduce the spread of ZYMV include removal and destruction of old cucurbit crops, any wild or volunteer cucurbit plants, and rouging out any cucurbit



Figure 5. Zucchini yellow (ZYMV) of summer squash. (Courtesy R. Providenti).

plants showing virus-like symptoms, especially prior to fruit set; planting a tall non-host border crop around the crop (plant four weeks prior to cucurbits); good hygiene practices through use of foot baths and wash down of equipment; and use of ZYMV-resistant cultivars when available. However, resistance breaking strains occur so resistance should not be used alone. The use of insecticides cannot completely prevent the spread of the virus.