

Tobacco Rattle Virus in Potatoes

Tobacco rattle virus (TRV) — a grower guide to early recognition and management



TRV IN SOUTH AFRICA — A PATTERN OF APPEARANCE

1984

Tulips — Transvaal
Whitlock (Univ. Witwatersrand):
first confirmed TRV in SA

→ **~20 years** →

cycle

2004

Potatoes
First reported on
potatoes in SA

→ **~20 years** →

cycle

2026

Potatoes — South Africa
Confirmed by PCS
through a positive
diagnostic test

Source: Whitlock VH, *Plant Disease* 68:351, 1984 (DOI: 10.1094/PD-68-351a) & CABI, 2026. *Tobacco rattle virus*. In: *CABI Compendium*. doi:10.1079/cabicompendium.54208

Tobacco Rattle Virus (TRV) has recently been detected in a registered seed potato planting in South Africa, highlighting the importance of vigilant monitoring within seed potato production systems. Infection with TRV may result in **spraing**, also referred to as **corky ringspot symptoms**, characterised by necrotic arcs, rings or flecks within the tuber flesh. As these internal symptoms are only visible when tubers are cut, they are often first detected during grading, packing or processing. The use of high-quality certified seed potatoes, together with effective management of the virus and its nematode vectors, remains essential to limiting the occurrence and spread of TRV.

What is TRV?

Tobacco rattle virus (TRV) is a soil-borne virus transmitted by free-living nematodes (*Trichodorus* and *Paratrichodorus* spp.) during feeding on potato roots. The virus is not spread by insects or leaf contact. Infection occurs when nematodes feed on infected roots and transfer the virus to healthy plants — often within as little as 1 hour of feeding.

The disease is commonly described as “spraing” or “internal rust” — arc-shaped, brown to corky discolouration deep in the tuber flesh that shows no reliable external symptom on the tuber surface before cutting (Eriksson, 1996; Williams et al., 1996).



Necrotic spots and rings — TRV on leaf. © Pasquale Piccirillo / CABI Compendium

Symptoms

- **Tubers:** Arc-shaped corky rings deep in the flesh (spraing); internal rust in sandy soils. Only visible on cutting — no external symptom on the skin.
- **Leaves & stems:** Necrotic spots and rings on leaves; stem mottling and blistering of branches (Ciskowska, 1992).
- **Pepper:** Ringspot mosaic and yellow mosaic (Marte et al., 1979; Tian & Zhang, 1995).
- **Symptoms worsen** during storage and in warm, wet seasons (Ryden et al., 1994).



TRV mosaic symptoms on pepper leaf. © Pasquale Piccirillo / CABI Compendium

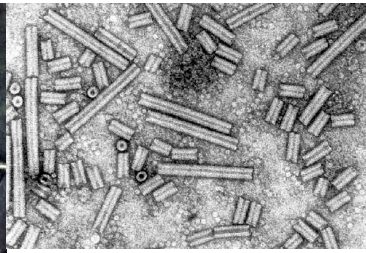




Ringspots on tobacco leaf — TRV isolated from pepper. © Pasquale Piccirillo / CABI Compendium



Necrotic spots on tobacco leaf — greenhouse inoculation. © Pasquale Piccirillo / CABI Compendium



TRV virus particles under electron microscope. © IACR-Rothamsted / CABI Compendium



Viola arvensis (field pansy) — a weed host of TRV. © Naturescape Wildflower Farm

How does TRV spread?

- Nematodes (*Trichodorus primitivus*, *T. similis*, *Paratrichodorus pachydermus*) transmit the virus — up to 14 species are known vectors (Ploeg & Decraemer, 1997).
- Nematodes acquire the virus within 1 hour of feeding on infected roots and remain viruliferous for up to 3 months.
- Optimal transmission at 15–20°C in well-draining sandy to sandy loam soils.
- Long-distance spread via infected seed potatoes and planting material (Engsbro, 1976).
- Weed hosts such as *Viola arvensis* (field pansy) can spread the virus through seed — up to 10% infected seed recorded (Cooper & Harrison, 1973).
- Spread also occurs via wind-carried soil particles and surface water (Polak, 1994).

Diagnosis & Testing

- **Cut tubers during inspection** — arc-shaped corky discolouration in the flesh is diagnostic.
- Confirm with **ELISA, PCR or RT-PCR** — RT-PCR is significantly more sensitive than ELISA for tuber and nematode samples (Kawchuk et al., 1997).
- Be aware of **latent (symptomless) infections** — tubers can be infected without visible symptoms.
- Use the **bait leaf method** to test soil for infective nematodes (van Hoof, 1976).
- DAS-ELISA, TBIA and DIBA can also be used for TRV identification (Hamed et al., 2012).

Prevention & Management

- **No direct chemical control** of the virus itself is available — management focuses on nematode reduction and prevention.
- **Field selection:** Avoid fields with a known nematode or TRV history; conduct soil and nematode tests before planting.
- **Seed source:** Plant only PCS certified seed potatoes.
- **Crop rotation:** Barley is the most effective nematode suppressant; rotate with cereal crops. Following in rotation is more effective than a non-host crop alone (Langels, 1994; Gripwall, 1986; Barchend & Heide, 1985).
- **Weed control:** Remove *Viola arvensis* (field pansy, pictured above), volunteer plants and alternative weed hosts.
- **Early harvest** reduces spraing symptoms — especially in wet, warm seasons (Svensson, 1974).
- **Soil treatment:** Soil fumigation can reduce nematode populations in the top 0–20 cm, but is costly and subject to environmental restrictions (Williams et al., 1996).
- **Water:** Use uncontaminated irrigation water — test open water sources for TRV and vector nematodes.

Tolerant Cultivars

- No cultivar is fully resistant — tolerance levels vary considerably (Robinson & Dale, 1994).
- **Bintje:** Relatively resistant through hypersensitive reaction (Engsbro, 1973).
- **King Edward, Provita, Saturna:** Intermediate tolerance (Svensson, 1974; Carlsson, 1986).
- **British Queen:** Highly susceptible — avoid in high-risk soils.
- Native *Solanum* spp. (*S. acaule*, *S. boliviense*, *S. chacoense*) carry resistance genes but have not yet been used in commercial breeding (Kalfov & Melard, 1972).

Key message for growers: TRV-associated tuber symptoms, commonly referred to as spraing or corky ringspot, are internal and only visible when tubers are cut. By the time they are seen, infection has already occurred. Prevention includes certified seed potatoes, appropriate crop rotation, and management and testing of the nematodes that transmit the virus. If symptoms are observed, notify PCS immediately and submit samples for laboratory confirmation.