Potato spindle tuber viroid disease (PSTVd)

What is it?

Potato spindle tuber viroid disease (PSTVd) is a quarantinable pathogen of Australia and poses a serious threat to Australia's potato and tomato crops. PSTVd was first reported in North America where it has been found in isolated pockets in northern and north eastern USA and Canada and has spread to other continents via the movement of infected potato tubers. The disease is reported to occur in Asia, Africa, North America, South America, Europe, China and recently in New Zealand. In Australia, PSTVd has been reported in tomatoes in Western Australia, Queensland New South Wales and South Australia. In potatoes, severe PSTVd strains have caused losses of up to 65% in tuber number and size. In tomatoes, losses of 40-50% in yield have been reported.

What does it look like?

Symptoms of PSTVd can be very difficult to diagnose as expression is dependent on the strain of the viroid, plant cultivar infected and climatic conditions. Symptoms can easily be confused with nutrient imbalances, spray damage or other plant diseases. Mild and severe strains of PSTVd do occur and symptoms are usually more pronounced under high light intensity and temperature. Many cultivars of potato and tomato may be symptomless and act as carriers of the disease.

The first symptoms of PSTVd infection in tomato are growth reduction and chlorosis in the top of the plant. Subsequently, this growth reduction may develop into stunting and the chlorosis may become more severe, turning into reddening and/or purpling. In this stage, leaves may become brittle. Generally, this stunting is permanent. Occasionally, however, plants may either die or partially recover. As stunting begins, flower and fruit initiation stop.

Tomato plants showing chlorosis and purpling
Photos courtesy Ian Campbell PIRSA
Foliar symptoms of potato include an upright and stunted growth habit with an erect stem and shortened internodes between leaflets resulting in an overlapping appearance. The leaflets are often smaller in size with a rugose appearance. Infected potato tubers are often elongated with pointed ends, have deeper eyes than normal and the tuber skin is often cracked. On severely affected tubers, knobs and swellings may appear.

**How is it spread?**

The PSTVd agent is very stable and reaches exceptionally high concentration within infected plants. It is contact transmitted through small wounds in the leaf surface caused by contact between healthy and diseased plant sap.

Spread can occur through handling of plants, movement of animals and machinery through a crop, cutting tools and clothing. Infected cutting knives used for cut seed will spread the viroid prior to planting. Initial introduction of the viroid into potato crops is mostly through infected seed tubers and in tomato by infected true seed.

Secondary spread then occurs by contact.

**What other plants can be infected by PSTVd?**

PSTVd has been detected in avocado (*Persea americana*), sweet cucumber (*Solanum mericatum*) and an Australian native *Solanum* spp. Several important Solanaceous crops, potato (*Solanum tuberosum*), tomato (*Lycopersicum esculentum*) and eggplant (*Solanum melongena*), are also natural hosts of PSTVd.

**What to do**

Growers can put on-farm biosecurity measures in place to reduce the chance of pests and disease getting onto their properties.

These include:

- using pest-free propagation material and seedlings, sourced from a reputable supplier
- putting up farm biosecurity signs on gates and fences to manage visitors coming onto your property
- avoiding sharing equipment
- keeping equipment and vehicles clean and free of plant matter
- wearing clean clothing before visiting other growers’ properties
- teaching farm workers on-farm hygiene practices, what to look for and how to report unusual pests and diseases.
- report suspect symptoms to the Exotic Plant Pest Hotline 1800 084 881.

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