

ZUCCHINI YELLOW MOSAIC

Zucchini yellow mosaic disease, caused by *Zucchini yellow mosaic virus* (ZYMV), was first observed in 1973 in northern Italy. Now, ZYMV occurs worldwide in cucurbit-growing regions and in both field and greenhouse production. This disease is one of the most economically important viral diseases of cucurbits.

The host range of ZYMV is relatively narrow, and the virus infects primarily members of the family Cucurbitaceae. Relatively few non-cucurbitaceous hosts of ZYMV have been identified. Experimentally, ZYMV infects plant species in 10 families (including cucurbits), but most of these species show local lesions or develop symptomless infection. In general, ZYMV reservoir hosts do not appear to play a very important role in disease epidemiology.

Symptoms

ZYMV causes symptoms on foliage and fruits of cucurbits. Melons, pumpkins, and watermelons are more susceptible to ZYMV. Melon plants infected with ZYMV are severely stunted, particularly if infected early in development and leaves typically develop a strong yellow mosaic, blisters, and deformation. Fruits may show mosaic or mottling and cracking, and seeds may be distorted and have low



Figure 1. Yellow mosaic of squash leaves, caused by *Zucchini yellow mosaic virus* (ZYMV). (Courtesy R. L. Gilbertson)



Figure 2. Shoestring symptoms on squash leaves, caused by *Zucchini yellow mosaic virus* (ZYMV). (Courtesy R. Providenti)

For further information contact **Mohammad Babadoost**, Extension Specialist in Fruit and Vegetable Pathology, Department of Crop Sciences, University of Illinois, at Urbana-Champaign. (Phone: 217-333-1523; email: babadoos@illinois.edu).

University of Illinois provides equal opportunities in programs and employment. WMV is spread

germination rates. Squash and pumpkin plants infected with ZYMV are stunted, and leaves show severe symptoms including various combinations of vein clearing, yellowing (Figure 1), deformation, and development of “shoestring” symptoms (Figure 2). Fruits may be severely deformed and distorted, and sometimes have knoblike growth (Figures 3 and 4). Cucumber and watermelon develop mosaic or mottle symptoms on leaves, and watermelon fruits are also malformed and often develop deep longitudinal and radial cracks. Seed production in watermelon is drastically reduced, and seeds are frequently deformed.



Figure 3. Fruits of zucchini with symptoms caused by Zucchini yellow mosaic virus (ZYMV). (Courtesy R. Provvidenti)

Symptoms induced in cucurbits by ZYMV can resemble those caused by *Papaya ringspot virus* (PRSV), *Watermelon mosaic virus* (WMV), and *Cucumber mosaic virus* (CMV). Therefore, symptoms alone are not sufficient for identification of ZYMV. ZYMV can be detected by serological methods such as ELISA or by RT-PCR and sequencing.

Disease Cycle

In nature, ZYMV is transmitted in a nonpersistent (stylet-borne) manner by at least 26 species of aphids. Aphids acquire the virus from reservoir hosts, and viruliferous winged aphids fly to cucurbits fields and initiate infections. Infected plants appear in fields (generally 7-10 days) after inoculation. The virus can be spread rapidly via both colonizing and non-colonizing aphid species. When aphid populations are large high incidences of ZYMV infection (up to 100%) can develop. The virus is acquired and transmitted by aphid vectors in 5-10 seconds and the vectors retain the virus for hours.

ZYMV is also easily transmitted mechanically (via sap). In addition, ZYMV can be spread mechanically through farming operations (e.g., via sap generated when tires crush leaves and stems of infected plants and when leaves of healthy plants are wounded). Moreover, transmission of the virus may occur via plant-to-plant contact (leaves of infected and healthy plants rubbing together). Aphids move the virus back to reservoir hosts in and around fields. Seed-transmission of ZYMV has not been clearly



Figure 4. Pumpkin fruits with color breaking and knobs caused by Zucchini yellow mosaic virus (ZYMV). (Courtesy T. A. Zitter)

documented, although it is believed that low levels of seed transmission may occur in squash and zucchini. Long-distance spread of ZYMV occurs by infected fruits.

Disease Management

Management of ZYMV requires an integrated approach of the following methods.

- New cucurbit fields should not be adjacent to or near established fields with ZYMV - infected plants. Similarly, new fields should not be planted downwind of established fields with ZYMV-infected plants.
- If transplants are used, plant virus- and aphid-free plants.
- Plant resistant cultivars to ZYMV wherever they are available. Cucurbit cultivars with resistance to ZYMV have been developed.
- Eliminate potential reservoir hosts. Some of the reservoir hosts are symptomless, but could carry the virus.
- Since the greatest losses occur when plants are infected in early development (before flowering), efforts should be made to delay ZYMV infection during early season by controlling weeds, rogueing diseased plants early in the season, and preventing aphids from landing on plants (e.g., by using reflective mulches).
- Applications of mineral oils and insecticides can slow the spread of viruses in cucurbit fields. The application of chemicals may be combined with a program of rogueing infected plants early in the growing season. Application of systemic insecticides are more effective than contact insecticides for management of virus diseases.
- After the crop is harvested, old plants should be removed and destroyed to prevent old plants serving as sources of inoculum for other plants.