

## Data Sheets on Quarantine Pests

# Citrus vein enation 'virus'

### IDENTITY

**Name:** Citrus vein enation 'virus'

**Taxonomic position:** Viruses (probable, no group suggested)

**Common names:** CVEV (acronym)

Vein enation, woody gall (English)

**Notes on taxonomy and nomenclature:** Vein enation disease was described in California (USA) and woody gall in Australia; the two were later shown to be different symptoms of the same disease (Wallace & Drake, 1960). Virus etiology is supposed mainly on the circumstantial evidence that the disease is graft- and aphid-transmitted; however, virus-like particles have been observed.

**EPPO computer code:** CSVEXX

**EU Annex designation:** II/A2 - as Citrus vein enation woody gall

### HOSTS

Certain citrus rootstocks are susceptible: rough lemons (*Citrus jambhiri*), sour oranges (*C. aurantium*). Scion species or cultivars of citrus can be infected, but only latently except under glasshouse conditions: lemons (*C. limon*), mandarins (*C. reticulata*) and oranges (*C. sinensis*) (Catara & Davino, 1984). Other citrus species recorded as susceptible include *C. junos*, citrons (*C. medica*), satsumas (*C. unshiu*) and various local Chinese varieties (Chen *et al.*, 1992). In India, nearly all citrus species were found to be susceptible, but mostly symptomlessly (Mali *et al.*, 1976).

### GEOGRAPHICAL DISTRIBUTION

**EPPO region:** Libya, Spain, Turkey.

**Asia:** China (Zhejiang), India (southern, Assam, Maharashtra), Iran, Japan, Turkey.

**Africa:** Kenya, Libya, Réunion, South Africa, Tanzania.

**North America:** USA (California).

**South America:** Peru.

**Oceania:** Australia (New South Wales), Kiribati, New Zealand.

**EU:** Present.

### BIOLOGY

CVEV is transmitted in a persistent manner by its aphid vector, *Toxoptera citricidus*, and is also transmitted by other aphids (*Myzus persicae* and *Aphis gossypii*). The latent period of the virus in the vector was found to be 2-3 days (Maharaj & da Graca, 1989). No other biological or epidemiological information seems to be available on the virus.

## DETECTION AND IDENTIFICATION

### Symptoms

CVEV is symptomless in most commercial cultivars. The symptoms for which the disease is named (vein enation, woody gall) are those seen on woody indicators: enations (up to 1 mm) on the leaf veins, cauliflower-like swellings or galls on the bark of the stems, especially associated with thorns or wounds (Garnsey, 1988). Trees grafted on a susceptible rootstock (e.g. rough lemon) may show galling at the graft union.

### Morphology

Spherical virus-like particles, 27 nm in diameter, have been observed in galls, enations (Iwanami *et al.*, 1992) and in the vector *T. citricidus* (Maharaj & da Graca, 1988) but the 'virus' has not been characterized further.

### Detection and inspection methods

CVEV can be detected by grafting bark chips of suspect material on woody indicators. Enations are seen in 5-8 weeks on the underside of leaves of limes (*Citrus aurantiifolia*), rough lemons (*Citrus jambhiri*) or sour oranges (*Citrus aurantium*). Swellings or galls appear more slowly on stems of *C. jambhiri* or *C. volkameriana*. The virus is not apparently mechanically transmissible, nor have serological methods for its detection been developed.

## MEANS OF MOVEMENT AND DISPERSAL

CVEV is transmitted by aphids in the field, but there is no positive indication that it spreads very actively in this way in citrus orchards. Movement is more likely to be in infected planting material, since the virus is readily graft-transmitted.

## PEST SIGNIFICANCE

### Economic impact

CVEV is not reported to be of any economic importance, except in so far as its presence interferes with the "virus-free" status of certified planting material.

### Control

CVEV can be controlled by the use of healthy planting material. Shoot-tip grafting (Roistacher & Kitto, 1977) and thermotherapy (Roistacher, 1979) are effective in eliminating it. In areas where the disease occurs, it is suggested not to use susceptible rootstocks. There is no suggestion in the literature that control of the vectors has been considered useful on account of this virus (though the same aphids do, of course, transmit citrus tristeza closterovirus; EPPO/CABI, 1996a).

### Phytosanitary risk

CVEV has not been considered to be a quarantine pest by any regional plant protection organization. Since it causes no direct economic losses and is already present in the EPPO region, there is no basis for suggesting that it should be an EPPO A2 quarantine pest. It can be considered at most as a "quality" pest, to be excluded from citrus planting material by normal certification (OEPP/EPPO, 1995). This has been the EPPO position on *Spiroplasma citri* (EPPO/CABI, 1996b), which is much more important than CVEV.

## PHYTOSANITARY MEASURES

No phytosanitary measures at import are needed.

**BIBLIOGRAPHY**

- Catara, A.; Davino, M. (1984) [Citrus diseases not found in Italy, caused by viruses and virus-like pathogens]. *Informatore Fitopatologico* **34** (11), 9-21.
- Chen, G.Q.; Yan, S.X.; Roistacher, C.N. (1992) First report of citrus vein enation disease in China. *Plant Disease* **76**, 1077.
- EPPO/CABI (1996a) Citrus tristeza closterovirus. In: *Quarantine pests for Europe*. 2nd edition (Ed. by Smith, I.M.; McNamara, D.G.; Scott, P.R.; Holderness, M.). CAB INTERNATIONAL, Wallingford, UK.
- EPPO/CABI (1996b) *Spiroplasma citri*. In: *Quarantine pests for Europe*. 2nd edition (Ed. by Smith, I.M.; McNamara, D.G.; Scott, P.R.; Holderness, M.). CAB INTERNATIONAL, Wallingford, UK.
- Garnsey, S.M. (1988) Vein enation (woody gall). In: *Compendium of citrus diseases* (Ed. by Whiteside, J.O.; Garnsey, S.M.; Timmer, L.W.), p. 50. American Phytopathological Society, St. Paul, USA.
- Iwanami, T.; Kano, T.; Koizumi, M. (1992) Spherical virus-like particles associated with vein enation on Yuzu (*Citrus junos*). *Bulletin of the Fruit Tree Research Station* No. 23, 137-143.
- Maharaj, S.B.; da Graca, J.V. (1988) Observation of isometric virus-like particles associated with citrus vein enation-infected citrus and the viruliferous aphid vector *Toxoptera citricidus*. *Phytophylactica* **20**, 357-360.
- Maharaj, S.B.; da Graca, J.V. (1989) Transmission of citrus vein enation virus by *Toxoptera citricidus*. *Phytophylactica* **21**, 81-82.
- Mali, V.R.; Chaudhuri, K.G.; Rane, S.D. (1976) The vein-enation virus disease of citrus in India. *Indian Phytopathology* **29**, 43-45.
- OEPP/EPPO (1995) Certification schemes No. 12. Pathogen-tested citrus trees and rootstocks. *Bulletin OEPP/EPPO Bulletin* **25**, (4).
- Roistacher, C.N. (1979) Elimination of citrus pathogens in propagative budwood I. Budwood selection, indexing and thermotherapy. In: *Proceedings of the International Society of Citriculture* Vol. 3 (Ed. by Grierson, W.), pp. 965-972. University of California, Riverside, USA.
- Roistacher, C.N.; Kitto, S.L. (1977) Elimination of additional citrus viruses by shoot-tip grafting *in vitro*. *Plant Disease Reporter* **61**, 594-596.
- Wallace, J.M.; Drake, R.J. (1960) Woody galls on citrus associated with vein-enation virus infection. *Plant Disease Reporter* **44**, 580-584.