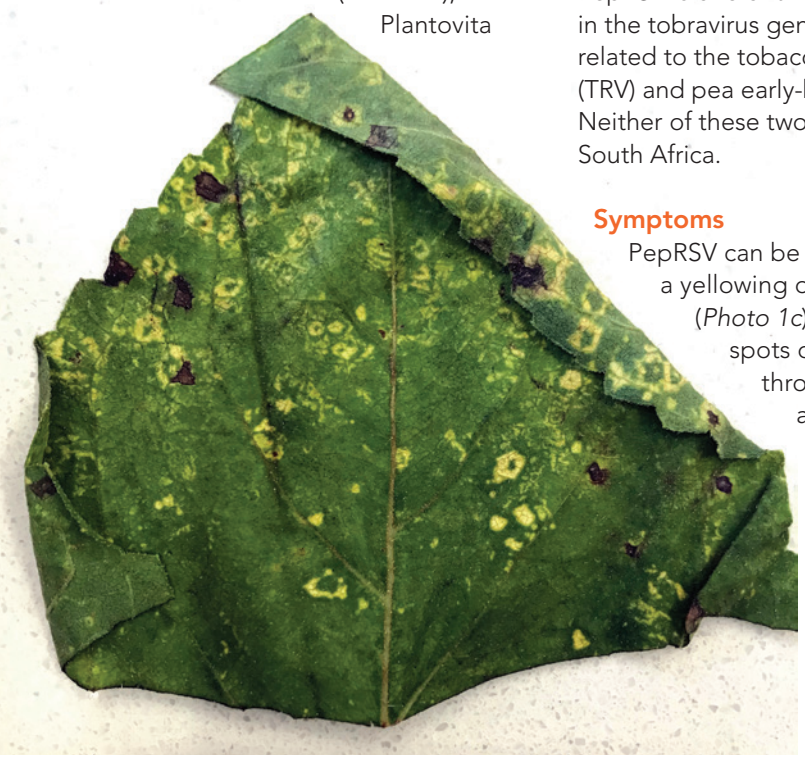
Pepper ringspot virus in the spotlight

By Dirk Uys, Potatoes SA, and Dr Lindy Esterhuizen, Agricultural Research Council

The pepper ringspot virus (PepRSV) was observed in several production areas last year, including Limpopo, Free State, KwaZulu-Natal, North West and the Northern Cape. The Agricultural Research Council's (ARC) Research Institute for Plant Protection at Roodeplaat is currently undertaking a nationwide survey to determine the extent of the spread of the virus.

The occurrence of the disease was reported in the January/February 2023 edition of *CHIPS* when the Independent Certification Council for Seed Potatoes in collaboration with Potatoes SA, the Potato Certifications Service, ARC, Department of Agriculture, Land Reform and Rural Development (DALRRD), Plantovita and PathSol, confirmed the presence of PepRSV.



An example of PepRSV on sunflower. (Source: Dr David Read, University of Pretoria)

These potato tubers exhibit (a) external rings and (b) internal spots caused by tobacco rattle virus infection, (c) yellowing of leaves caused by PepRSV, and (d) internal spots also caused by PepRSV.

Even though PepRSV symptoms had been observed in the past, the virus was only confirmed in 2020. Dr David Read from the University of Pretoria's Forestry and Agricultural Biotechnology Institute also reported the disease in sunflower last year.

What causes pepper ringspot?

PepRSV is one of three virus species in the tobravirus genus. It is closely related to the tobacco rattle virus (TRV) and pea early-browning virus. Neither of these two viruses occur in South Africa.

Symptoms

PepRSV can be observed as a yellowing of the leaves (*Photo 1c*) through ring spots on the tubers and through symptoms accompanied by internal browning (*Photo 1d*).

In several cases, the disease can also occur as an asymptomatic, latent infection. *Photo 1d* shows a tuber with severe symptoms, but this degree of symptoms is rarely observed. Most tubers appear symptom-free or exhibit only a small number of brown spots or ring-like spots.

Distribution

The PepRSV virus was noted in Brazil in the 1960s and in South Africa in 2020. Its presence in other parts of the world is unknown. Dissemination methods for tobraviruses include mechanical transmission through seed and pollen on crops such as tomatoes, peppers and several nematode species in different parts of the world. Implements can also spread the virus.

Research indicates that tobraviruses can be spread through the stubby-root nematode (*Nanidorus minor*). This remains to be confirmed in the case of PepRSV. Evaluations are currently being conducted by the ARC. Delivering results will take some time, as it is extremely difficult to multiply nematodes in colonies for transmission test purposes.

Host series

The virus can occur on a wide host range and can sometimes be symptomless. PepRSV has been reported on the following host plants: blackjack (*Bidens pilosa*), *Chenopodium amaranticolor*, *Nicotiana clevelandii*, tobacco

(*Nicotiana tabacum*), beans (*Phaseolus vulgaris*), peas (*Pisum sativum*), tomatoes (*Lycopersicon esculentum*), peppers (*capsicum* spp.) and fava beans (*Vicia faba*).

The role of legislation

It is important to emphasise that the *Agricultural Pests Act, 1983 (Act 36 of 1983)* was developed to control the spread of new diseases. It is managed by DALRRD's Directorate of Plant Health. To limit the spread of a new disease, the directorate must be informed. DALRRD has lifted restrictions on the marketing of table potatoes. As a preventative measure, this does not apply to seed potatoes.

Control

It is impossible to control viral diseases using plant protection products; thus the spread thereof must be limited. It is currently not clear whether PepRSV can be spread by nematodes. However, the logical step would be to implement a nematode control strategy. The virus can be spread through plant material, and it therefore makes sense to reduce the risk of seed contamination by planting a variety of cultivars from different seed sources.

No known adverse effects on consumers have been reported and infected potatoes are therefore suitable for consumer use. If the disease is indeed present, the following measures can be applied:

- Report the presence of symptoms to the Plant Health Directorate by emailing phytomatters@dalrrd.gov.za.
- To prevent the spread of the virus through the planting of plant material, infected seed may not be marketed for seed purposes.

For more information or references, send an email to Dirk Uys at dirk@potatoes.co.za or Dr Lindy Esterhuizen at esterhuizenl@arc.agric.za.