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Data Sheets on Quarantine Pests

Raspberry leaf curl 'luteovirus'

IDENTITY

Name: Raspberry leaf curl 'luteovirus'
Taxonomic position: Viruses: Possible *Luteovirus*
Common names: RLCV (acronym)
Raspberry curl, American raspberry leaf curl (English)
Notes on taxonomy and nomenclature: Speculation that the agent may be a luteovirus (Matthews, 1982) is premature and is based only on the relations of the agent with its aphid vector. The morphology of the agent has not been described.
EPPO computer code: RYLCXX
EPPO A1 list: No. 31
EU Annex designation: I/A1

HOSTS

Apparently confined in nature to *Rubus* spp. such as *R. allegheniensis*, *R. idaeus*, *R. idaeus* var. *strigosus*, *R. neglectus*, *R. occidentalis* and *R. phoenicolasius*. These are the main natural hosts but other *Rubus* spp. are minor natural hosts (Stace-Smith & Converse, 1987).

In the EPPO region all cultivated *Rubus* spp. should be regarded as potential hosts.

GEOGRAPHICAL DISTRIBUTION

EPPO region: Absent.
North America: Canada (British Columbia to Manitoba, Prince Edward Island) and USA, mostly in the north-eastern seaboard regions (Connecticut, Massachusetts, Maine, New Hampshire, New York, Rhode Island, Vermont); also Idaho, Michigan, Montana, Ohio, but absent from Pacific coastal regions (Stace-Smith & Converse, 1987).
EU: Absent.

BIOLOGY

Although the alpha and beta forms are described as strains of the same agent, the alpha strain does not protect plants from infection with the beta strain (Bennett, 1930), suggesting that the two forms may not be closely related. Movement of the agent within *Rubus* plants is relatively slow and seems to be confined to phloem tissue (Bennett, 1927).

The agent is transmitted in a persistent manner by its aphid vectors (Stace-Smith & Converse, 1987). Studies with the alpha strain indicate that *Aphis rubicola* requires a minimum acquisition access feed of 2 h to acquire the agent from infected plants. Once acquired, the aphid is able to transmit the agent for many days, probably for the duration of its life. All life stages of the aphid can transmit but the agent is not transmitted through the egg. Nevertheless, *A. rubicola* is reported to be a somewhat inefficient vector (Bolton, 1970).

DETECTION AND IDENTIFICATION

Symptoms

In the year of infection, most infected *Rubus* plants may show no symptoms or only a mild down-curling of the tip leaves. However, in the year after infection, leaves on both primocanes and fruiting canes are markedly curled downwards and may be yellowed. New canes are stunted and branched, and the plants develop a rosetted appearance. Fruit are small and are usually misshapen and crumbly.

Morphology

No causal agent has been described but many of its features given below suggest it is a virus (Stace-Smith & Converse, 1987). Two forms of the agent termed alpha and beta, respectively, are described (Bennett, 1927); the alpha form infects red and purple raspberry and the beta form, in addition, infects black raspberry.

Detection and inspection methods

The agent is transmitted by the small raspberry aphid, *Aphis rubicola* (present in North America) and *A. idaei* (present in Europe). Aphid transmission to the sensitive indicator species *Rubus phoenicolasius* induces pronounced leaf curl symptoms within 10 days. However, results from graft-inoculation tests usually take longer. The characteristic symptoms of the disease can often be diagnosed directly in infected raspberry and blackberry but such symptoms should be distinguished from leaf curling induced by the feeding of large numbers of non-viruliferous *A. idaei* colonizing raspberry and *A. rubifolii* colonizing blackberry. Symptoms should also be distinguished from raspberry leaf curl induced in some *Rubus idaeus* cultivars by infection with the European nematode-transmitted viruses, raspberry ringspot nepovirus and tomato black ring nepovirus. Unlike these two nepoviruses, the agent of raspberry leaf curl is not transmissible by inoculation of *Rubus* sap to herbaceous virus indicator plants (Stace-Smith & Converse, 1987). Test methods have been summarized in EPPO's quarantine procedure for *Rubus* viruses (OEPP/EPPO, 1991).

MEANS OF MOVEMENT AND DISPERSAL

In North America, the only geographical area where the agent occurs naturally, spread to raspberry is by the small raspberry aphid *A. rubicola*. Although no experimental data exist, it is assumed that in North America the small blackberry aphid, *A. rubifolii*, may transmit the agent to blackberry as blackberry is not a host for *A. rubicola*. The European aphid *A. idaei* has been shown experimentally to be a vector of the alpha strain. The agent is probably not transmitted through seed or pollen. In addition to natural spread by infective aphids, the agent can also be spread through the distribution of planting material derived by vegetative propagation from infected plants.

PEST SIGNIFICANCE

Economic impact

In North America, incidence of raspberry leaf curl causes major yield losses of up to 40% as well as decreasing fruit quality. Infected plants are greatly weakened and, after a few years, many suffer severe winter injury and die. About 8% of fields surveyed in Quebec (Canada) were infected (Caron *et al*., 1977). Although most prevalent in north-east USA and Canada, the incidence there of the disease organism seems to have declined somewhat since 1980.

Control
Spread in crops can be decreased by application of insecticides and by roguing infected plants.

Phytosanitary risk
RLCV is listed as an A1 quarantine pest by EPPO (OEPP/EPPO, 1978). Its natural aphid vectors, *A. rubicola* and *A. rubifolii*, are not established in the EPPO region. However, the experimental vector, *A. idaei*, is common on raspberry in the EPPO region and could result in widespread dissemination of the agent should infected plants or infective vector aphids be imported and established in the region.

PHYTOSANITARY MEASURES

According to the EPPO Specific Quarantine Requirements for this virus (OEPP/EPPO, 1990), countries may prohibit importation of plants for planting of *Rubus* from non-EPPO countries. They should, however, require that such *Rubus* plants were grown in a field found free from RLCV during the last growing season.

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