Prepared by CABI and EPPO for the EU under Contract 90/399003

Data Sheets on Quarantine Pests

Peach yellows phytoplasma

IDENTITY

Name: Peach yellows phytoplasma
Synonyms: Peach yellows virus (formerly)
Peach little peach MLO
Peach red suture MLO
Taxonomic position: Bacteria: Tenericutes: Mollicutes: Phytoplasmas
Common names: Peach yellows, little peach disease, red suture disease (English)
Notes on taxonomy and nomenclature: According to Kirkpatrick (1995), DNA hybridization studies and sequence analyses suggest that peach yellows phytoplasma is related to, but distinct from, peach X-disease phytoplasma (EPPO/CABI, 1996). It differs from it in symptoms and vector.
EPPO computer code: PCYXXX
EPPO A1 list: No. 139
EU Annex designation: I/A1 - as Peach yellows mycoplasm

HOSTS

Peaches (*Prunus persica*) are the principal host of peach yellows phytoplasma. Almonds (*P. dulcis*), apricots (*P. armeniaca*) and *P. salicina* are also infected. All *Prunus* spp. which have been experimentally graft-inoculated proved to be susceptible. Peach yellows phytoplasma is symptomless in some cultivars of *P. salicina* such as Abundance, Chalco and Chabot. The phytoplasma can also be artificially transmitted to herbaceous hosts.

GEOGRAPHICAL DISTRIBUTION

EPPO region: Absent. According to CMI (1983), yellows diseases of peaches have been recorded in Israel, Lebanon, Syria and possibly in Turkey (see below under Asia). All these reports are of uncertain validity, and probably refer to the recently characterized European stone fruit yellows phytoplasma (Lorenz *et al.*, 1994; Seemüller & Foster, 1995), which also causes the peach yellows disease seen in Italy (Campania, Lazio) since the early 1980s (Ragozzino *et al.*, 1990). Modern molecular identification methods (Ahrens *et al.*, 1993) would now have to be used to confirm any supposed record of peach yellows phytoplasma in the EPPO region.
Asia: India (Himachal Pradesh, West Bengal), Israel, Lebanon, Syria, Turkey, Turkmenistan. Only the Indian record is relatively recent (Ahlawat & Chenulu, 1981). All can be ignored, on the same grounds as above.
North America: Canada (Ontario), USA (first described near Philadelphia in Pennsylvania as long ago as 1791. Now found in Colorado (unconfirmed), Illinois, Indiana, Kentucky,

Maryland, Michigan, North Carolina, New York, Ohio, Pennsylvania, South Carolina, Tennessee, Virginia). According to Kirkpatrick (1995), it is not found in western or southern states, so previously cited records in California and Texas are presumably erroneous.
EU: Absent.
Distribution map: See CMI (1983, No. 60).

BIOLOGY

The phytoplasma is transmitted by a leafhopper, *Macropsis trimaculata*. It has an incubation period of 1-3 years in trees in the orchard, or less than 60 days in the glasshouse. In the vector, the mean incubation period is 16 days (Pine & Gilmer, 1976). The peach diseases known as little peach and red suture are caused by distinct strains of peach yellows phytoplasma. Red suture is not apparently transmitted by *M. trimaculata*, though it does spread naturally.

DETECTION AND IDENTIFICATION

Symptoms

Leaf buds, even those which should normally remain dormant, develop prematurely. The leaves are yellowed and stunted, and the tree forms spindly branched shoots. In an advanced stage of the disease, the shoot tips die back. Severely affected trees die within 2-3 years but survival for 6 years is possible.

The disease caused by the little peach strain is slightly different. At the beginning of the growing season, the foliage is greener and proliferation of leaves on short side branches gives the tree a bushy appearance. The leaves become chlorotic during the season. The symptoms are first seen on one branch, or part of the tree, then spread to the whole tree. Fruits ripen late (by up to 3 weeks) and are small and insipid (Dunez, 1981).

Morphology

The peach yellows agent was shown to be a phytoplasma by the electron microscope studies of Jones *et al*. (1974). Biomolecular tests now show its clear affinities with peach X-disease phytoplasma.

Detection and inspection methods

The phytoplasma can be tested on peach seedlings (cv. Elberta or GF305) in the field, but 4 years are needed for results to be certain. It can also be tested on the same indicators in the glasshouse, symptoms appearing up to 3 months after inoculation. An EPPO phytosanitary procedure for fruit tree phytoplasmas gives details (OEPP/EPPO, 1994).

MEANS OF MOVEMENT AND DISPERSAL

The capacity of the vector *Macropsis trimaculata* to disperse the phytoplasma is only local. The pathogen is most likely to be spread internationally in infected planting material or possibly in vectors carried on plants. It has been intercepted in American material imported into France.

PEST SIGNIFICANCE

Economic impact

Peach yellows was responsible for serious losses in the USA in the 19th century, when it was the object of classic research by Erwin Smith (who failed, not surprisingly, to establish the nature of the agent) and of some of the first legislative measures against a plant disease (Michigan Yellows Law of 1875) (Ainsworth, 1981). Severe outbreaks continued into the early 20th century, but the disease has now practically disappeared, largely because of effective control measures. Pine & Gilmer (1976) note that, in the past, peach yellows tended to follow a cyclical pattern in large peach-growing areas. Red suture caused some localized outbreaks in the period 1920 to 1940 in Michigan; it is now practically unknown.

Control

Infected trees should be destroyed and, if necessary, the vector *Macropsis trimaculata* should be controlled. Healthy planting material should be used. In this respect, peach yellows was one of the first 'virus-like' diseases to be treated by thermotherapy - dormant trees treated for 10 min at 50°C and buds for 3-4 min at 50°C (Kunkel, 1936).

Phytosanitary risk

Peach yellows phytoplasma is an EPPO A1 quarantine pest (OEPP/EPPO, 1986). In the EPPO region, peach, the main host, has the greatest economic importance of all *Prunus* spp. There are probably susceptible European cultivars and, in any case, American cultivars are frequently introduced. Though the American vector does not occur in Europe, local insects might act as vectors. The fact that the disease has from time to time been intercepted provides a reminder of the real risk of introduction. Healthy planting material of *Prunus* should evidently be free from peach yellows phytoplasma. However, this pest is really a historical curiosity rather than an immediate danger, and much less important in practice than peach X-disease phytoplasma (EPPO/CABI, 1996).

PHYTOSANITARY MEASURES

EPPO recommends (OEPP/EPPO, 1990) that *Prunus* planting material should come from a field inspected during the growing season and, particularly for material from infested countries, the material should be subject to an official certification scheme, with particular emphasis on preventing reinfection of healthy material by airborne vectors. The EPPO certification scheme for fruit trees (OEPP/EPPO, 1991/1992), though intended to be used primarily within the EPPO region, provides a suitable model.

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