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Data Sheets on Quarantine Pests

Strawberry mild yellow edge disease

IDENTITY

Notes on taxonomy and nomenclature: Recent investigations have shown that strawberry mild yellow edge disease is probably caused by a virus complex consisting of a potexvirus (strawberry mild yellow edge-associated potexvirus) as well as a virus originally designated strawberry mild yellow edge luteovirus, but which is now recognized as a strain or synonym of soybean dwarf luteovirus (Randles & Rattigen, 1995). Considerably more data is now available about the nature of the potexvirus. Whereas evidence for the occurrence of luteovirus-like particles is based on three different investigations (Yoshikawa *et al*., 1984; Martin & Converse, 1985; Spiegel *et al*., 1986), the potexvirus was consistently found using serological techniques with all sources tested of world-wide origin (Jelkmann *et al*., 1990; Hepp & Martin, 1991). Until a laboratory detection method becomes available for SMYEV, the aetiology of the disease will remain undetermined.
EU Annex designation: II/A2 - as Strawberry mild yellow edge virus

- **Strawberry mild yellow edge luteovirus**
  Name: Strawberry mild yellow edge luteovirus (synonym or strain of soybean dwarf luteovirus)
  Synonyms: Strawberry virus 2
  Taxonomic position: Viruses: *Luteovirus*
  Common names: SMYEV (acronym)
  EPPO computer code: SYMYEX
- **Strawberry mild yellow edge-associated 'potexvirus'**
  Name: Strawberry mild yellow edge-associated 'potexvirus'
  Taxonomic position: Viruses: Possible *Potexvirus*
  Common names: SMYEAV (acronym)
  EPPO computer code: SYMYAX

HOSTS

In nature, both viruses have been found only in *Fragaria* spp. The wild species *F. virginiana*, *F. vesca* and some clones of *F. chiloensis* show symptoms; *F. ovalis* is a symptomless carrier. Most strawberry cultivars are symptomless carriers of the disease.

SMYEAV has been experimentally transmitted to *Chenopodium quinoa* and *C. murale* but could not be maintained over longer periods in these plants (Jelkmann *et al.*, 1990; A.N. Adams, personal communication). Experimental transmission was also possible by grafting to *Rubus rosaefolius*.

GEOGRAPHICAL DISTRIBUTION

Strawberry mild yellow edge is one of the widespread and common virus diseases in cultivated strawberries. The distribution given here is for the disease. The potexvirus and luteovirus have been found together in Canada (British Columbia) and Germany. The situation elsewhere remains unclear.

EPPO region: Throughout western Europe, specifically recorded in Belgium, Bulgaria, Czech Republic, France, Germany, Ireland, Israel, Italy, Luxembourg, Slovakia, Switzerland, UK.
Asia: China (Hebei, Hubei, Heilongjiang, Jilin, Jiangxi, Liaoning, Shandong, Shanxi, Zheijiang), Israel, Japan (Honshu), Kazakhstan.
Africa: South Africa.
North America: Canada (British Columbia), USA (California, North Carolina, Oregon, Washington).
South America: Chile, Paraguay.
Oceania: Australia (Queensland, Tasmania, Victoria, Western Australia), New Zealand.
EU: Present.

BIOLOGY

Until recently, the association of the disease with a virus of the luteovirus group was based on the persistent transmission of its agent(s) by the strawberry aphid *Chaetosiphon fragaefolii* and its symptomatology. Evidence for a luteovirus as causal agent was given when spherical particles, limited to phloem cells, were found in thin sections (Yoshikawa *et al*., 1984) and also in partial purifications (Martin & Converse, 1985). A serological relationship of partially purified preparations of SMYEV with beet western yellows luteovirus was reported by Spiegel *et al*. (1986).

However, dsRNA from infected strawberry tissue that was thought to be of SMYEV origin proved to be replicative nucleic acid of SMYEAV (Jelkmann *et al*., 1990). This virus has now been described in detail (Jelkmann *et al*., 1990) and its full nucleotide sequence obtained (Jelkmann *et al*., 1991). Although aphid transmission is not known for potexviruses, SMYEAV can be transmitted in a persistent manner by *C. fragaefolii*. The mechanism for this unusual characteristic is unclear.

Aphid vector transmission is not always successful due to some inefficient strains of aphids or some less easily transmitted virus strains. Nymphs, apterae and alatae of *C. fragaefolii* all transmit the virus(es) equally well. 100% transmission occurred with an acquisition feeding period of 2 days and a transmission feeding period of 8 days (Krczal, 1979).

DETECTION AND IDENTIFICATION

Symptoms

Cultivated strawberries usually remain symptomless.

Morphology

See Biology.

Detection and inspection methods

Transmission by grafting or by its aphid vector *Chaetosiphon fragaefolii* to sensitive clones of *F. vesca* is currently being used for detection and identification of the disease.

On *F. vesca* indicator clones EMC, UC-4, UC-5 or *F. vesca* var. *semperflorens* cv. Alpine, symptoms include mottling of young leaves, epinasty, chlorotic flecking, vein necrosis of maturing leaves and premature senescence of older leaves. *F. virginiana* UC-10 and UC-11 are also useful indicators. On *F. vesca* indicator clones, symptoms usually appear within 3 weeks after inoculation by aphid or grafting.

No symptoms appear on experimentally inoculated *Chenopodium quinoa* and *C. murale*. Antisera have been produced to SMYEAV coat protein fusion protein, expressed

in *Escherichia coli*. This has been shown to be useful in detecting the potexvirus by immunoelectron microscopy (Jelkmann *et al*., 1990; Hepp & Martin, 1991).

MEANS OF MOVEMENT AND DISPERSAL

Under natural conditions, the two viruses on strawberries are dispersed by the strawberry aphid *Chaetosiphon fragaefolii*. Movement also occurs with runners or with propagated material from tissue culture. Seed transmission is not known.

PEST SIGNIFICANCE

Economic impact

Stawberry mild yellow edge disease is one of the major diseases of strawberries in most parts of the world; however, because of the interaction of cultivars, viruses and virus strains, crop management and environment, it is difficult to assess the importance of the disease in terms of economic loss. Alone, it is not particularly damaging to most cultivars, but it seldom occurs alone. The complex of the disease with other pathogens, for example, strawberry mottle agent, strawberry crinkle rhabdovirus, strawberry veinbanding caulimovirus (EPPO/CABI, 1996), or strawberry pallidosis agent, can cause severe loss of plant vigour, yield and fruit quality (Converse *et al*., 1987).

Control

Control of the virus can be achieved by thermotherapy or meristem culture, combined with planting of certified virus-free material. Thermotherapy for SMYE was successful at approximately 50% when the central growing point was excised and plants were almost completely defoliated during treatment for 9 weeks at 38°C. The technique stimulated the development of side crowns, which could then be excised and rooted in sand at normal greenhouse temperatures (Converse *et al*., 1987).

Phytosanitary risk

Neither of the viruses associated with strawberry mild yellow edge disease is considered a quarantine pest by any regional plant protection organization. Quarantine status cannot be justified, in view of the extremely wide distribution of the disease. Normal virus-free certification, along the lines for which EPPO published (OEPP/EPPO, 1994) a certification scheme, provides the appropriate means of control for strawberry material traded both nationally and internationally.

PHYTOSANITARY MEASURES

Treated plant material should meet the conditions that EPPO recommends in its certification scheme (OEPP/EPPO, 1994) for pathogen-free strawberries. Diseased plant material should be eradicated.

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