



# Extension FactSheet

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## Mosaic Virus Diseases of Vine Crops

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Mosaic diseases of vine crops in Ohio are caused by at least five different viruses: 1) cucumber mosaic virus (CMV), 2) squash mosaic virus (SQMV), 3) watermelon mosaic virus-2 (WMV-2), 4) zucchini yellow mosaic virus (ZYMV) and 5) papaya ringspot virus-watermelon isolate (PRSV-W). All five of these viruses can infect all cultivated vine crops (squash, melons, gourds, cucumbers, pumpkins) and under ideal conditions can cause a high rate of crop failure and severe economic losses.

### Symptoms

As the names imply, all five viruses cause a mottling of foliage called mosaic. This is characterized by the presence of intermingled patches of normal and light green or yellowish colored plant tissue. Depending on environmental conditions, mosaic symptoms can range from mild to severe and be visible on both leaves and fruit. The younger the plant when infected, the more

severe the symptoms as the plant matures. In some cases, plants infected at the seedling stage may collapse and die. Plants infected at the flowering stage may not set fruit or young fruits may abort. If plants are more mature when infected they do not show severe mosaic and may still produce marketable fruit. The most dramatic symptoms are often associated with infected fruit. Fruit symptoms can range from subtle color change to severe deformation. It is not uncommon to have two or more viruses infecting the same plant and in these cases symptoms may be much more severe than if the plant were infected with only one virus. It is nearly impossible to distinguish between any of the five viruses based only on visible symptoms. Because of this, it is important to have suspect plants sent to a diagnostic clinic capable of using specialized techniques to identify the viruses that are present. Proper disease management depends on knowing which specific virus is involved.



Figure 1. Mild mosaic symptoms on squash leaves. Note healthy leaves at bottom of picture.

### Disease Cycle and Transmission

All five vine crop mosaic viruses are transmitted by insects. CMV, ZYMV, WMV-2 and PRSV-W are transmitted primarily by the green peach aphid and the melon aphid. SQMV is transmitted by the striped cucumber beetle and spotted cucumber beetle and also through seed, but only at a very low rate. In most cases these insects acquire the virus by feeding on weeds or other vine crops that are infected. The insects then feed on noninfected vine crops and in the process of this feeding transmit the virus to the host plant. In the case of the green peach and melon aphid, the insect carries the virus on its probing mouthparts and the aphid only needs to probe the plant to transmit the virus. Feeding by the aphid is not necessary. Once the insect probes one plant, it can move onto the next, probing and infecting as it goes. The more aphids present, the quicker and more complete the virus spread. By this process, large acreages can become infected quickly.



Figure 2. Severe mosaic and distortion of leaves and fruit on zucchini.



Figure 3. Severe mosaic and deformation of yellow crookneck squash.

## Management

1. Plant varieties with resistance to these viruses whenever possible. The availability of varieties with virus resistance varies depending on the virus and the vine crop in question. Major seed producers list resistant varieties in their seed catalogs.
2. Control weeds which could harbor the viruses from areas around production fields. Pokeweed is a primary weed in the Ohio area which harbors many plant viruses. Weeds also serve as hosts for insects that transmit the viruses.
3. Since the virus is moved about by insects it would seem logical that insect control would be a primary method of virus control. However, in this case it is not that simple. Since aphid vectors need only probe the plant to transmit the virus, insect control is not really that effective in controlling the virus. Even if the aphid were to die immediately following probing, virus transmission would still take place. To control the insect effectively insecticides would need to be applied on a daily basis. The economics of this may not be feasible. Aphids also move long distances with weather fronts making local control difficult.



Figure 4. Mosaic symptoms on acorn squash fruit.

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