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Data Sheets on Quarantine Pests

Strawberry vein banding caulimovirus

IDENTITY

Name: Strawberry vein banding caulimovirus
Taxonomic position: Viruses: *Caulimovirus*
Common names: SVBV (acronym)
Veinbanding of strawberry (English)
Adernmosaik der Erdbeere (German)
Notes on taxonomy and nomenclature: Strains of this virus that have been identified include: strawberry yellow veinbanding virus, strawberry necrosis virus (Schöninger), strawberry chiloensis veinbanding virus, strawberry eastern veinbanding virus. In North America, most strains found on the west coast are more severe than those found along the east coast.
EPPO computer code: SYVBXX
EPPO A2 list: No. 101
EU Annex designation: I/A1

HOSTS

The virus is known to occur only on *Fragaria* spp. The main host is *Fragaria vesca* (wild strawberry). Commercial strawberries may also be infected, but diagnostic symptoms are usually only apparent when strawberry latent C 'rhabdovirus' is present simultaneously (EPPO/CABI, 1996).

GEOGRAPHICAL DISTRIBUTION

EPPO region: Locally established in Czech Republic, Hungary, Ireland and Russia (European); unconfirmed reports from Germany, Italy, Slovakia, Slovenia, Yugoslavia.
Asia: China, Japan, Russia (Far East).
North America: Canada (British Columbia, Ontario), USA (found in two distinct zones, one along the east coast including Arkansas, the other on the west coast (California)).
South America: Brazil (São Paulo), Chile.
Oceania: Australia (New South Wales, Tasmania).
EU: Present.
For further information, see also Miller & Frazier (1970).

BIOLOGY

The following aphids are cited as vectors: *Acyrthosiphon pelargonii*, *Amphorophora rubi*, *Aphis idaei*, *A. rubifolii*, *Aulacorthum solani*, *Chaetosiphon fragaefolii*, *C. jacobi*, *C. tetrarhodum*, *C. thomasi*, *Macrosiphum rosae*, *Myzus ascalonicus*, *M. ornatus*,, *M. persicae*.

Of these species, *Chaetosiphon* spp. are the most efficient vectors in glasshouse experiments, although other genera are probably important vectors when they occur in large numbers and frequently move from plant to plant. Aphids can acquire and transmit

the virus in 30-120 min, but persistence in the vector is short, usually less than 8 h (semipersistent type). There are differences in the efficiency of clonal lines of aphids, and evidence that some species will transmit only certain strains of SVBV. *Aphis gossypii*, *A. fabae*, *Aulacorthum solani* and *Macrosiphum euphorbiae* failed to transmit the virus in a limited number of trials.

The virus is transmissible by grafting and by means of *Cuscuta subinclusa*. Attempts to transmit SVBV mechanically have been unsuccessful. The incubation period in the indicator host varies from 2 to 5 weeks depending on the strain.

For additional information, see Frazier (1955), Miller & Frazier (1970), Smith (1972).

DETECTION AND IDENTIFICATION

Symptoms

On *Fragaria vesca*

Symptoms initially appear on the youngest developing leaf; there is an epinasty of midribs and petioles, a tendency for opposite halves of leaflets to be appressed, irregularly wavy leaflet margins, and slight crinkling of the laminae. Usually, the above symptoms are mild and not all present simultaneously. It is not until the affected leaf expands that clearing, followed by yellowish banding of some or all of the veins, becomes visible. Often, the coloration occurs in scattered discontinuous streaks of varying lengths along the main and secondary veins.

The second and third leaves formed after onset of symptoms are affected more severely than the first or any subsequent leaf; in older leaves, chlorotic streaks are reduced in number, scattered and confined to portions of the leaflets. This may be followed by the appearance of a series of apparently healthy leaves and then reappearance of mild or severe symptoms.

For additional information, see Frazier (1955), Mellor & Fitzpatrick (1961), Miller & Frazier (1970) and Smith (1972).

On commercial strawberries

There are no very diagnostic symptoms but, if strawberry latent C disease is also present, the reaction to infection is intermediate to that on *F. vesca* (EPPO/CABI, 1996). In the cv. Marshall, for example, the veinbanding is usually diffuse, commonly located along main veins and may often appear as spots. As affected leaves mature, the veinbanded areas may gradually disappear, or they may become brownish-red or necrotic. Especially on outdoor plants, the veins become discoloured, without previous chlorosis. Affected leaflets characteristically exhibit epinasty, mild crinkling and wavy margins.

Morphology

The particle of this caulimovirus is isometric (40-50 nm in diameter). Native viral DNA is circular and double-stranded (Stengel *et al.*, 1988).

Detection and inspection methods

Diagnosis must usually be made or confirmed by use of virus-free *F. vesca* indicator plants. Research in California has shown that the *F. vesca* clone UC-6 and the *F. virginiana* clone UC-12 are superior for detecting and diagnosing SVBV. A modified leaf grafting technique is used (Frazier, 1974).

An ELISA test can be performed by using cauliflower mosaic caulimovirus antisera; however, routine serological detection requires the production of an SVBV-specific antiserum (Converse, 1987).

MEANS OF MOVEMENT AND DISPERSAL

In the field, the virus is transmitted by aphid vectors. Because of the ability of certain aphid species to undertake long, high-altitute flights, wide natural dissemination is possible. This is, however, limited by the relatively short persistence of the virus in the vector.

In international trade, SVBV is liable to be carried on infected plants and propagating material of strawberries.

PEST SIGNIFICANCE

Economic impact

Because of the sporadic occurrence and low incidence of SVBV, the disease is only of minor importance. Fruit yield and size are affected and runner production reduced. In combination with stawberry latent C disease, SVBV reduced yield by 17% in the first fruiting year, and total and saleable fruit by 88% and 100%, respectively, in the third year (Bolton, 1974).

Control

There are no specific control measures. SVBV is highly resistant to inactivation by heat therapy but it can be eliminated from plants by means of meristem tip culture. As a consequence, the use of certified planting material is the best control procedure, and certification schemes for the production of healthy planting material of strawberry are in operation in several EPPO countries. EPPO published (OEPP/EPPO, 1994) an internationally acceptable certification scheme for strawberries. Control of aphids with insecticides could reduce the incidence of the disease.

Phytosanitary risk

SVBV is listed as an A2 quarantine pest by EPPO (OEPP/EPPO, 1978) and is also of quarantine significance for IAPSC. The most important factors in evaluating the potential of SVBV in a new area are the presence of aphid vectors and their mobility. Because of the variety of vectors, conditions can be defined only in so far as they affect aphids in general, e.g. extremely low winter temperatures killing overwintering nymphs and adults; windy climates restricting activity of alatae.

PHYTOSANITARY MEASURES

EPPO (OEPP/EPPO, 1990) recommends that importing countries can require that plants for planting of *Fragaria ananassa*, from countries where the pest occurs, should be derived from mother plants tested and found free from SVBV during the last three growing seasons and should have been maintained under conditions preventing their reinfestation; the consignment must come from a field found free (with its immediate vicinity) of the virus during the last growing season.

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