Agriculture Notes

Tomato spotted wilt virus in potatoes

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Tomato spotted wilt virus (TSWV) is common and widespread throughout Australia and affects around 500 species of crops, ornamentals and weeds. In potatoes, it is particularly important in seed crops, because it can be passed on to successive crops in seed tubers.

Symptoms

TSWV symptoms can vary greatly according to the strain of virus and potato variety.

Potato plants

Potato plants with TSWV may show dead (necrotic) spots or patches on the leaves. These can appear as concentric rings separated by green tissue, which may lead to confusion with target spot (early blight). Severely affected stems, and occasionally the whole plant, may die. Plants grown from infected tubers are severely stunted, with a rosette form of growth and dark green leaves. See Figures 1 and 2.

Figure 1. TSWV symptoms on a potato plant.

Figure 2. TSWV-infected plant on the left; healthy plant on the right.

Potato tubers

Potato tubers can grow normally after TSWV infection, but may be small and distorted and show sunken, black necrotic spots. Internally, tubers may have hollow necrotic centres, dark shadowing and necrotic spots. These spots may appear as concentric rings and be visible through the skin (Figure 3). However, it is also possible for infected tubers to show no external symptoms.

Figure 3. TSWV symptoms on a potato tuber (variety Snow Gem).

Economic damage

By reducing tuber size, TSWV reduces the total yield of a crop. Tuber distortions and internal necrosis caused by the virus affect crop quality and further reduce marketable yield.

Spread and source of infection

TSWV is spread in potato crops by planting infected seed tubers and by some species of thrips, which are small (1-2mm long), flying insects.

Infected potato seed

TSWV can be carried from one potato crop to the next through infected seed. However, some potato varieties are much more likely to pass on the virus than others (Table 1).

Table 1. Percentage of TSWV infection carried over to the next crop in different potato varieties.

Variety	% carryover
Shepody	84
Russet Burbank	32
Atlantic	16
Coliban	<5

Thrips

Organisms which are responsible for spreading a disease are known as vectors of the disease. Several species of thrips that are well-established in Australian potato districts can act as vectors of TSWV, by transmitting it from an infected plant to a healthy potato plant.

Many of the plants and weeds that are found near potato crops could be infected with TSWV. If thrips eggs are laid on infected plants, the larvae which hatch from the eggs can pick up TSWV as they feed by puncturing the surface cells and sucking out the contents. The larvae need to feed for more than 15 minutes to pick up TSWV from the plant.

As the larvae mature into adults, they fly off and feed on other plants (including potatoes), spreading the virus as they do so. The adult thrips also need to feed for more than 15 minutes to infect a plant. The adults tend to be more attracted to plants in flower, since they also feed on pollen.

Thrips populations tend to increase during spring and summer, when conditions are warm and moisture levels high. Numbers can build up rapidly and, if they do, the process of their feeding can damage the crop regardless of whether or not they have TSWV. Detecting thrips by sight is difficult, as they tend to hide in the flowers. The best way to detect them is to shake or tap the flowers over a container or a sheet of paper.

In Victoria, TSWV is mainly spread by the tomato thrips *(Frankliniella schultzei)* and the onion thrips *(Thrips tabaci)*. However, the most effective vector of TSWV is the western flower thrips (WFT), *Frankliniella occidentalis* (Figure 4). This has not yet been found to be a problem in Australian potato crops, since potato seems to be a non-preferred host plant. However, in Victoria, where WFT was only detected for the first time in 1996, this could change as the insect becomes more established. WFT is particularly resistant to chemical pesticides. Growers should be prepared to monitor their crops for both TSWV and thrips.

Figure 4. Western flower thrips

I actual size

Management

Virus diseases such as TSWV cannot be cured, but a number of measures can be taken to manage both the virus and its vectors:

Avoiding the virus

- Plant only certified seed.
- Control weeds in and around the crop.
- Avoid overlapping crops.
- If possible, avoid planting the varieties which are most likely to carry over TSWV.
- Keep the property free of old crop residues and volunteer potatoes.
- Inspect the crop for infected plants and rogue them out (this may only be economically viable for seed crops).

Avoiding the vector

- Plant crops very early or late in the season, so that young, vulnerable plants are not exposed to peak thrips infestations.
- Keep the property free of old crop residues and volunteer potatoes.
- Control weeds (especially flowering ones) in and around the crop.
- Do not bring plant material (including cut flowers) onto the property unless it has been checked for western flower thrips.
- Monitor the crop for thrips. The presence of thrips can be checked by shaking or tapping potato or weed plants (particularly flowers) over a sticky trap (available from agricultural suppliers DPI-Knoxfield). In susceptible areas, traps can be placed

around the crop to monitor changes in the thrips population.

- **Chemical control.** Thrips are secretive and hard to get at with sprays. They may also be resistant to chemicals or only susceptible at some stages of their life cycle. Chemicals therefore need to be used very carefully if they are not to be wasted. Because some thrips species are more resistant to chemicals than others, it is important to have the species identified before considering chemical control.
- Applying granular systemic soil insecticides at planting may protect young plants, although mixed results have been observed.
- Insecticide sprays are best applied during periods of peak thrips activity, which can be determined by monitoring. However, because harmless species may also be active at these times, it is essential to first have the species correctly identified.

TSWV is most effectively managed by controlling the source rather than the vector!

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Figure 3 courtesy of the Plant Virology Group, at Agriculture Western Australia.

Figure 4 courtesy of Peter Gillespie, NSW Agriculture.

Further information

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DPI Knoxfield
Phone: (03) 9210 9222

Registered chemicals:
Chemical Information Service
Ph. (03) 9210 9379

Correct diagnosis is essential for effective pest and disease control. A commercial diagnostic service is available at DPI (Knoxfield). For further information, phone Crop Health Services on (03) 9210 9356 or fax (03) 9887 3166.