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Data Sheets on Quarantine Pests

Lime witches' broom phytoplasma

IDENTITY

Name: Lime witches' broom phytoplasma
Taxonomic position: Bacteria: Tenericutes: Mollicutes: Phytoplasmas
Common names: Oman witches' broom disease
EPPO computer code: CSLWBX
EU Annex designation: II/A1 (as witches' broom MLO on citrus)

HOSTS

The only known natural host of lime witches' broom phytoplasma is *Citrus aurantiifolia*, the small-fruited acid lime which is grown in the Arabian peninsula. The phytoplasma has been graft-transmitted to *Citroncirus* x *webberi*, but at low frequency and with slow symptom development (Garnier *et al*., 1991). In the same trials, the phytoplasma was not transmitted to either oranges (*Citrus sinensis*) or sour oranges (*C. aurantium*). Dodder (*Cuscuta*) has been used to transmit the phytoplasma to *Catharanthus roseus*, a widely used indicator plant for phytoplasmas.

GEOGRAPHICAL DISTRIBUTION

EPPO region: Absent.
Asia: Oman (since the late 1970s), United Arab Emirates (since 1989).
EU: Absent.

BIOLOGY

Lime witches' broom is the first well characterized phytoplasma disease of citrus, except the special case of stubborn disease caused by the spiroplasm *Spiroplasma citri* (EPPO/CABI, 1996). Blastomania (Mali *et al*., 1975) is a somewhat similar witches' broom disease reported on *C. aurantiifolia* and *C. limonia* in India; Sharma & Singh (1988) have shown that it is associated with phytoplasmas. Lime witches' broom is graft-transmitted. The mechanism of natural transmission is unknown but, as the disease is spreading rapidly in Oman on non-grafted limes, a leaf-sucking insect vector is probably involved. The cicadellid *Hishimonus phycitis*, which is a vector of aubergine little leaf phytoplasma in India (Bindra & Singh, 1969; Mitra, 1988), has been suggested as a vector, but no supporting evidence has been published. *H. phycitis* also transmits a sesame phytoplasma disease, and has been reported on various crops, though not particularly on citrus.

DETECTION AND IDENTIFICATION

Symptoms

On lime, witches' broom symptoms develop over the whole tree, accompanied by small chlorotic leaves and twig dieback, until practically no normal leaves or shoots remain. No flowers or fruits are produced, and the plant dies relatively quickly (within 3-4 years). On the single artificially infected *Citroncirus* x *webberi* which has been obtained, small leaves and proliferations were seen.

Morphology

Typical phytoplasma cells are readily found in sieve tubes by electron microscopy (Garnier *et al*., 1991).

Detection and inspection methods

Monoclonal antibodies and nucleic acid probes have been developed by Garnier *et al*. (1991), and can be used to detect the phytoplasma in lime and *Catharanthus roseus*. Mexican lime can be used as a woody indicator.

MEANS OF MOVEMENT AND DISPERSAL

Lime witches' broom has spread naturally in Oman, presumably by vector. Internationally, it seems more likely that it would move with diseased planting material. The sudden appearance of the disease in Oman, where limes have been grown for centuries, makes it conceivable that the disease was introduced from elsewhere.

PEST SIGNIFICANCE

Economic impact

This newly known disease of lime occurs widely in the coastal region of Oman. Symptoms are severe and rapidly affect the whole tree, inhibiting flowering and fruiting. By 1986, thousands of trees had been lost (Bové, 1986). The disease is considered sufficiently important for an eradication programme to be envisaged.

Control

Production of healthy planting material (e.g. by shoot-tip grafting) would be one approach to control. In view of the existence of natural spread between ungrafted trees, measures would have to be taken to prevent reinfection (cf. *Spiroplasma citri*, EPPO/CABI, 1996).

Phytosanitary risk

Lime witches' broom phytoplasma has not been considered a quarantine pest by any regional plant protection organization, but this may be partly because it has only recently been described. It could possibly have been recently introduced to the Arabian peninsula from elsewhere, e.g. India, where the rather similar disease called blastomania has been described.

The phytoplasma apparently only naturally infects lime, which is not a significant citrus crop in EPPO countries. Hence, its importance for the EPPO region appears at first sight minor. However, lime is the only citrus crop cultivated in the countries within its present geographic range, so there is no field evidence to show whether the phytoplasma spreads naturally to other *Citrus* spp. While graft-transmission experiments to *C. sinensis* and *C. aurantium* failed, and to *Citroncirus* x *webberi* succeeded in only one case, this failure may be a problem of experimental technique. Further experimentation is needed to establish

whether other *Citrus* spp. can be infected by other means. Until this is available, it is practically impossible to make a useful judgement on the possible risk to the EPPO region.

Available information on the vector potential of *Hishimonus phycitis* is so scarce that no evaluation is possible. *H. phycitis* is in any case a tropical insect which is only a minor pest in its own right. It is not likely to become established in the EPPO region. However, other cicadellids could possibly transmit the phytoplasma.

PHYTOSANITARY MEASURES

If it is confirmed that lime witches' broom phytoplasma presents a risk to citrus cultivated in the EPPO region, importation of planting material of *Citrus aurantiifolia* from the countries where the disease occurs should be prohibited. In practice, this is already so for citrus more generally.

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