Prepared by CABI and EPPO for the EU under Contract 90/399003

Data Sheets on Quarantine Pests

Potato T trichovirus

IDENTITY

Name: Potato T trichovirus
Synonyms: Potato T capillovirus Potato virus T
Taxonomic position: Viruses: *Trichovirus*
Common names: PVT (acronym)
EPPO computer code: POTXXX
EPPO A1 list: No. 247
EU Annex designation: I/A1

HOSTS

PVT has been detected in Peruvian basic seed stocks of potatoes (*Solanum tuberosum*) and transmitted mechanically to 46 species in eight plant families including Chenopodiaceae, Fabaceae and Solanaceae (Salazar & Harrison, 1978a). Various wild *Solanum* species are susceptible.

GEOGRAPHICAL DISTRIBUTION

EPPO region: Absent.
South America: Recorded from Peru and Bolivia but probably occurs more widely in the Andean region of South America (Salazar & Harrison, 1978a, b).
EU: Absent.

BIOLOGY

PVT was found to be serologically related to apple stem grooving capillovirus (Fuchs & Merker, 1985), but is now considered to belong to the related genus *Trichovirus* (Martelli *et al.*, 1994). An isolate differing in virulence has been obtained from Bolivia (Salazar & Harrison, 1978b). Vectors responsible for spreading PVT in potato crops are not known. PVT is readily transmitted through true potato seed and pollen (Jones, 1982) and spreads to tubers produced by infected plants.

DETECTION AND IDENTIFICATION

Symptoms

Most plants primarily infected by PVT remain symptomless, but plants of potato cv. King Edward developed slight vein necrosis and chlorotic spotting, while cv. Cara showed top necrosis about 12 days after inoculation. Secondary infections are largely symptomless under glasshouse conditions.

Morphology

The virus has flexuous filamentous particles about 687 nm long and 12 nm wide which show a characteristic substructure when stained with uranyl acetate (Salazar *et al.*, 1978). The nucleotide sequence of the 3'-terminal has been determined (Ochi *et al.*, 1992).

Detection and inspection methods

Indicator plants

Chenopodium amaranticolor is useful for diagnosis. Inoculated leaves are symptomless or develop chlorotic lesions. Systemic symptoms are distortion and sometimes top necrosis in 8-10 days followed by the production of almost symptomless infected leaves. *C. quinoa* remains symptomless in inoculated leaves or develops chlorotic spots. Systemic mosaic is produced in high light intensity and top necrosis in low intensity. *Phaseolus vulgaris* cvs Pinto and Prince are used to distinguish PVT from other potato viruses with elongated particles. Necrotic ringspots are produced in leaves shaded heavily after inoculation, followed by systemic necrosis and recovery of plants.

Serological detection methods

PVT is moderately immunogenic. The production of antiserum is difficult due to low virus yields but this can be overcome by successive sampling of purified virus by storing in liquid nitrogen. ELISA is useful for virus detection (Schroeder & Weidemann, 1990; Vernon-Shirley *et al.*, 1993).

MEANS OF MOVEMENT AND DISPERSAL

Spread is by true seed and pollen to seed. In international trade, it could be carried by potato tubers, or by true seed of germplasm material.

PEST SIGNIFICANCE

Economic impact

PVT is not known to have any direct economic importance in potato.

Control

As with all potato viruses, control depends on the production of high-quality seed potatoes from virus-free nuclear stock. Dodds & Horton (1990) stress the value of producing plantlets free from PVT using nucleic acid spot hybridization and nitrocellulose membrane enzyme-linked immunosorbent assays.

Phytosanitary risk

PVT is included among the non-European potato viruses of the EPPO A1 quarantine list (OEPP/EPPO, 1984a). In general all regional plant protection organizations outside South America recommend very strict measures for potato material from that continent. The principal perceived risk is the introduction of new viruses into seed potato production schemes, increasing the cost and difficulty of operating these schemes, and opening up new possibilities for yield losses from single or mixed virus infections. Any seed potato-exporting country in which PVT was reported would immediately find itself in difficulties with respect to the phytosanitary certification of its exports. The risk is particularly important because of the simple pathway which exists from useful germplasm material (local potato cultivars, wild tuber-forming *Solanum* spp.) in the potato's centre of diversity in South America through to nuclear stock material of new cultivars in seed potato-producing countries. Thus there is a great risk of introduction due to the increased international exchange of breeding material and germplasm, whether in the form of tubers, rooted cuttings, *in vitro* cultures or true seeds.

Individually, PVT could be regarded, among the group of South American potato pathogens, as of medium importance for the EPPO region. It is probably of little direct economic importance but it is transmitted by true seed. Though it can relatively easily be excluded by prohibition of commercial trade in potato tubers, there is a risk of introduction with breeding material, in which it could only be detected by careful testing under quarantine.

PHYTOSANITARY MEASURES

Importation of potato tubers from countries where PVT occurs should be prohibited. PVT is one of the group of South American pests of potato which justify strict post-entry quarantine procedures in the EPPO region, together with equivalent checks before export. Only material for scientific purposes, in quantities limited to what is strictly necessary and subject to import permit, should normally be imported from countries where PVT occurs. Because of the probability that any material of wild tuber-forming *Solanum* spp. originates ultimately from South America, the same tests should be applied whatever the origin. EPPO's specific quarantine requirements (OEPP/EPPO, 1990) outline suitable quarantine measures, while EPPO's phytosanitary procedures lay down the test procedures to be followed both before export and in post-entry quarantine after import (OEPP/EPPO, 1984b).

BIBLIOGRAPHY

Dodds, J.H.; Horton, D. (1990) Impact of biotechnology on potato production in developing countries. *AgBiotech News and Information* **2**, 397-400.

Fuchs, E.; Merker, D. (1985) [Partial purification of apple stem grooving virus and antiserum production]. *Archiv für Phytopathologie und Pflanzenschutz* **21**, 171-181.

Jones, R.A.C. (1982) Tests for transmission of four potato viruses through potato true seed. *Annals of Applied Biology* **100**, 315-320.

Martelli, G.P.; Candresse, T.; Namba, S. (1994) Trichovirus, a new genus of plant viruses. *Archives of Virology* **134**, 451-455.

Ochi, M.; Kashiwazaki, S.; Hiratsuka, K.; Namba, S.; Tsuchizaki, T. (1992) Nucleotide sequence of the 3'-terminal region of potato virus T RNA. *Annals of the Phytopathological Society of Japan* **58**, 416-425.

OEPP/EPPO (1984a) Data sheets on quarantine organisms No. 128, Potato viruses (non-European). *Bulletin OEPP/EPPO Bulletin* **14**, 11-22.

OEPP/EPPO (1984b) Quarantine procedures No. 21, Potato viruses (non-European) and potato spindle tuber viroid. *Bulletin OEPP/EPPO Bulletin* **14**, 73-76.

OEPP/EPPO (1990) Specific quarantine requirements. *EPPO Technical Documents* No. 1008.

Salazar, L.F.; Harrison, B.D. (1978a) Host range, purification and properties of potato virus T. *Annals of Applied Biology* **89**, 223-235.

Salazar, L.F.; Harrison, B.D. (1978b) Potato virus T. *CMI/AAB Descriptions of Plant Viruses* No. 187. Association of Applied Biologists, Wellesbourne, UK.

Salazar, L.F.; Hutcheson, A.M.; Tollin, P.; Wilson, H.R. (1978) Optical diffraction studies of particles of potato virus T. *Journal of General Virology* **39**, 333-342.

Schroeder, M.; Weidemann, H.L. (1990) Detection of quarantine viruses of potato by ELISA. *Bulletin OEPP/EPPO Bulletin* **20**, 581-590.

Vernon-Shirley, M.L.; Burns, R.; George, E.L.; Hoadley, M.E. (1993) A simple assay system incorporating monoclonal antibodies for the detection of potato virus T. *Potato Research* **36**, 83-88.