VIROIDS –

A growing threat to your production

The Scottish Government

SASA

Awareness

Potato mini-tuber and tomato growers should be aware of the potential risk from viroids (*Potato spindle tuber viroid* (PSTVd) and other pospiviroids) to their production systems. This leaflet provides some suggestions for minimising risks of transmission.

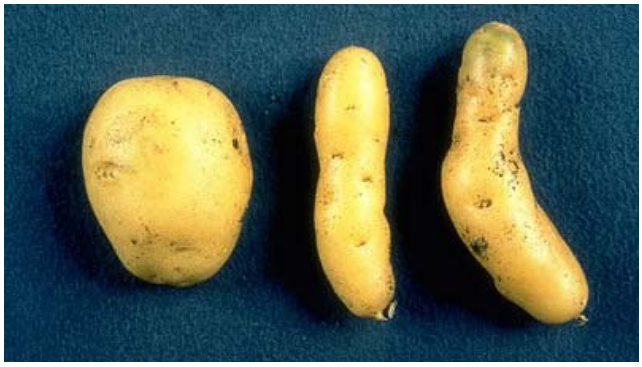
Background

Pospiviroids, including PSTVd, are small virus-like plant pathogens. PSTVd is a quarantine organism for the EU. Primarily it infects potato and tomato causing substantial yield loss.

Over the last four years there have been findings of PSTVd in commonly traded ornamental (garden) plants in Europe (including the UK), most frequently in *Solanum jasminoides* and *Brugmansia* spp. Emergency EU measures were introduced in 2007 to determine the extent of the findings of PSTVd and to eradicate it where found. One of the measures requires Member States to conduct annual surveys of host plants. In the 2007 survey PSTVd was found in *S. jasmonides* and *Tomato chlorotic dwarf viroid* in petunia plants in Scotland. In all cases statutory action was taken to destroy the infected material.

In Europe, the pospiviroids *Citrus exocortis viroid*, *Columnea latent viroid*, *Mexican papita viroid, Tomato apical stunt viroid,* and *Tomato chlorotic dwarf viroid* have all been found infecting ornamental plants and also tomato (Table 1). These viroids can infect potato in experiments. PSTVd and possibly other viroids can also infect other crops such as avocado (*Persea americana*), pepper (*Capsicum*), cape gooseberry (*Physalis peruviana*) and pepino (*Solanum muricatum*).

PSTVd in tomato, © Fera



Spindle shaped tubers caused by PSTVd

Surfinia petunia (do not show obvious symptoms of viroids)

Pathways

A potential pathway for introducing pospiviroids is via ornamental plants or seed. As viroids readily survive in dried sap they can also be spread by contact. Recent research by Verhoeven *et al.* (2010) demonstrated transmission of PSTVd from sap of *Brugmansia suaveolens* and *S. jasminoides* to potato and tomato, with tomato being more readily infected and more infection from *S. jasminoides* than *Brugmansia*. Temperature was an important factor in transmission rate, with more infection at 25°C than at 15°C. Sap was still infective even when diluted by 100,000 and undiluted sap remained infective on finger tips even after two hours. Infection also occurred after inoculation by cutting.

Aphids have been implicated in the transmission of viroids and it has been shown that PSTVd can be co-transmitted by aphids with *Potato leafroll virus* in potato crops.

What you can do:

- Assess the plant health risks of your operation.
- Do not handle plant material of unknown health status.
- Keep ornamental plants and other potential hosts of pospiviroids away from potato and tomato crops.
- Do not handle ornamental plants and other potential hosts of pospiviroids prior to handling potatoes or tomatoes.
- Operate good hygiene measures. Minimise plant debris. Disinfect equipment as appropriate.

If you suspect infection or require any further information please contact the Horticulture and Marketing Unit (hort.marketing@scotland.gsi.gov.uk) or Colin Jeffries (colin.jeffries@sasa.gsi.gov.uk).

Table 1. Pospiviroid infection of traded ornamental plants (Verhoeven, 2010)

Viroid	Plant spp	Plant Family	Viroid	Plant spp	Plant Family
Chrysanthemum stunt viroid	*Ageratum* spp	*Asteraceae*	*Potato spindle tuber viroid*	*Brugmansia* spp	*Solanaceae*
	Argyranthemum frutescens	*Asteraceae*		*Calibrachoa* spp	*Solanaceae*
	Chrysanthemum x *morifolium*	*Asteraceae*		*Datura* sp	*Solanaceae*
	Dahlia spp	*Asteraceae*		*Lycianthes rantonnetii*	*Solanaceae*
	Pericallis x *hybrida*	*Asteracea*		*Petunia* spp	*Solanaceae*
	Petunia spp	*Solanaceae*		*Solanum jasminoides*	*Solanaceae*
	Solanum jasminoides	*Solanaceae*		*Solanum jamesonii*	*Solanaceae*
	Verbena spp	*Verbenaceae*	*Tomato apical stunt viroid*	*Cestrum* spp	*Solanaceae*
	Vinca major	*Apocynaceae*		*Lycianthes rantonnetii*	*Solanaceae*
Citrus exocortis viroid	*Glandularia pulchella*	*Verbenaceae*		*Solanum jasminoides*	*Solanaceae*
	Impatiens spp	*Balsaminaceae*		*Solanum pseudocapsicum*	*Solanaceae*
	Solanum jasminoides	*Solanaceae*		*Solanum jamesonii*	*Solanaceae*
	Verbena spp	*Verbenaceae*	*Tomato chlorotic dwarf viroid*	*Brugmansia sanguinea*	*Solanaceae*
Columnea latent viroid	*Brunfelsia undulata*	*Solanaceae*		*Petunia hybrida*	*Solanaceae*
	Columnea erythrophyte	*Gesneriaceae*		*Pittosporum tobira*	*Pittosporaceae*
	Gloxinia spp	*Gesneriaceae*		*Verbena* spp	*Verbenaceae*
	Nematantus wettsteinii	*Gesneriaceae*		*Vinca minor*	*Apocynaceae*

Sources of information

O'Neil & Mumford (2006). Potato spindle tuber viroid in tomato and new viroid reports. HDC factsheet 09/06.

Verhoeven *et al.* (2010). Mechanical transmission of Potato spindle tuber viroid between plants of Brugmansia suaveoles, Solanum jasminoides and potatoes and tomatoes. European Journal of Plant Pathology 128, 417-421.

Verhoeven, JThJ (2010). Identification and epidemiology of pospiviroids. PhD thesis Wageningen University. http://library.wur.nl/WebQuery/wda/lang/1937017