

Virus diseases of cucurbit crops

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Five principal viruses are recorded infecting cucurbit crops in Western Australia, Cucumber mosaic virus (CMV), Papaya ringspot virus-cucurbit strain (PRSV), Squash mosaic virus (SqMV), Watermelon mosaic virus (WMV) and Zucchini yellow mosaic virus (ZYMV). Of these PRSV, SqMV and ZYMV are widespread and cause significant yield loss and fruit quality defects in cucumber, honeydew melon, pumpkin, rockmelon, squash, watermelon and zucchini crops.

Zucchini yellow mosaic virus (ZYMV)

Hosts

All cucurbit crops are susceptible to ZYMV including vegetable cucurbits (cucumber, pumpkin, squash and zucchini) and melons (rockmelon, honeydew melon and watermelon). It also infects certain non-cucurbitaceous weeds (eg. mallow) and wild cucurbits (eg. Afghan melon) naturally. These act as infection reservoirs.

Distribution

ZYMV occurs worldwide. It infects plants in many cucurbit growing areas throughout Australia. In Western Australia it infects cucurbit crops in Carnarvon, Geraldton, Kununurra and Perth, but has not yet been found at Broome.

Symptoms

Severe mosaic symptoms commonly occur in leaves of cucurbit plants infected with ZYMV. Other leaf symptoms include deformation, blistering and reduced size, and infected plants are stunted. Pumpkin and zucchini fruit develop discoloration and knobbly areas which cause fruit deformation and. Infected rockmelon fruit often have poorly formed surface 'netting'.



Figure 2. Fruit symptoms of ZYMV on Jarrahdale pumpkin – knobbly and distorted



Figure 3. Leaf symptom of ZYMV on zucchini – severe mosaic and distortion



Figure 1. Leaf symptoms of ZYMV on Jarrahdale pumpkin – severe mosaic and distortion



Figure 3. Leaf symptom of ZYMV on zucchini – severe mosaic and distortion

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Spread

ZYMV is transmitted by a wide range of aphid species of which the green peach (*Myzus persicae*) and melon (*Aphis gossypii*) aphids are the most important. Aphids pick up the virus from either ZYMV-infected crop plants or nearby infected weeds then spread it to healthy cucurbit crop plants.

Papaya ringspot virus (PRSV)

Hosts

PRSV infects many cucurbit crops including cucumber, honeydew melon, pumpkin, rockmelon, squash, watermelon and zucchini but does not infect non-cucurbit crops. It also infects some wild and native cucurbit species (eg. paddy melon, Afghan melon) which act as infection reservoirs.

Distribution

PRSV is found worldwide but mainly in tropical areas. In Australia, it is reported infecting plants in the cucurbit growing areas of Queensland, Northern Territory and northern Western Australia (Kununurra and Broome)

Symptoms

Distinctive mosaic symptoms commonly occur on leaves of cucurbit plants infected with PRSV. It also causes leaf distortion and blistering. Infected plants are often deformed and stunted. Infected zucchini and pumpkin develop lumpy distorted fruit while rockmelon fruit may have poorly formed surface 'netting'. Watermelon fruit may develop ringspot patterns on the skin or have an uneven surface.



Figure 6. Fruit symptom of PRSV on watermelon – ringspots and uneven skin surface



Figure 7. Leaf symptoms of PRSV on butternut pumpkin – mottle, distortion and blistering



Figure 5. Leaf symptom of PRSV on watermelon – mosaic, crinkling and distortion



Figure 8. Fruit symptoms of PRSV on butternut pumpkin – lumpy and distorted

Spread

PRSV is spread by a number of different aphid species including the green peach and melon aphids, both of which colonise cucurbit plants. The virus is picked up from infected crop plants or weeds and spread to healthy cucurbit crop plants.

Squash mosaic virus (SqMV)

Hosts

SqMV infects vegetable cucurbits and melons as well as wild or native cucurbits, but does not infect non-cucurbitaceous crops or weeds.

Distribution

SqMV is found worldwide. It infects vegetable cucurbit and melon crops in Western Australia (Kununurra and Broome) and these outbreaks result from sowing infected cucurbit seed.

Symptoms

The virus causes stunting and leaf mottle in infected seedlings. Older infected plants develop leaves with distorted margins, vein clearing and mild to severe mosaic. Infected fruit may have mottling on the skin and be malformed or distorted.

Spread

SqMV is readily seed-borne in cucurbit seed stocks and is spread between plants by the 28-spotted ladybird (*Henosepilachna vigintioctopunctata*). Aphids are not vectors of SqMV. The virus can also spread readily in infected crops by contact through the tiny wounds created on plants by machinery (eg. spraying equipment), cutting implements and personnel (eg. during weeding).

Watermelon mosaic virus (WMV)

Hosts

As well as infecting all types of cucurbit crops, WMV also infects wild cucurbits naturally. Solanaceous and Asteraceous plants, many of which are weeds, act as reservoirs for infection.

Distribution

WMV is distributed widely throughout the world. In Western Australia it has been found infecting cucurbits in Perth, Kununurra, Carnarvon and Broome. However, its incidence is generally low in the state.

Symptoms

WMV produces less severe symptoms on cucurbit leaves and fruit than PRSV, ZYMV and SqMV. Foliage symptoms are mild mosaic, leaf deformation and plant stunting with little effect on fruit.

Spread

As with ZYMV and PRSV, WMV is spread by a number of different aphid species. The virus is picked up from infected crop plants or weeds and spread to healthy cucurbit plants.

Cucumber mosaic virus (CMV)

Hosts

CMV infects all types of cucurbit crop plants. It has a very wide natural host range including many other non-cucurbit crop plants and weeds from a range of plant families.

Distribution

CMV is distributed widely throughout most regions of the world. In Western Australia it infects cucurbit crops in Broome, Carnarvon, Geraldton, Kununurra and Perth. Many non-cucurbit crop plants can also become infected, acting as reservoirs for the virus to spread to cucurbit species. However, its incidence is generally low in cucurbit crops.

Symptoms

Leaves on infected cucurbit plants show mild mottling, distortion, and may be downcurled. Plants infected with CMV are often stunted.

Spread

CMV survives in reservoir hosts. It is also seed-borne on some weed hosts. A number of different aphid species pick up the virus from infected plants and spread it to crop plants.

NOTE: Cucurbit plants can be infected by more than one virus at the same time.

Control of CMV, PRSV, SqMV, WMV and ZYMV

- Destroy all old crops promptly once finished, as old plants are potent sources of infection for spread to non-infected crops.
- Avoid planting cucurbit crops sequentially in close proximity to each other.
- Remove all weeds and volunteer cucurbit crop plants within and around cucurbit crops as these can harbour aphids and viruses.
- Remove plants with virus symptoms within the crop as these are an important infection source. This needs to be done early in the life of the crop, and is especially important with squash and zucchini.
- Use of super-reflective plastic mulch deters vector aphids from landing and so reduces virus spread.

For SqMV

Use seed that has been virus tested and found healthy before sowing.

For ZYMV and PRSV

Use cucurbit varieties with ZYMV and/or PRSV resistance if available.

NOTE: Spraying insecticides to control CMV, PRSV, WMV and ZYMV is not a good virus management approach because insecticides do not act fast enough to prevent the rapid spread of these viruses by aphids, and may increase rather than reduce virus spread.