

Diseases of cucurbit vegetables

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Cucurbits include watermelons, cantaloupes, cucumbers, zucchini, pumpkins, squash, bitter melons, gourds, and hairy melons. They are grown in most parts of NSW in frost-free times. Cucurbits are warm weather crops which are sown, grown and harvested over spring, summer and autumn.

This Primefact covers common cucurbit diseases caused by fungi, bacteria and viruses. There are other less common diseases affecting cucurbits which are not covered here. Although descriptions of the more common diseases have been given to assist with identification, it can be difficult to diagnose some diseases with similar symptoms. Consider sending samples to a plant disease diagnostic laboratory for correct identification, so that correct management options can be applied.

Alternaria leaf spot

Cause: Fungus – *Alternaria cucumerina* and *Alternaria alternata*

Symptoms: Small spots develop on the upper surface of leaves which could develop into larger coalescing lesions. These lesions might have concentric rings.

Source of infection: The fungi survive in soil on plant debris and seed may also be the source of new infections.

Favoured by: Warm, wet conditions.

Control:

- Use disease-free seed.
- Use the recommended fungicides.



Figure 1. *Alternaria* leaf spot

Downy mildew

Cause: Fungus – *Pseudoperenospora cubensis*



Figure 2. Downy mildew (photo courtesy of Denis Persley – QDPI&F)

Symptoms: Leaves have a mottled appearance. Leaf spots turn a pale yellow colour, enlarge and dry out. Can be confused with the bacterial disease angular leaf spot.

Source of infection: Other cucurbit crops affected by downy mildew and old infected crop trash. Spread by spores in wind, air currents, workers and machinery.

Favoured by: Moist conditions, such as rain, fog and heavy dews and therefore more common in districts of higher rainfall.

Control:

- Use tolerant varieties where available.
- Monitor crops closely to identify the disease early in its cycle and be alert to weather conditions that may cause an early infection.
- Use a fungicide program that allows for the rotation of protective and systemic fungicides which reduce the chance of fungicide resistance developing.

Powdery mildew

Cause: Fungus – *Podosphaera xanthi*

Symptoms: White powdery spots develop on leaves. Symptoms usually develop first on the underside of leaves before covering both sides. Leaves gradually turn yellow to a papery brown and eventually die.



Figure 3. Powdery mildew (photo courtesy of David Commens – SPS)

Source of infection: Other cucurbit crops and infected weeds. Spread by spores carried in wind and air currents.

Favoured by: Warm, relatively dry conditions (unlike downy mildew). Light dews provide sufficient moisture for infection.

Control:

- Use tolerant varieties where available.
- Monitor crops closely to identify the disease early in its cycle.
- Use a fungicide program involving the rotation of protective and systemic fungicides that reduce the chance of fungicide resistance developing.
- Petroleum spray oils, milk and bicarbonates might offer some control.

Anthraco

Cause: Fungi – *Colletotrichum orbiculare*

Symptoms: Brown to black spots develop on leaves; long dark spots develop on stems and round sunken spots develop on fruit. Fruit symptoms might develop in transit.



Figure 4. Anthracnose on rockmelon fruit

Source of infection: Infected crop trash and infected seed. Spread by windblown rain, people, animals, and machinery moving through the crop in wet conditions.

Favoured by: Moist conditions.

Control:

- Use tolerant varieties where available.
- Monitor crops closely to identify the disease early in its cycle.
- Use recommended fungicides.
- Don't replant in sites that have previously had the disease, or use a long rotation.

Scab or gummosis.

Cause: Fungus – *Cladosporium cucumerinum*

Symptoms: Can affect leaves, petioles, stems and fruits. Water-soaked spots occur on leaves and runners. These spots eventually turn grey to white. The centre of the spots could then drop out to give a 'shot-holed' appearance. Lesions on fruit are often confused with anthracnose. These spots are 3–4 mm in diameter and might ooze a gummy substance. The spots could then be invaded by secondary rotting bacteria which cause the spots to smell.

Source of infection: The fungi can be seed-borne, but also survive in soil on undecomposed plant material. Spread by wind in moist conditions.

Favoured by: Cool, wet weather, including rain, dew and fogs.

Control:

- Use resistant cultivars.
- Use disease-free seed.
- Apply appropriate fungicides particularly if cool, wet weather is expected.

- Rotate cucurbits with other crops, with two or more years between cucurbits.
- Avoid low-lying, shaded areas prone to heavy fogs and dews.



Figure 5. Gummosis on cucumber fruit (photo courtesy of Denis Persley – QDPI & F)

Septoria leaf spot

Cause: Fungus – *Septoria cucurbitacearum*

Symptoms: Leaf spots are brown with small, black, fruiting bodies. Raised spots develop on fruit, often with star-shaped cracks.



Figure 6. Septoria leaf spot (photo courtesy of Denis Persley – QDPI&F)

Source of infection: The fungi can survive on crop debris, especially from the previous season. It can be spread by rain splash and windborne rain.

Favoured by: Cool, rainy weather. Mainly found on pumpkins.

Control:

- Rotation will reduce disease levels after a block has been affected. Minimum 2 year break without cucurbits.
- Monitoring crops for disease is a high priority.
- Application of the recommended fungicides when appropriate.

Gummy stem blight

Cause: Fungus – *Didymella bryoniae*

Symptoms: Stems, leaves and fruit could all be affected, with leaves displaying brown to black spots. Stems near the crown might have a bleached appearance and exude a brownish gum; however, similar symptoms appear with charcoal rot and fusarium wilt.

Source of infection: Infected crop trash, soil, weeds and infected seed. Spread by spores carried in wind and air currents.

Favoured by: Moist conditions and high relative humidity.

Control:

- Monitor crops and make sure the disease is diagnosed correctly, as charcoal rot and fusarium wilt display similar symptoms in hotter regions.
- Crop rotation is important if the disease has occurred.
- Remove and destroy infected crop residue.
- Apply recommended fungicides.



Figure 7. Gummy stem blight (Photo courtesy of David Commens, South Pacific Seeds)

Charcoal rot

Cause: Fungus – *Macrophomina phaseolina*

Symptoms: Bleaching of stems and leaf death near the crown of the plant. The stems could also have gum exuding from these areas as the bleached areas turn drier. Symptoms may be very similar to gummy stem blight. Symptoms often appear late in the season.

Source of infection: The fungus is a common soil-borne organism. It has a wide host range. Crop trash also provides a source of further infection.

Favoured by: A common soil-borne fungus that is favoured by warm to hot conditions and spread by trash and soil.



Figure 8. Charcoal rot

Control:

- Have the disease diagnosed correctly as it can be confused with gummy stem blight.
- There are no control options for this disease.

Damping-off of seedlings and fungal root rots

Cause: Damping-off and root rots are caused by several fungi including *Pythium*, *Rhizoctonia* and *Fusarium*

Symptoms: The first symptoms are water-soaked lesions occurring at soil level. This leads to wilting and seedling death. Often, plants that have survived damping-off might show symptoms of root rot. Roots can have a watery grey appearance, particularly the finer feeder roots.

Source of infection: These fungi are common soil inhabitants that might also infect weeds or survive on decaying plant material. Can be spread by water and soil.

Favoured by: Cool temperatures, high soil moisture and poor aeration. Root rots of older plants are also common in moist hot conditions, especially under plastic mulches.

Control:

- Usually sporadic outbreaks and can be difficult to control.
- Fungicide seed treatments provide some control of damping-off.
- Plant to allow vigorous growth, and do not overwater.
- Ensure residue from previous crops is broken down.

Careful irrigation management is important with drip under plastic.

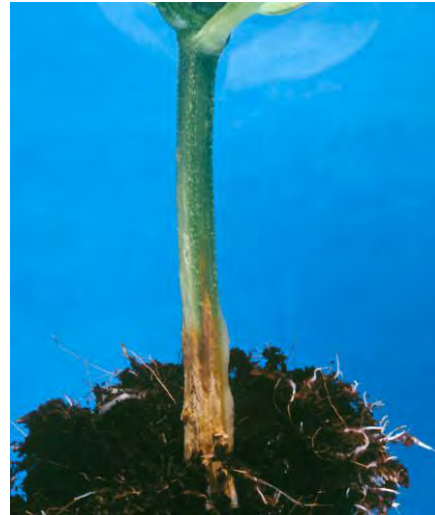


Figure 9. Damping-off of cucumber seedling

Angular leaf spot

Cause: Bacterium – *Pseudomonas syringae* pv. *lachrymans*

Symptoms: On leaves the disease first appears as small, water-soaked spots which enlarge to about 3 mm in diameter. The spots become tan on the upper surface and gummy or shiny on the lower surface, due to bacterial ooze which dries out and turns white. Round lesions occur on fruit. Could be confused with anthracnose. Mainly found on cucumbers, but also found on rockmelon, honeydew, watermelon and squash.

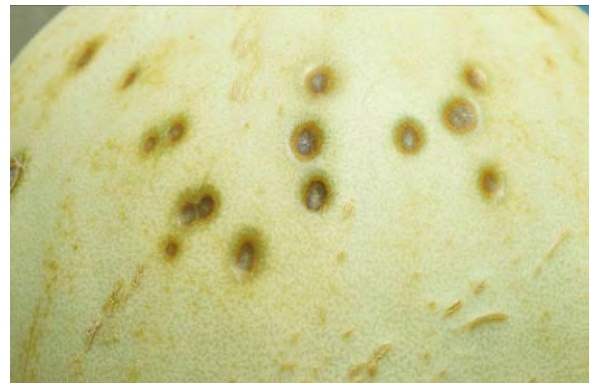


Figure 10. Fruit symptoms of angular leaf spot on honeydew melon

Source of infection: Seed and infected crop refuse.

Favoured by: Warm and humid conditions. Spread by rain, irrigation water, hands and clothing of workers.

Control:

- Use only disease-free seed.
- Practise rotation and destroy plant debris by burning, if possible, or ploughing in.
- Do not work in the crop when it is wet.

- High levels of nitrogen fertiliser may increase disease levels.
- Monitor crops to find early symptoms and apply recommended fungicides if conditions are favourable for disease.

Bacterial leaf spot

Cause: Bacterium – *Xanthomonas campestris* pv. *cucurbitae*



Figure 11. Bacterial leaf spot (photo courtesy of Denis Persley – QDPI&F)

Symptoms: Spots first appear on squash and pumpkin leaves as small water-soaked or greasy areas on the underside of leaves, and as indefinite yellow areas on the upper side of leaves. In about five days the spots become round to angular with thin, brown, translucent centres and a wide, yellow halo. The spots enlarge up to about 7 mm diameter. Occasionally young stems and petioles are attacked. Young fruit may also be affected. Fruit may produce a light brown ooze from small, water-soaked areas, which can extend into the seed cavity, causing seed infection.

Source of infection: Disease can be transmitted by seed and infected crop residue, as well as rain splash and the movement of people and machinery.

Favoured by: Cool, damp weather.

Control:

- Use disease-free seed.
- Do not work in the crop when it is wet.
- Practise rotation and destroy plant debris by burning, if possible, or ploughing in.
- Use recommended chemical treatments, but often it is too late after fruit symptoms are noticed.

Mosaic

Cause: Watermelon mosaic virus (Type 1 and 2), papaya ringspot virus and zucchini yellow mosaic virus.



Figure 12. WMV-2 affected watermelon leaves (photo courtesy of Denis Persley – QDPI&F)

Symptoms: Light and dark green mottling of the leaves. Distortion of leaves and stunting of the plant might occur. Marrow and summer squash fruit might show sunken concentric circles or a raised marbled pattern.

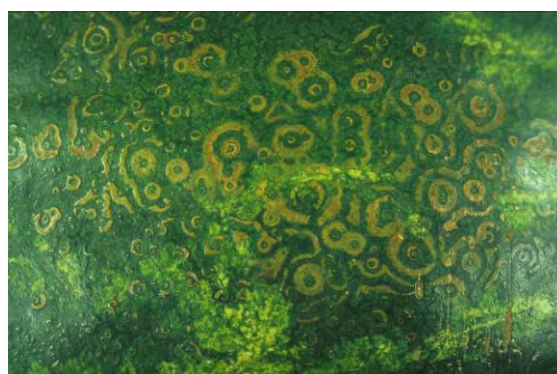


Figure 13. WMV-2 affected watermelon

Papaya ringspot virus may cause lumpy distorted fruit on zucchini. Viruses may also affect fruit set. All commercially grown cucurbits are susceptible. Pumpkin, squash, rockmelon and zucchini crops are most commonly affected.

Source of infection: Other mosaic-affected cucurbit crops and weeds. Spread by aphids that only need a very short period of feeding to transmit the virus.



Figure 14. Watermelon mosaic virus on squash



Figure 15. PRSV-W affected zucchini fruit (photo courtesy of David Commens - SPS)



Figure 16. PRSV-W affected watermelon leaves (photo courtesy of Brenda Coutts – WA DPI)

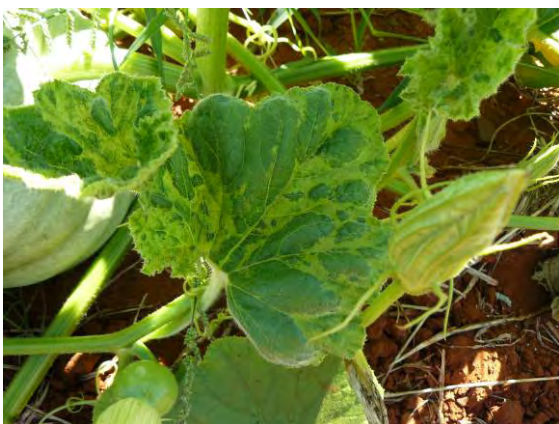


Figure 17. ZYMV affected leaves of Jarrahdale pumpkin (photo courtesy of Brenda Coutts – WA DPI)

Control:

- Use tolerant varieties.
- If only a few plants are affected they should be removed and destroyed.
- Insect control is an option if monitoring is practised and appropriate insecticide applications are made. However, the time for transmission by the aphids is so short that chemical control might not be viable.
- Plant residue should be incorporated as soon as possible after harvest.
- White plastic mulch is used in areas where there is a history of this disease. It is used to confuse and deter aphids from visiting and feeding on plants.



Figure 18. ZYMV affected fruit of Jarrahdale pumpkin (photo courtesy of Brenda Coutts – WA DPI)

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Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (July 2009). However, because of advances in knowledge, users are reminded of the need to ensure that information upon which they rely is up to date and to check currency of the information with the appropriate officer of New South Wales Department of Primary Industries or the user's independent adviser.

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