

EPPO DATA SHEETS ON QUARANTINE PESTS

Impatiens necrotic spot tospovirus

IDENTITY

Name: Impatiens necrotic spot tospovirus

Taxonomic position: Viruses: *Bunyaviridae*: *Tospovirus*

Common names: INSV (acronym)
Necrotic spot (English)

Notes on taxonomy and nomenclature: the virus strains constituting serogroup III of tomato spotted wilt tospovirus (TSWV; OEPP/EPPO, 1999) have been distinguished as the separate species INSV (de Avila *et al.*, 1992; Vaira *et al.* 1993).

EPPO computer code: IMNSXX

EPPO A2 list: no. 291

EU Annex designation: not specifically included, but INSV had not been distinguished from TSWV at the time the latter was included in Annexes I/B and II/A2.

HOSTS

INSV, like TSWV, has a wide host range. The recorded hosts of INSV seem in general also to be hosts of TSWV, but this may require detailed confirmation as the two viruses were not initially distinguished. The recorded hosts of INSV remain rather less numerous than those of TSWV, and it is much more frequently found on ornamental crops than on vegetables. On ornamentals, INSV is typically found on *Impatiens* New Guinea hybrids. Other ornamental hosts include *Aconitum*, *Alstroemeria*, *Anemone*, *Antirrhinum*, *Begonia*, *Bouvardia*, *Callistephus*, *Columnnea*, *Cyclamen persicum*, *Dahlia*, *Dendranthema x grandiflorum*, *Eustoma grandiflorum*, *Exacum affine*, *Fatsia japonica*, *Gerbera*, *Gladiolus*, *Limonium*, *Lobelia*, *Pittosporum*, *Primula*, *Ranunculus*, *Senecio cruentus*, *Sinningia speciosa*, *Zantedeschia aethiopica*. INSV is the first virus to be recorded from a fern (the glasshouse ornamental *Asplenium nidus-avis*). Vegetable hosts include *Capsicum annuum*, *Cichorium endivia*, *Cucumis sativus*, *Lactuca sativa*, *Ocimum basilicum* and *Valerianella olitoria*. INSV has not particularly been recorded from weed hosts.

GEOGRAPHICAL DISTRIBUTION

INSV apparently has a more restricted distribution than TSWV, but this may partly reflect the fact that the two viruses have only rather recently been distinguished. In some cases, countries where TSWV is widespread have not found INSV (e.g. Argentina; Gracia *et al.*, 1999; Australia, Latham & Jones, 1997; Portugal, Louro & Kuo, 1997).

EPPO region: Belgium, France (mainland), Germany, Israel, Italy (Emilia-Romagna, Liguria, Piemonte, Puglia, Sicilia, Toscana, Veneto), Netherlands, Poland, Spain (mainland), United Kingdom (isolated records in England).

Asia: Israel.

North America: Canada (British Columbia, Manitoba), USA (Arkansas, California, Connecticut, Delaware, Idaho, Iowa, Kansas, Kentucky, Maine, Maryland, Massachusetts, Mississippi, Missouri, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, Texas, Virginia, Vermont).

Central America and Caribbean: Costa Rica.

EU: present.

Distribution map: see CABI/EPPO (1998; no. 755).

BIOLOGY

INSV is, like TSWV, transmitted mainly by *Frankliniella occidentalis* (de Angelis *et al.*, 1994). Other thrips species have not yet been recorded as vectors. The biology of INSV is very similar to that of TSWV (OEPP/EPPO, 1999). The two viruses often occur together (Kaminska *et al.*, 1997).

DETECTION AND IDENTIFICATION

Symptoms

Impatiens New Guinea hybrids develop stunting, black discoloration at the base of the leaf, or brown leaf spots. In general, the symptoms caused by INSV are similar to those due to TSWV (OEPP/EPPO, 1999).

Morphology

The virions of INSV are similar to those of TSWV (OEPP/EPPO, 1999).

Detection and inspection methods

Essentially the same methods are available as for TSWV (OEPP/EPPO, 1999). In particular, INSV can be detected by mechanical transmission to *Nicotiana benthamiana*, ELISA (Vicchi & Bellardi, 1997), direct tissue-blot assay, dot blot immunoassay, and direct examination of plant tissues for characteristic viral inclusions (Daughtrey *et al.*, 1997). INSV can be distinguished from TSWV by these methods (Nagata *et al.*, 1997; Weekes *et al.*, 1997; Xia *et al.*, 1997). Alternatively, both viruses can be detected by a general tospovirus assay (Roggero *et al.*, 1997).

MEANS OF MOVEMENT AND DISPERSAL

INSV is liable to spread naturally with its vector *F. occidentalis* (EPPO/CABI, 1996a). In international trade, it may be carried by susceptible host plants, whether pot plants or plants for planting, and will be especially liable to spread if these plants also carry vectors. INSV is not seed-transmitted.

PEST SIGNIFICANCE

Economic impact

INSV causes significant losses on a great variety of glasshouse ornamentals in many European countries, wherever *F. occidentalis* is present to act as a vector. The type of damage and loss caused is more or less the same as that caused by TSWV, although it has a somewhat more limited host range. Although INSV is found in glasshouse vegetable crops, its impact is not apparently as great on these hosts as that of TSWV. INSV has not been recorded very often on outdoor crops, even in countries where *F. occidentalis* persists all the year round out of doors. Vicchi & Bellardi (1997) have recorded it on outdoor lettuces, and other crops (Vicchi *et al.*, 1999), in Italy.

In the USA, a very similar situation has been reported, INSV being the more commonly encountered problem in ornamental glasshouses, while TSWV causes problems on outdoor vegetables (Daughtrey *et al.*, 1997). A long list of flower crops suffers significant losses. Some growers of *Sinningia speciosa* have had 100% losses.

Control

As for TSWV on glasshouse ornamentals, control methods (Daughtrey. *et al.* 1997) centre on: the use of virus-free planting material (OEPP/EPPO, 1997); monitoring of *F. occidentalis* populations with coloured sticky traps; rapid response by appropriate treatments to any increase in thrips population; the use of screens (mesh size < 135 µm) to prevent entry of thrips into glasshouses; and placing new plants in separate glasshouse compartments. Research is under way to find resistant cultivars of various ornamental plants. Ullman *et al.* (1998) consider strategies for future management based on a better understanding of epidemiology.

Phytosanitary risk

INSV was added to the A2 list of EPPO in 1998. It clearly presents a risk similar to that from TSWV.

PHYTOSANITARY MEASURES

As for TSWV (OEPP/EPPO, 1999).

REFERENCES

- CABI/EPPO (1998) *Impatiens* necrotic spot tospovirus *Distribution Maps of Plant Diseases* No. 755. CAB International, Wallingford (GB).
- Daughtrey M, Jones RK, Moyer JW, Daub ME & Baker JR (1997) Tospoviruses strike the greenhouse industry – INSV has become a major pathogen on flower crops. *Plant Disease* **81**, 1220-1230.
- de Angelis JD, Sether DM & Rossignol PA (1994) Transmission of *Impatiens* necrotic spot virus in peppermint by western flower thrips. *Journal of Economic Entomology* **87**, 197-201.
- de Avila AC, de Haan P, Kitajima EW, Kormelink R, Resende RO, Goldbach RW & Peters D (1992) Characterization of a distinct isolate of tomato spotted wilt virus (TSWV) from *Impatiens* sp. in the Netherlands. *Journal of Phytopathology* **134**, 133-151.
- EPPO/CABI (1996a) *Frankliniella occidentalis*. In: *Quarantine pests for Europe*. 2nd edition (Ed. by Smith, I.M.; McNamara, D.G.; Scott, P.R.; Holderness, M.). CAB INTERNATIONAL, Wallingford (GB).
- EPPO/CABI (1996b) *Scirtothrips dorsalis*. In: *Quarantine pests for Europe*. 2nd edition (Ed. by Smith, I.M.; McNamara, D.G.; Scott, P.R.; Holderness, M.). CAB INTERNATIONAL, Wallingford (GB).
- Gracia O, de Borbon CM, de Millan NG & Cuesta GV (1999) Occurrence of different tospoviruses in vegetable crops in Argentina. *Journal of Phytopathology* **147**, 223-227.

- Kaminska M, Korbin M, Malinowski T & Rudzinska-Langwald A (1997) [Tospoviruses causing diseases in greenhouse crops.] *Progress in Plant Protection* **37**, 369-373 (in Polish).
- Latham LJ & Jones RAC (1997) Occurrence of tomato spotted wilt tospovirus in native flora, weeds, and horticultural crops. *Australian Journal of Agricultural Research* **48**, 359-369.
- Louro D & Kuo CG (1997) Detection and identification of tomato spotted wilt virus and impatiens necrotic spot virus in Portugal. *Acta Horticulturae* no. 431, 99-105.
- Nagata T, de Avila AC & Dusi AN (1997) Identification and detection of *Tospovirus* species by dot enzyme-linked immunosorbent assay (Dot-ELISA). *Fitopatologia Brasileira* **22**, 45-49.
- OEPP/EPPO (1997) EPPO Standard PM 4/20 (1) Certification scheme for pathogen-ested material of New Guinea hybrids of impatiens. *Bulletin OEPP/EPPO Bulletin* **27**, 611-620.
- OEPP/EPPO (1999) EPPO Data sheets on quarantine pests: tomato spotted wilt tospovirus. *Bulletin OEPP/EPPO Bulletin* **29**, 465-472.
- Roggero P, Ogliara, P, Dellavalle G, Lisa V, Malavasi F, Adam G & Kuo CG (1997) A general tospovirus assay using monoclonal antibodies against tomato spotted wilt virus glycoproteins. *Acta Horticulturae* no. 431, 167-175.
- Ullman, DE, Casey CA, Whitfield AE, Campbell LR, Robb KL, Medeiros RB, German TL & Sherwood JL (1998) Thrips and tospoviruses: present and future strategies for management. In *Brighton Crop Protection Conference: Pests & Diseases – 1998*, pp. 391-400. BCPC, Farnham (GB).
- Vaira AM, Roggero P, Luisoni E, Masenga V, Milne RG & Lisa V (1993) Characterization of two tospoviruses in Italy: tomato spotted wilt and impatiens necrotic spot. *Plant Pathology* **42**, 530-542.
- Vicchi V & Bellardi MG (1997) [Impatiens necrotic spot tospovirus infection on lettuce in Italy.] *Informatore Fitopatologico* **47** (3), 55-57 (in Italian).
- Vicchi V, Fini P & Cardoni M (1999) [Presence of impatiens necrotic spot tospovirus (INSV) on vegetable crops in Emilia-Romagna region.] *Informatore Fitopatologico* **49** (4), 53-55 (in Italian).
- Weekes RJ, Mumford RA, Barker I, Wood KR & Kuo CG (1997) Diagnosis of tospoviruses by reverse-transcription polymerase chain reaction. *Acta Horticulturae* no. 431, 159-166.
- Xia JQ, Sutula CL & Marti DB (1997) Development of a greenhouse test for tomato spotted wilt virus and impatiens necrotic spot virus. *Acta Horticulturae* no. 431, 193-198.