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Data Sheets on Quarantine Pests

Cherry little cherry 'virus'

IDENTITY

Name: Cherry little cherry 'virus'
Synonyms: K & S disease, K & S little cherry
Taxonomic position: Uncertain
Common names: Little cherry (English)
Petite cerise (French)
Kleinfrüchtigkeit der Kirsche (German)
Cereza pequeña (Spanish)
Notes on taxonomy and nomenclature: The pathogen is graft-transmissible and infected plants contain flexuous filamentous virus-like particles (Ragetti *et al.*, 1982) and pathogen-specific ds-RNA (Hamilton *et al.*, 1980). A virus-like pathogen thus probably causes little cherry disease (Eastwell *et al.*, 1996).
EPPO computer code: CRLCXX
EU Annex designation: II/A1 - for non-European isolates

HOSTS

Sweet cherry (*Prunus avium*) is the most sensitive host of the disease which causes fruit symptoms also in sour cherry (*P. cerasus*) and in *P. pensylvanica*. The ornamental cherries *P. incisa*, *P. serrulata*, *P. sieboldii*, *P. subhirtella* and *P. yedoensis* are often latently infected, especially the cultivars of the oriental flowering cherry *P. serrulata* including the cvs Kanzan and Shirofugen. *P. emarginata*, *P. mahaleb* and *P. tomentosa* were demonstrated as further tolerant hosts of the pathogen, while apricots, plums, peaches and *P. virginiana* could not be infected in experiments to transmit the pathogen of little cherry disease by bud-inoculation (Welsh & Cheney, 1976).

With the exception of the American wild cherry species *P. emarginata* and *P. pensylvanica*, all host plants are cultivated in Europe as fruit trees or ornamental plants; sweet cherry and *P. mahaleb* are also endemic wild species.

GEOGRAPHICAL DISTRIBUTION

The disease, which originated in Japan, is probably now distributed world-wide in latently infected ornamental cherries. It has been specifically recorded from the following countries (Németh, 1986).

EPPO region: Belgium, Germany, Italy, Poland (found in the past but not established), Romania, Russia (European), Spain, Switzerland, UK. Reported but not confirmed in France, Hungary, Norway and Sweden.
Asia: Japan.
North America: Canada (British Columbia), USA (California, Oregon, Washington).
Oceania: Australia (unconfirmed), New Zealand.
EU: Present.

BIOLOGY

The little cherry pathogen probably colonizes the phloem, because, in phloem parenchyma and companion cells of leaf midribs and petioles of infected trees, elongated, flexuous, virus-like rods were detected by electron microscopy, as well as small spherical or ellipsoid vesicles (diameter about 75 nm); additionally hexagonal tubules (530 x 1450 nm) were observed in the phloem companion cells (Raine *et al*., 1975; 1979). These three structures were not found in healthy trees. The flexuous rods (diameter about 12 nm) were usually arranged in large aggregates and occurred also in the tubules.

From the leaves of diseased sweet cherry trees, a double-stranded RNA could be isolated, but attempts to isolate double-stranded RNA from latently infected trees failed (Hamilton *et al*., 1980; Legrand & Verhoyen, 1986).

The little cherry pathogen is transmitted by the apple mealy bug *Phenacoccus aceris* (Raine *et al*., 1986). This insect lives on many woody plant species. It was introduced into Canada from Europe and multiplied intensively as its predators were absent in Canada (J. T. Slykhuis, personal communication).

Little cherry disease was probably introduced latently with ornamental flowering cherries from Japan into many countries but, as found in Canada (Slykhuis *et al*., 1980), natural spread to and between sweet cherry trees occurs only in areas where *P. aceris* is present. In Europe, this insect is indigenous, but a number of predators limit population increase in orchards. For this reason the risk of natural spread of the disease is probably lower than in Canada. Furthermore *P. aceris* can easily be controlled by insecticides if necessary.

DETECTION AND IDENTIFICATION

Symptoms

Economically important fruit symptoms have been reported mainly from American large-sized, dark-fruited sweet cherry cultivars. At first the fruits of sensitive cultivars develop quite normally, but about 10 days before harvest they do not mature any further. At picking time, most cherries of diseased trees of cv. Lambert are pointed in shape, imperfectly coloured, small and insipid in taste. On cv. Bing the fruits show the same symptoms as on cv. Lambert in the season after infection, while in subsequent years many may reach almost normal size but have an insipid flavour. Fruits of infected cvs Sam and Van are of normal colour and shape, but their size and sweetness are reduced to such an extent that they cannot be sold on the market. Fruit symptoms vary in severity for all cultivars from season to season and from region to region. In cultivars with red or yellow fruit the symptoms are considerably milder than in the dark-fruited ones mentioned. Many of the European cultivars seem to be tolerant of the little cherry pathogen. In trees of sour cherry cv. Montmorency, light-coloured small fruit may occur after infection. A few sweet cherry cultivars also display leaf symptoms, especially Sam, Van and Star. In late summer or early autumn, the interveinal areas of the upper leaf-surface turn red-violet or become bronze-coloured, while the midrib and the main veins retain their green colour for some time. Discoloration may appear on the basal leaves of the current season's growth at the end of August when the nights are cool, but is more conspicuous in September. Red-violet discoloration also occurs on the leaves of the cherry rootstock Mazzard F 1211 after inoculation with the little cherry pathogen, but is not so distinct as in cv. Sam.

Morphology

The pathogen has not yet been isolated, but virus-like, rod-shaped particles have been found in phloem cells of diseased trees (Raine *et al*., 1975). For more details see Biology.

Detection and inspection methods

The little cherry pathogen is evenly distributed through an infected tree and is very readily transmissible by grafting. For this reason, testing with woody indicators which display clear leaf symptoms is a reliable method for certification programmes to detect latent infections in cherry propagation material. Sweet cherry cv. Sam has been recommended as indicator for this purpose, but Canindex 1 is better because it reacts more distinctly and earlier in the season (Hansen & Green, 1985). Normally the test by inoculation of buds in 1-year-old indicator plants or by double-budding lasts 1 year, but in certification programmes for healthy mother plants the duration of tests should be prolonged up to 2 years in the field. It may be shortened in the glasshouse to a period of 3 months by a special procedure (Fridlund, 1980).

By UV microscopy of cross-sections of petioles, fluorescent inclusions were observed in the walls of phloem cells of infected trees after staining with acridine orange. This reaction happened with petioles of cherry trees with symptoms as well as with petioles of latently infected oriental flowering cherries. It may be of diagnostic value for the detection of latent infections in cultivars of the oriental flowering cherry *Prunus serrulata* (Legrand & Verhoyen, 1985; 1986).

MEANS OF MOVEMENT AND DISPERSAL

The little cherry pathogen is spread by the vector *Phenacoccus aceris* within orchards with infected trees, but the long-distance dispersal of the pathogen happens with infected young trees, rootstocks, scions and budsticks. Young cherry plants with the pathogen are produced by the use of infected propagation material.

PEST SIGNIFICANCE

Economic impact

In some American dark-fruited sweet cherry cultivars, including Lambert, Sam and Van, the disease causes a strong reduction of fruit size, while other cultivars react with mild fruit deformations only or do not develop any symptoms at all. In very sensitive cultivars, however, infection of a tree often results in a total loss of its crop.

Severe damage occurred in British Columbia (Canada) where the disease was first observed in 1933. It spread rapidly in the eastern part of the province where sensitive cultivars were widely grown in the Koolenay region. In this region, sweet cherry production dropped by roughly 90% within 30 years (1949-1979). In another fruit-growing area of British Columbia, the Okanagan region, 1500 sweet cherry trees which showed fruit symptoms had to be rooted out between 1969 and 1979 to prevent a further natural spread of the disease.

Control

Since 1977 the eradication programme in the Okanagan region has been improved by insecticide sprays against *P. aceris* (Slykhuis *et al*., 1980). This insect was suspected and later confirmed as the vector of the disease (Raine *et al*., 1986). Testing for latent infections with the little cherry pathogen has been included in the certification schemes for fruit-tree propagation material, to provide healthy young cherry trees.

In the western states of the USA some crop losses were caused by little cherry disease also, but natural spread of the disease has been very limited. In Europe little cherry disease has not yet become a serious problem. Most cherry cultivars in Europe seem to be tolerant. This advantageous situation may, however, be changed in future as the American cultivars Sam and Van are now increasingly cultivated in Europe.

Phytosanitary risk

The little cherry pathogen has not been listed as a quarantine pest by EPPO or any other regional plant protection organization. In view of its probable wide distribution, though at low levels, it does not seem that special measures are needed for imported material. Like the majority of other virus and virus-like pathogens of fruit trees, it can be treated as a quality pest and controlled by national certification schemes for virus-free planting material of fruit trees (OEPP/EPP0, 1991/1992).

PHYTOSANITARY MEASURES

Diseased young trees show no symptoms at the time of planting. Furthermore, some sweet cherry cultivars and ornamental cherries can be latently infected. Therefore young cherry trees should be produced from mother plants tested with woody indicators and found free from latent infections with the little cherry pathogen. Sweet cherries and ornamental cherries should not be planted side by side, if the ornamental cherries do not derive from tested mother plants.

After an outbreak of the disease in an orchard, control measures, including the eradication of infected trees, depend on the presence and abundance of the vector and its predators. In well managed cherry orchards, special chemical control of *P. aceris* will probably not be necessary in Europe. The Canadian eradication programme in the Okanagan region is described under Pest significance.

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