

Mini data sheet on *Pseudomonas syringae* pv. *actinidiae*

Pseudomonas syringae pv. *actinidiae* was added to the EPPO A2 List in 2012. A full datasheet will be prepared, in the meantime you can view here the data which was previously available from the EPPO Alert List (added to the EPPO Alert List in 2009-deleted in 2012).

Pseudomonas syringae pv. *actinidiae* (bacterial canker of kiwifruit)

Why: Bacterial canker of kiwifruit caused by *Pseudomonas syringae* pv. *actinidiae* was first described in Japan in the 1980s, causing damage in *Actinidia* orchards. The disease was then observed in Korea where it also caused economic losses. In the EPPO region, the disease was first noticed in Central Italy in 1992 where it remained sporadic and with a low incidence during 15 years. But in 2007/2008 economic losses started to be observed particularly in the Lazio region and the possible spread of the disease to other kiwifruit producing regions in Italy began to raise concerns. Because *P. syringae* pv. *actinidiae* is currently emerging in the Mediterranean region, the EPPO Secretariat decided to add it to the EPPO Alert List.

Where: Although *P. syringae* pv. *actinidiae* was originally described in Japan, its area of origin has not been ascertained. For example, comparison studies between Korean and Japanese strains showed that they have different phylogenetic origins.

EPPO region: France (first found in July 2010 in Rhône-Alpes and Aquitaine, then in Corse, Midi-Pyrénées, Pays de Loire, and Poitou-Charentes), Italy (Calabria, Campania, Emilia-Romagna, Friuli-Venezia Giulia, Lazio, Piemonte, Veneto), Portugal (in March 2010 in Entre Douro-e-Minho province), Spain (in 2011 in 2 orchards of Galicia), Switzerland (first found in June 2011 in 1 orchard, Valais canton, under eradication), Turkey (first found in 2009/2010 in Rize province).

Asia: China (Anhui, Shaanxi, Sichuan), Japan (Hokkaido (on *Actinidia arguta*), Honshu, Kyushu, Shikoku), Korea Republic.

Data is lacking on the situation of *P. syringae* pv. *actinidiae* in China (where *Actinidia* species originate from); only a small number of records were reported from the province of Anhui. In the literature, several papers mention the presence of *P. syringae* pv. *actinidiae* in Iran, but the original publication only refers to *P. syringae* pv. *syringae*.

South America: Chile (in 2010 in O'Higgins and Maule regions).

Oceania: Australia (Victoria), New Zealand. It was first detected in New Zealand in 2010 in several kiwifruit orchards of the North Island (mainly in the regions of Hawke's Bay and Bay of Plenty) and in the South Island (Golden Bay, Motueka). In 2011, it continued to spread in New Zealand and was found for the first time in Australia.

On which plants: *Actinidia* species: *A. deliciosa*, *A. chinensis*, *A. arguta*, and *A. kolomikta* (there is no data on the susceptibility of other *Actinidia* species). Observations made in Italy suggested that damage is more severe on yellow fleshed kiwifruit (i.e. *A. chinensis* cvs. 'Hort 16A' and 'Jin Tao') than on the more widely grown green fleshed cultivar (i.e. *A. deliciosa* cv. 'Hayward'). In France, both yellow and green cultivars are attacked but as in Italy, damage is more severe on yellow cultivars. Male and female vines are attacked in the same way but young vines (less than 5 years old) are more susceptible to the disease.

Damage: *P. syringae* pv. *actinidiae* causes brown discolouration of buds, dark brown angular spots surrounded by yellow haloes on leaves, cankers with white to reddish (oxydation) exudate on twigs and trunks, fruit collapse, wilting and eventually plant mortality. The most conspicuous symptom is the red-rusty exudation which covers bark tissues on trunks and twigs. Removal of the bark usually reveals a brown discoloration of the external vascular tissues and reddening of the tissues beneath lenticels.

Transmission: Data is lacking on the epidemiology of the disease. It has been observed that the pathogen is active between 10 to 20 °C and is limited by temperatures above 25°C. Inoculation studies showed that the bacterium can infect the plant through natural apertures (stomata, lenticels) and wounds. Symptoms are usually expressed during spring and autumn when climatic conditions are favourable to the disease (cool temperatures, persistent rains, high humidity), but the occurrence of latent infections cannot be excluded. It is suspected that the bacterium is spread by heavy rainfalls, strong winds, animals and humans. Over long distances, trade of infected

planting material can spread the disease. It has also been hypothesized that infected pollen could spread the disease but this has not been demonstrated.

Pathway: Plants for planting of *Actinidia* spp. (infected fruits cannot be totally excluded but seem very unlikely), contaminated pollen?

Possible risks: Kiwifruits (*A. deliciosa* and *A. chinensis*) are economically important crops which are grown in several EPPO countries (by order of importance in production: Italy, Greece, France, Portugal and Spain). In Japan and Korea, bacterial canker has become one of the most serious limiting factors for cultivating kiwifruit. In Italy, it is estimated that the economic losses (including impact on trade) due to *P. syringae* pv. *actinidiae* have reached 2 million euros. Control strategies are being developed against the disease and include preventive measures (e.g. good fertilization, avoidance of overhead irrigation, disinfection of pruning equipment, pruning and destruction of diseased parts), regular inspections of the orchards for disease symptoms, and the use of healthy planting material. Chemical control has been implemented in Japan (e.g. with copper compounds and antibiotics), but this has led to the appearance of resistant strains. It seems desirable to better understand the biology of *P. syringae* pv. *actinidiae* in order to develop adequate control strategies in areas where it occurs, and to avoid its further spread in Europe.

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