



Virus diseases of vegetable brassica crops

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Three viruses are recorded infecting vegetable brassica crops in Western Australia, *Turnip mosaic virus*, *Cauliflower mosaic virus* and *Beet western yellows virus*. Occasionally these three viruses cause significant economic loss but their occurrence is spasmodic. Vegetable brassica crops include cauliflower, broccoli, cabbage, Chinese cabbage, Brussels sprouts, radish, turnips and Swedes.

Turnip mosaic virus (TuMV)

Hosts

All vegetable brassica crops are susceptible to TuMV (formerly called cabbage black ringspot virus) including broccoli, Brussels sprouts, cauliflower, cabbage and Chinese cabbage. Other crops susceptible to TuMV include canola, lettuce, mustard and rhubarb. The virus has a wide natural host range, including many weeds which can act as reservoirs for infection.

Distribution

TuMV occurs worldwide. In Australia, it has been reported infecting plants in many brassica growing areas. In Western Australia, it infects vegetable brassica and canola crops as well as certain weeds. Its incidence in canola and vegetable brassica crops is low. Wild radish is the most important weed host identified so far in Western Australia.

Symptoms

Field

Severe mosaic symptoms commonly occur in leaves of brassica plants infected with TuMV. It also causes chlorotic (yellow) ringspots in young leaves. In older leaves, these ringspots develop into yellow or brownish spots surrounded by circular or irregular necrotic (dead) rings. Necrotic streaks, flecks and patches may also occur and plants can be deformed and stunted (Figures 1 and 2).

Stored cabbage

Infection occurs initially in the field but necrotic spots may develop after harvest during storage. These symptoms are on internal leaves, only showing when an infected cabbage is cut open.



Figure 1: Leaf symptoms of TuMV on cabbage – necrotic ringspots consisting of circular or irregular necrotic rings.



Figure 2: Leaf symptoms of TuMV on Chinese cabbage plant – tiny necrotic spots, chlorosis and necrotic patches, is deformed and stunted.

Spread

TuMV is transmitted by a wide range of aphids. Aphids pick up the virus from either TuMV-infected crop plants or nearby infected weeds and then spread it to healthy brassica crop plants. Climatic conditions that favour the build up of aphid populations increase the spread of the virus.

Cauliflower Mosaic Virus (CaMV)

Hosts

CaMV infects many vegetable brassica crops including broccoli, Brussels sprouts, cabbage and cauliflower but does not infect non-brassica crops. It also infects some brassicaceous weeds such as wild radish which act as infection reservoirs.

Distribution

CaMV is found in temperate regions worldwide. It infects vegetable brassica and canola crops in Western Australia.

Symptoms

In cauliflower, symptoms on leaves can be initially hard to see in the field. Later in the season, mosaic patterns are easier to observe and veinal chlorosis (vein clearing) becomes prominent (Figure 3), plants are stunted and heads produced are of a small size and poor quality. In other vegetable brassicas, CaMV infected plants often do not show any symptoms.

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Figure 3: Symptoms of CaMV in cabbage leaf – veinal chlorosis (vein clearing) and mild mosaic.

Spread

CaMV is spread by a number of different aphid species such as the green peach and cabbage aphids, both of which colonise vegetable brassica plants. As with TuMV, the virus is picked up from infected crop plants or weeds and spread to healthy brassica crop plants.

Beet western yellows virus (BWYV)

Hosts

BWYV infects all vegetable brassica crops, canola and brassicaceous weeds. It has a very wide host range including many other non-brassica crop plants and weeds from a range of plant families.

Distribution

BWYV is distributed throughout temperate regions of the world. In Western Australia, it commonly infects canola crops but it may be also found in vegetable brassica crops. Wild radish is a key host and acts as a reservoir for the virus. Many other non-brassica crops and native plants can also become infected, acting as reservoirs for the virus to be spread to brassica species.

Symptoms

The virus causes reddening of lower leaves, plant stunting and significant yield reductions can occur. Its symptoms are easily confused with those of nutritional imbalance, herbicide spray damage, waterlogging or other stress factors. In cabbage, BWYV also induces tip burn in internal leaves particularly during storage.

Spread

BWYV is spread predominantly by the green peach aphid which colonise brassica crops. Once an aphid is infected with BWYV, it transmits the virus for the rest of its life, so it is important to control aphid populations. Most populations of the green peach aphid in Western Australia are resistant to 'old chemistry' insecticides.

Control of TuMV, CaMV and BWYV

- Plant healthy brassica seedling transplants;
- Destroy all old crops promptly once finished, as the old plants are potent sources of infection for spread to non-infected crops;
- Avoid planting brassica crops sequentially in close proximity;
- Sow non-host barrier crops (e.g. cereal perimeter surrounding the brassica crop);
- Rotate brassica crops with non-host crops (e.g. tomato, celery) to help break the disease cycle;
- Manipulate planting dates to avoid exposing vulnerable young plants at times of year when peak aphid populations develop;
- Remove all weeds and volunteer crop plants in and around crops that might harbour aphids and virus;
- Remove plants with virus symptoms within the crop as these are an infection source; and
- Have a brassica free growing period as this breaks the infection cycle as the host for aphids is removed.

For TuMV only

- Use varieties with resistance to TuMV if available. Chinese cabbage varieties with resistance are available commercially.

For BWYV only

- Apply registered 'new chemistry' insecticides as required to control green peach aphids. Insecticides from different chemical groups should be used to prevent green peach aphids becoming insecticide resistant.

Important note: Spraying insecticides to control TuMV and CaMV is not a good management technique because insecticides do not act fast enough to prevent the rapid spread of these viruses by aphids.

Acknowledgments

Figures 1 and 2 were kindly supplied by Queensland Department of Primary Industries.

Figure 3 was kindly supplied by South Australian Research and Development Institute.

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