

**Plant Virus Diseases that Threaten Cucurbit Production in Arizona**

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Summary

A number of plant viruses were isolated from diseased cucurbits in Arizona during 1982-85. Watermelon mosaic virus 2, cucumber mosaic virus, and squash mosaic virus are previously recognized viral pathogens in Arizona and in most years are not considered economically threatening to cucurbit production. Three newly described plant viruses (lettuce infectious yellows, watermelon curly mottle and zucchini yellow mosaic) however, have the potential to, or already have, incited serious epidemics in Arizona. Losses are heaviest with these diseases when insect vector levels build up early in the growing season and plants become infected during critical developmental stages.

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Many plant viruses incite serious diseases annually in Arizona cucurbits. Though some of these diseases and their epidemiology are well documented as the result of prior research efforts (5, 6), new problems have been encountered recently (1, 2, 4) as changes in cucurbit production areas have occurred. From 1982-85, the viruses recovered from samples from Arizona cucurbit fields were identified by biological (mode of transmission and host range) and/or serological means and by electron microscopy.

Results and Discussion

Six plant viruses were identified from cucurbit samples and are listed in Table 1 with general characteristics of the viruses and the diseases they incite.

Cucumber mosaic virus (CMV) can be devastating to most cucurbits and generally occurs only in fields adjacent to urban landscape plants which are reservoirs of the virus. In some cases, the virus is seedborne. Good sanitation practices, the use of clean seed and maintaining distance from urban areas are effective control measures.

Squash mosaic virus (SqMV) is usually a problem only when virus contaminated seed is planted (6). The infected seedlings do not set fruit, but provide a source of virus inoculum from which older plants become infected when the beetle vectors arrive later

in the season. Planting clean seed is the most effective control.

Watermelon mosaic virus 2 (WMV-2) has been present in Arizona for many years (5). Varieties such as Topmark (muskmelon) and Calsweet (watermelon) are tolerant to the virus. Watermelon mosaic virus 1 (WMV-1) is distantly related to WMV-2, has a limited host range, and can cause severe losses in cucurbits.

Though the virus occurs in the Imperial Valley, it has apparently not been a problem in Arizona. Zucchini yellow mosaic virus (ZYMV) is related to WMV-1 and WMV-2 and has only recently been recognized as a serious cucurbit problem, worldwide (4). The virus causes severe distortion of the fruit and total losses have occurred in some areas. Preliminary results from a field plot experiment conducted in Tucson indicated that mixtures of ZYMV and WMV-2 are even more devastating than single infections (unpublished).

All three viruses are aphid transmitted and Myzus persicae L., the green peach aphid is the most efficient vector in spring plantings, while Aphis gossypi, the melon aphid is the important vector in fall crops. The development of resistant and/or tolerant varieties is underway but none are presently available.

The lettuce infectious yellows virus (LIYV) was newly recognized in Arizona following the 1981-82 growing season (1) and is a limiting factor in cucurbit production when the whitefly vector is present. Watermelon and specialty melons are the most severely affected cucurbits but heavy losses have also occurred in squash, melons and pumpkin.

The most effective control is to avoid planting cucurbits near early fall planted lettuce which is an important source of virus inoculum for later lettuce plantings and sequentially for spring planted cucurbits. There are no resistant varieties of cucurbits or lettuce available.

Leaf curl of cucurbits is caused by the newly identified watermelon curly mottle virus (2) which is a close relative of the squash leaf curl virus encountered in Imperial Valley in the late 1970's (3). The virus is especially damaging to watermelon, summer and winter squash (1) and buffalo gourd (7) while muskmelon and cucumber are affected less severely.

Table 1. Some Characteristics of Cucurbit Viruses Identified from Diseased Cucurbits in Arizona During 1982-85

Disease/ Virus	Host Range	Disease Symptoms	Means of Transmission
Mosaic/ Cucumber Mosaic Virus (CMV)	Extremely wide host range includ- ing cucurbits, lettuce, tomato, spinach, and many others. Many weeds and ornamentals.	Mild to severe mosaic symptoms; stunting common. Infected seedlings may die. Diseased fruit often deformed.	Aphid, mechanically (sap); seed- borne in some species.
Mosaic/ Squash Mosaic Virus (SqMV)	Natural host range limited to <u>Cucurbitaceae</u> , in which most species are susceptible; some strains do not infect watermelon.	Foliar symptoms: mild mosaic to severe mottle and deformation. Fruit may become deformed.	Spotted and striped cucum- ber beetles ( <u>Diabrotica</u> and <u>Acalymma</u> spp.); mechanically, seed-borne.
Mosaic/ Watermelon Mosaic Virus 2 (WMV-2)	<u>Cucurbitaceae</u> : All commercially grown cucurbits. Also infects many weeds: such as cheeseweed, lambquarter, coyote melon.	Mottled and mosaic leaves, shortened internodes, stunted plant growth. Fruit set inhibited if early infection.	Green peach and melon aphids ( <u>Myzus</u> <u>persicae</u> and <u>Aphis</u> <u>gossypii</u> ); mechanically.
Mosaic/ Watermelon Mosaic Virus 1 (WMV-1)	<u>Cucurbitaceae</u> : Most cucurbits.	Mottle and mosaic symptoms in infected leaves. Blisters and distortion also common. Fruit of infected plants of poor quality.	Same as WMV-2

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Disease/ Virus	Host Range	Disease Symptoms	Means of Transmission
Mosaic/ Zucchini Yellow Mosaic Virus (ZYMV)	<u>Cucurbitaceae</u> : All commercially grown cucurbits. Experimentally infects members of 11 other families. (infects dudaim melon)	Severe mosaic, yellowing, shoe- stringing of leaves. Stunting of infected plants. Fruit and seed deformation. Dark green blisters on leaves and fruit.	Same as WMV-2
Yellows/ Lettuce Infectious Yellows Virus (LIYV)	<u>Convolvulaceae</u> : morning glory. <u>Compositae</u> : lettuce, sow- thistle, prickly lettuce, dandelion. <u>Chenopodiaceae</u> : beet, lambsquarter. <u>Malvaceae</u> : cheeseweed <u>Cucurbitaceae</u> : melon, cucumber, pumpkin, squash.	Yellowing or reddening of leaves. Stunting of plant. Yield loss, especially if early infection occurs	Whitefly ( <u>Bemisia tabaci</u> ).
Leaf curl/ Watermelon Curly Mottle Virus (WCMoV)	<u>Cucurbitaceae</u> : cantaloupe, cucum- ber, watermelon, coyote melon, squash, pumpkin, dudaim melon. <u>Leguminosae</u> : bean ( <u>Phaseolus</u> )	Reduced fruit set. Dramatic leaf curling, distortion and mild mottle in watermelon, squash pumpkin, and bean. Mild curling of leaves in muskmelon and cucumber; mild mottle in certain cultivars.	Whitefly ( <u>Bemisia tabaci</u> ); mechanically.

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